
PROJECT MANUAL

PARENTS AND FRIENDS INC **RESIDENTIAL CARE FACILITY FOR THE ELDERLY**

350 CYPRESS STREET
FORT BRAGG, CA 95437
APN 018-090-12



ISSUE DATE: 2/17/2022
K.Boodjeh Architects

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PARENTS AND FRIENDS INC.

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PARENTS AND FRIENDS INC.

NOTICE INVITING BIDS

INVITATION TO BIDDERS

FROM:

The Owner (hereinafter referred to as Owner)
Parents and Friends Inc.
306 Redwood Ave.
Fort Bragg, CA 95437
Phone: 707-964-4940

And the Architect (hereinafter referred to as Architect)
K. Boodjeh Architects
531 3rd Street
Eureka, CA 95501
Phone: (707) 798-6107

DATE: February 17, 2022

TO: Potential Bidders

NOTICE IS HEREBY GIVEN that sealed bids are invited by Parents and Friends Inc. for the performance of all the work and the furnishing of all the labor, materials, supplies, tools, and equipment for the following project:

PARENTS AND FRIENDS CYPRESS STREET
RESIDENTIAL CARE FACILITY FOR THE ELDERLY

350 Cypress Street
Fort Bragg, CA 95437
A.P.N. 018-090-12

This Notice Inviting Bids is issued pursuant to the Contract Documents, prepared by K. Boodjeh Architects, Construction Drawings (Plans) dated February 17, 2022, and Project Manual (Specifications) dated February 17, 2022. The building permit will be issued after the selection of the Contractor and approvals of Mendocino County Air Quality Management District.

SECURING DOCUMENTS: A digital copy of the Plans, Specifications, and other Contract Documents will be provided through the City of Fort Bragg (Project Administrator). Please contact Natalie McLaughlin by email at nmclaughlin@shn-engr.com. Plans and Specifications and other Contract Document forms will be available for examination and viewing at City Hall, 416 N. Franklin Street, Fort Bragg, CA 95437. The Bid documents will be available on February 17, 2022.

PROJECT COST ESTIMATE: Opinion of Probable Costs is approximately \$3,130,740.

RELATED DOCUMENTS: The following Instructions to Bidders, Agreement, and General Conditions will be used to execute the contract:

CONTRACT EXECUTION: The Contract must be executed within 10 days of Notice of Award.

PARENTS AND FRIENDS INC.

SITE AVAILABILITY: The Site will be made available by appointment between Monday, February 21, 2022, and Wednesday, February 23, 2022, at the Project site, 350 Cypress Street, Fort Bragg, California. Contact Rick Moon RMOON@PARENTSANDFRIENDS.ORG to schedule a site visit. A site visit is not mandatory. Before submitting a bid for the work, it is recommended that the Bidder inspect the site and inform themselves as to the conditions under which he will be obligated to execute the work. 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, Contract Documents, Plans, Specifications, Instructions to Bidders, and the forms appended hereto and made a part hereof.

QUESTIONS & CLARIFICATIONS: In order to avoid any misinterpretation or misrepresentation between the Bidder, the Architect, and the Owner as regards the plans and specifications for the Project, neither the Owner 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 Morgan Ellig, 531 3rd Street, Eureka, CA, 95501, email: morgan@kboodjeh.com. Any responses to written Bidder inquiries will be at the full discretion of the Architect, and any responses will be in writing in the form of an Addendum to these Contract Documents, which will be sent to all Bidders. All questions must be submitted on or before 5PM Pacific Standard Time February 28, 2022.

PROJECT ADMINISTRATION & FUNDING: The project is financed with public funds through a program of the City of Fort Bragg. The City of Fort Bragg is the Project Administrator. The City of Fort Bragg is not an agent of the Owner, Architect, or Contractor, but is tasked with the proper administration of public funds. The Project is funded by State Community Development Block Grant (CDBG) funds, which carry with them both Federal and State requirements.

CONTENTS OF THE BID ENVELOPE: Each Bid shall be submitted on the forms furnished within the Bid Documents. All forms must be completed.

REQUIRED BID FORM: All bidders must submit bids on Section 00 41 00, the "Bid Form." The Owner will reject as non-responsive any bid not submitted on the required form. Bids must be complete. Bidders must complete all bid items and supply all information required by the bidding documents and specifications. The Owner 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. The Owner 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 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 Owner 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 be stated and be signed by each venturer.

PARENTS AND FRIENDS INC.

BID SECURITY: Each Bid shall be accompanied by 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.

BIDDER QUALIFICATIONS: 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. 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.

INSURANCE: It is 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.

RECEIPT OF BIDS: Each Bid must be contained in a sealed envelope as set forth in said Bid Documents, and addressed to June Lemos, City Clerk, 416 N. Franklin Street, Fort Bragg, California 95437 at or before 2:00 P.M., Pacific Standard Time, on March 11, 2022. The City Clerk will stamp bids with the date and time of receipt. Bids shall be deemed to include the written responses from the Bidder to any questions or requests for information that the Architect made as part of the bid evaluation process after submission of the bid. Telephone and telefax proposals will not be accepted. The Owner will reject all bids received after the specified time and will return such bids to bidders unopened.

BID OPENING: All Bids will be publicly opened, via a virtual bid opening, link below, and summary amounts read aloud. The City Clerk, whose duty it is to open the Bids, will open Bids that have been received before the deadline. Bidders or their authorized agents may be present. After the opening of bids, the Architect will review all bids for accuracy and reserves the right to correct obvious errors.

You are invited to a Zoom webinar.

When: Mar 11, 2022 02:00 PM Pacific Time (US and Canada)

Topic: Parents & Friends Cypress Street RCFE Project Bid Opening

Please click the link below to join the webinar:

<https://us06web.zoom.us/j/86163751690>

Or Telephone:

US: +1 720 707 2699 or +1 253 215 8782

Webinar ID: 861 6375 1690

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

PARENTS AND FRIENDS INC.

RESERVATION OF RIGHTS: The Owner specifically reserves the right, in its sole discretion, to reject any or all bids, or re-bid, or waive minor irregularities from bid requirements. If no bids are received, the Owner reserves the right to identify interested contractor(s) and negotiate directly without re-bidding. No Bid shall be withdrawn for a period of ninety (90) calendar days subsequent to the opening of Bids without the consent of the Owner.

SECURITIES IN LIEU OF RETENTION: Public Contract Code Section 22300 gives the Contractor the option to deposit securities with an escrow agent as a substitute for retention earnings to be withheld by the Owner. 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.

EQUAL OPPORTUNITY EMPLOYMENT: 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.

MONITORING BY THE DEPARTMENT OF INDUSTRIAL RELATIONS: This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations. 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 this chapter unless currently registered and qualified to perform public work pursuant to Section 1725.5. It is not a violation of this section 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.

PREVAILING WAGE: 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. Copies of the general prevailing rates of per diem wages for each craft, classification, or type of worker needed to execute the Contract, as determined by the Director of the State of California Department of Industrial Relations, are included in the Bidding Documents, may be obtained from the California Department of Industrial Relations website (<http://www.dir.ca.gov/OPRL/dprewagedetermination.htm>) and are deemed included in the Bidding Documents. Upon request, City will make available copies to any interested party. Also, the successful Bidder shall post the applicable prevailing wage rates at the Site.

CALIFORNIA FAIR EMPLOYMENT & HOUSING ACT: 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 12900)

PARENTS AND FRIENDS INC.

SECTION 002213 – SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

1. PROJECT DESCRIPTION

- A. Project Location:
350 Cypress Street
Fort Bragg, CA 95437
- B. Existing Building: The site has an existing building that is not part of this project. No work do be done in the existing building or to the exterior of the existing building
- C. Proposed Site Work: Exterior work includes a reconfiguration of the existing parking lot. New parking and accessible parking spaces will be added between the new building complex and the existing building. Drainage improvements, Site utilities, new propane tanks, and waste & recycling enclosures. There will be sidewalks and decorative stamped concrete connecting the new buildings to each other and the new parking lot. The site will have new landscaping, site lighting, fencing, a built in BBQ, and a birdbath.
- D. Proposed Building Work: The Project will consist of (2) residential structures each containing (4) bedrooms, a residential kitchen, dining, living, and laundry space along w/(3) full bathrooms and an office. the bedrooms are to serve clients, permanently, licensed as a 24-hour care facility. clients may be classified as ambulatory, non-ambulatory, or bedridden.

2. TIME FOR COMPLETION

- A. The project must be completed by January 31,2023.

3. LIQUIDATED DAMAGES

- A. As actual damages for any delay in completion are impossible of determination, the Contractor and their sureties shall be liable for and shall pay to the Owner the sum of \$500 as fixed, agreed and liquidated damages for each calendar day of delay beyond the contract completion date until the work is completed and accepted.

4. SUBSTITUTIONS

- A. All pre-bid 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 PRE-BID SUBSTITUTION REQUEST FORM - SECTION 00 43 25, see Section 00 72 00, GC 27, B.
- 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."

PARENTS AND FRIENDS INC.

5. COMMUNICATIONS

- A. All notices, requests, instructions, approvals, proposals, and claims must be in writing.

6. MINIMUM RATES OF PAY

- A. A schedule of the minimum rates of pay applicable to this Contract may be found at the State of California Department of Industrial Relations Director's General Prevailing Wage Determinations (<https://www.dir.ca.gov/OPRL/DPreWageDetermination.htm>), and shall be made available to any interested party on request.

7. 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 Architect shall be consulted with regard to locations.
- C. Upon completion of the project, 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 Architect.

8. PERFORMANCE AND PAYMENT BONDS

- 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.

9. 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 house of use. This does not preclude use of mechanical equipment, i.e. jack hammers or power-driven fasteners.
 - 2. The Architect 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 Architect 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 the Architect.

PARENTS AND FRIENDS INC.

- 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.

10. SECURITY SYSTEM

- A. Security System to be provided by Advanced Security in Eureka, CA.

11. FURNISHINGS & APPLIANCES

- A. The Owner will provide and install Furnishings and Appliances unless otherwise indicated in Construction Documents. The Contractor does not need to include Furnishings and Appliances in their bid unless otherwise indicated in Construction Documents.

12. TELEPHONE AND DATA SYSTEM

- A. AT&T is the phone system provider. The Owner will install the phone and data system. Each work station has 2 data ports (one for phone, one for computer). Contractor to provide CAT 6 cables.

13. MENDOCINO COUNTY DEPARTMENT OF HEALTH AND HUMAN SERVICES
PRIVACY AND SECURITY POLICY

- A. Anyone working on the project site must read, fill out, and file the example form in Appendix C.

14. PRE-CONSTRUCTION MEETING

- A. A Pre-Construction Meeting must be scheduled with the Contractor, Architect, Owner, and Tenant after the Owner's Notice to Proceed and before Construction begins.

END OF SECTION 002213

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SECTION 004100 - BID FORM

TO
PARENTS AND FRIENDS INC.

CONSTRUCTION OF PARENTS AND FRIENDS INC. RESIDENTIAL CARE FACILITY FOR
THE ELDERLY PROJECT

Name of Bidder: _____
(Note: Name must be exactly as it appears on Contractor's License.)

Business Address: _____

Telephone Number: _____

Residence Address: _____

The work to be done shall be constructed in accordance with the Contract Documents, prepared by K. Boodjeh Architects, Construction Drawings (Plans) dated February 17, 2022 and Project Manual (Specifications) dated February 17, 2022.

Bids are submitted for the entire work. The Bidder shall set forth for the Base Bid and each Alternate, if any, in clearly legible figures, a written Lump Sum Bid price and a numeric Lump Sum Bid price.

In case of a discrepancy between the two notated prices, the written price shall prevail, unless, however, if the amount set forth in writing is ambiguous, unintelligible or uncertain for any cause, or is omitted, then the amount set forth in the numeric column for the item shall prevail.

The undersigned, as Bidder, declares that the only persons or parties interested in this proposal as principals are those named herein; that this proposal is made without collusion with any other person, firm, or corporation; that Bidder has carefully examined the location of the proposed work, the annexed proposed form of contract, and the plans therein referred to; and proposes and agrees if this proposal is accepted, that Bidder will contract with Parents & Friends Inc. in the form of the copy of the contract annexed hereto, to provide all necessary machinery, tools, apparatus and other means of construction, and to do all the work and furnish all the material specified in the contract, in the manner and time therein prescribed, and according to the requirements of the Architect as therein set forth, and that he will take in full payment therefor the following item prices to wit:

Receipt and compliance with the following Addenda to the Contract Documents is acknowledged:

1. Addendum No. _____ Dated _____
2. Addendum No. _____ Dated _____
3. Addendum No. _____ Dated _____

PARENTS AND FRIENDS INC.

4. Addendum No.____ Dated_____

5. Addendum No.____ Dated_____

I, _____, as an agent for_____

_____, declare under penalty of perjury under the laws of the State of California, that the information contained in this Bid is true and correct.

Executed at _____, California, on _____, 2022.

THE UNDERSIGNED, as Bidder, proposes the following:

BASE BID:

To furnish and complete the entire work as shown on the drawings and listed in the specifications, including required contract bonds and insurance, without additions or subtractions on account of specified alternates, for the sum of:

Lump Sum Base Bid:	
_____	\$ _____
Total Amount in Words	Total

EXTERIOR VS INTERIOR WORK:

For the Owner's reference, please break the Base Bid (Bid Schedule) into two categories, Exterior and Interior work:

Exterior Work:

_____	\$ _____
Total Amount in Words	Total

Interior Work:

_____	\$ _____
Total Amount in Words	Total

BID ALTERNATES

The Owner shall have the right to accept alternates in any order or combination, unless otherwise specifically provided in the bidding documents. please provide separate pricing for these deductive alternates (see Project Manual Section 004324, Alternates):

1. (Alternate - complete site work and only Building #1)

\$ _____

END OF SECTION 004100

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PARENTS AND FRIENDS INC.

SECTION 00 43 23 - ALTERNATES

1. GENERAL

1. SUMMARY

A. Related Documents:

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

B. Section Includes:

1. Administrative and procedural requirements for alternates.

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.

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 listing of Bid Alternates is included on the Bid Form. Specification sections referenced in the Schedule contain requirements for materials necessary to achieve the Work described under each alternate.

1. Include as part of each alternate, miscellaneous devices, appurtenances and similar items incidental to or required for a complete installation whether or not mentioned as part of the alternate.
2. State on the Bid Form amounts that will be ADDED to or DEDUCTED from the Base Bid amount for the work described in the listing of Bid Alternates included on the Bid Form.

END OF SECTION 00 43 23

PARENTS AND FRIENDS INC.

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PARENTS AND FRIENDS INC.

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 004325

PARENTS AND FRIENDS INC.

SECTION 00 45 19 - NONCOLLUSION AFFIDAVIT

PARENTS AND FRIENDS INC.

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 00 45 19

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PARENTS AND FRIENDS INC.

SECTION 00 45 26 – WORKERS' COMPENSATION CERTIFICATE

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 selfinsure 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 selfinsure 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 selfinsurance 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

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 00 45 26

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SECTION 00 45 46 – RESPONSIBILITY / NONRESPONSIBILITY

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)

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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.

END OF SECTION 00 45 46

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SECTION 00 45 47 - PUBLIC CONTRACT CODE SECTION 10232 STATEMENT

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

Date

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

END OF SECTION 00 45 47

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SECTION 00 45 48 - DEBARMENT AND SUSPENSION CERTIFICATION

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:

1. is not currently under suspension, debarment, voluntary exclusion, or determination of ineligibility by any Federal, State or local agency;
2. has not been suspended, debarred, voluntarily excluded or determined ineligible by any Federal, State or local agency within the past 3 years;
3. does not have a proposed debarment pending; and
4. 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.

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

Date: _____

END OF SECTION 00 45 48

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ATTACHMENT– CONTRACT

CONTRACT CHECK LIST

Complete, accurate, executed copies of the following documents must be submitted to the City of Fort Bragg in accordance with the bid package issued by the City for the Parents & Friends inc. Project, within ten (10) working days of receiving written notice of award of the project. The bidder’s security of any successful bidder that fails to do so will be forfeited to the City.

_____ Contract Check List

_____ Contract, Part 1

_____ Contract, Part 2 – General Provisions

_____ Contract, Part 3 – Special Provisions

_____ Required Contract Provisions for CDBG-Aided Construction Contracts _____ Copies of Subcontractors Contracts

_____ Performance Bond

_____ Payment Bond

_____ Maintenance Bond

_____ Certificates of Insurance and Endorsements

_____ Escrow for Deposit Agreement, if applicable

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PARENTS AND FRIENDS INC.

CONTRACT, PART 1

Parents & Friends Inc., 306 Redwood Avenue, Fort Bragg, CA 95437 ("Owner") enters into this Contract, dated _____, for reference purposes only, with _____ ("Contractor").

RECITALS

- **NOTICE INVITING BIDS.** The Owner gave notice inviting bids to be submitted by March 11, 2022, for the Parents and Friends Inc. Project by published notice and/or posting in accordance with California Public Contract Code Section 20164 and other applicable law.
- **BID OPENING.** On March 11, 2022, Owner representatives opened the bids for the Parents & Friends Project and read the bids aloud.
- **PROJECT AWARD.** On Monday, March 21, 2022, the Parents & Friends Inc. awarded the Parents & Friends Project to the Contractor and directed Owner staff to send the Contractor written notice of award of the project. Parents & Friends Inc. conditioned award of the project on the Contractor's providing executed copies of all documents specified in the contract check list included in the bid package within ten (10) working days of receiving written notice of award of the project.
- **REQUIRED DOCUMENTS.** The Contractor has provided the Owner executed copies of all documents specified in the contract check list included in the bid package within ten (10) working days of receiving written notice of award.

CONTRACT TERMS

The Owner and the Contractor agree as follows:

1. **THE WORK.** The Contractor shall furnish all equipment, tools, apparatus, facilities, material labor, and skill necessary to perform and complete in a good and workmanlike manner the Parents & Friends inc. Project ("Work") as shown in the Technical Specifications and Project Plans in accordance with the Contract Documents and applicable law.
2. **LOCATION OF WORK.** The Work will be performed at the following location 350 Cypress Street Fort Bragg, CA 95437 APN 018-090-12
3. **TIME FOR COMPLETION.** The Contractor must complete the Work in accordance with the Contract Documents by January 31, 2023 ("Time for Completion").
4. **REMEDIES FOR FAILURE TO TIMELY COMPLETE THE WORK.** If the Contractor fails to fully perform the Work in accordance with the Contract Documents by the Time for Completion, as such time may be amended by change order or other modification to

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this Contract in accordance with its terms, and/or if the Contractor fails, by the Time for Completion, to fully perform all of the Contractor's obligations under this Contract that have accrued by the Time for Completion, the Contractor will become liable to the Owner for all resulting loss and damage in accordance with the Contract Documents and applicable law. The Owner's remedies for the Contractor's failure to perform include, but are not limited to, assessment of liquidated damages of \$500 per day in accordance with California Government Code Section 53069.85 and the Contract Documents, and/or obtaining or providing for substitute performance in accordance with the Contract Documents.

5. **CONTRACT PRICE AND PAYMENT.** As full compensation in consideration of completion of the Work in accordance with the Contract Documents and in consideration of the fulfillment of all of the Contractor's obligations under the Contract Documents, the Owner will pay the Contractor in lawful money of the United States the total price of Dollars (\$_____) (the "Contract Price") as specified in the Contractor's completed Bid Form dated March 11, 2022, and attached to and incorporated in this Contract. Payment to the Contractor under this Contract will be for Work actually performed in accordance with the Contract Documents and will be made in accordance with the requirements of the Contract Documents and applicable law. The Owner will have no obligation to pay the Contractor any amount in excess of the Contract Price unless this Contract is first modified in accordance with its terms. The Owner's obligation to pay the Contractor under this Contract is subject to and may be offset by charges that may apply to the Contractor under this Contract. Such charges include but are not limited to, charges for liquidated damages and/or substitute performance in accordance with the Contract Documents.

5. **PREVAILING WAGES.** In accordance with California Labor Code Section 1771, not less than the general prevailing rate of per diem wages for work of a similar character in the locality in which the Work is to be performed, and not less than the general prevailing rate of per diem wages for holiday and overtime work fixed as provided in the California Labor Code must be paid to all workers engaged in performing the Work. In accordance with California Labor Code Section 1770 and following, the Director of Industrial Relations has determined the general prevailing wage per diem rates for the locality in which the Work is to be performed. In accordance with California Labor Code Section 1773, the Owner has obtained the general prevailing rate of per diem wages and the general rate for holiday and overtime work in the locality in which the Work is to be performed for each craft, classification or type of worker needed to perform the project. In accordance with California Labor Code Section 1773.2, copies of the prevailing rate of per diem wages are on file at the City Public Works Department and will be made available on request. Throughout the performance of the Work the Contractor must comply with all provisions of the Contract Documents and all applicable laws and regulations that apply to wages earned in performance of the Work. The project is being paid by State Community Development Block Grant (CDBG) funds, which carry with them both Federal and State requirements, including Federal Prevailing Wage. Each worker classification must be compared for its State Prevailing Wage and its Federal Prevailing Wage, including fringe benefits for each. The higher of the two must be paid.

7. **THE CONTRACT DOCUMENTS.** This Contract consists of the following documents ("Contract Documents"), all of which are incorporated into and made a part of this Contract as if set forth in full. In the event of a conflict between or among the Contract Documents, precedence will be in the following order:

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Volume1:

- 7.1 This Part 1 of the Contract and change orders and other amendments to this Contract signed by authorized representatives of the Owner and the Contractor.
- 7.2 The General Provisions, Part 2 of the Contract, and change orders and other amendments to the General Provisions signed by authorized representatives of the Owner and the Contractor.
- 7.3 The Special Provisions, Part 3 of the Contract, addenda to the Special Provisions signed by authorized representatives of the Owner and issued prior to bid opening, Equal Product Proposals accepted by the Owner and signed by authorized representatives prior to bid opening, and change orders and other amendments to the Special Provisions signed by authorized representatives of the Owner and the Contractor.

Volume 3:

- 7.4 The Technical Specifications, addenda to the Technical Specifications signed by authorized representatives of the Owner and issued prior to bid opening, Equal Product Proposals accepted by the Owner and signed by authorized Owner representatives prior to bid opening, and change orders and other amendments to the Technical Specifications signed by authorized representatives of the Owner and the Contractor.
- 7.5 The Project Plans, addenda to the Project Plans signed by authorized representatives of the Owner and issued prior to bid opening, Equal Product Proposals accepted by the Owner and signed by authorized Owner representatives prior to bid opening, and change orders and other amendments to the Project Plans signed by authorized representatives of the Owner and the Contractor.

Volume 4:

7.6 Federal and State Prevailing Wage Determinations,

Volume 2:

- 7.7 Notice Inviting Bids
- 7.8 Instructions to Bidders
- 7.9 The successful bidder's completed Proposal Cover Page and Bid Schedule
- 7.10 The successful bidder's completed Contractor License Information
- 7.11 The successful bidder's completed List of Proposed Subcontractors

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- 7.12 The successful bidder's Workers Compensation Insurance Certification
 - 7.13 The successful bidder's completed Non-collusion Affidavit
 - 7.14 The successful bidder's Debarment Certification
 - 7.15 The successful bidder's completed Certificates of Insurance and Endorsements
 - 7.16 The successful bidder's executed Performance Bond
 - 7.17 The successful bidder's executed Payment Bond
 - 7.18 The Maintenance Bond form included in the bid package that the Contractor must execute prior to release of final payment under the Contract
 - 7.19 The successful bidder's Qualification Statement, if any
 - 7.20 The successful bidder's signed Signature Form
8. PROVISIONS INCORPORATED BY REFERENCE. Provisions or parts of provisions that are incorporated by reference and not set forth at length in any of the Contract Documents will only form a part of this Contract to the extent the Contract Documents expressly make such provisions or parts of provisions a part of this Contract. For example, published public works agreement provisions, such as those of the State of California Department of Transportation Standard Specifications (known as the Standard Specifications) are only a part of this Contract to the extent expressly incorporated in the Contract by section number. When such published provisions are made a part of this Contract, references in the published provisions to other entities, such as the State, the Agency, or similar references, will be deemed references to the Owner as the context of this Contract may require.
9. INTERPRETATION OF CONTRACT DOCUMENTS. Any question concerning the intent or meaning of any provision of the Contract Documents, including, but not limited to, the Technical Specifications or Project Plans, must be submitted to the Project Manager-Grants, or his/her designee, for issuance of an interpretation and/or decision by the authorized Project Manager-Grants in accordance with the requirements of the Contract Documents. Interpretations or decisions by any other person concerning the Contract Documents will not be binding on the Owner. The decision of the Project Manager-Grants, or his/her designee, shall be final.
10. ASSIGNMENT PROHIBITED. The Contractor may not assign part or all of this Contract, or any monies due or to become due under this Contract, or any other right or interest of

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the Contractor under this Contract, or delegate any obligation or duty of the Contractor under this Contract without the prior written approval of an official authorized to bind the Owner and an authorized representative of Contractor's surety or sureties. Any such purported assignment or delegation without such written approval on behalf of the Owner and the Contractor's sureties will be void and a material breach of this Contract subject to all available remedies under this Contract and at law and equity.

11. CERTIFICATION RE CONTRACTOR'S LICENSE. By signing this Contract the Contractor certifies that the Contractor holds a valid Type A license issued by the California State Contractors Licensing Board, and that the Contractor understands that failure to maintain its license in good standing throughout the performance of the Work may result in discipline and/or other penalties pursuant to the California Business and Professions Code, and may constitute a material breach of this Contract subject to all available remedies under this Contract and at law and equity.
12. SEVERABILITY. If any term or provision or portion of a term or provision of this Contract is declared invalid or unenforceable by any court of lawful jurisdiction, then the remaining terms and provisions or portions of terms or provisions will not be affected thereby and will remain in full force and effect.

Executed on _____, 2022 by _____

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CONTRACT, PART 2 GENERAL PROVISIONS

The following terms as used in any agreement of which these General Provisions are a part are defined as follows:

- 1.1 Architect or Engineer: The person or persons so specified on the title sheet of the Technical Specifications and/or Project Plans.
- 1.2 ASTM: American Society for Testing and Materials, latest edition.
- 1.3 Bid Package: All of the documents listed as comprising the entire Bid Package as specified in the Instructions to Bidders and representing the full set of documents made available to bidders on the Project.
- 1.4 Caltrans Standard Specifications: Caltrans manual entitled, "Standard Specifications, State of California, California State Transportation Agency, Department of Transportation", latest edition.
- 1.5 Caltrans Construction Manual: California Department of Transportation Construction manual, latest edition.
- 1.6 Owner: Parents & Friends Inc.
- 1.7 Construction Manager: The Owner's authorized representative for administration and overall management of the Project contract and Work. The Construction Manager is the official point of contact between the Owner, the Architect and/or Engineer, and the Contractor. The Construction Manager for this project shall be Engineering Technician Diane O'Connor.
- 1.8 Contract: The agreement between the Owner and Contractor concerning the Project, as evidenced by and comprised of the Contract Documents.
- 1.9 Contract Documents: All those documents listed in the Project agreement as comprising the entire agreement between the Owner and the Contractor.
- 1.10 Contractor: The successful bidder for the Project and party to the Project agreement with the Owner as specified in the Project agreement.
- 1.11 Days: Unless otherwise specified in the Contract Documents, days mean working days.
- 1.12 Project: The Parents & Friends Inc. Residential Care Facility of the Elderly project as described in the Technical Specifications and Project Plans.
- 1.13 Project Inspector: The party or parties charged by the Owner with inspecting the Work for compliance with the requirements of the Contract Documents and applicable laws and regulations. The Project Inspector acts under the direction of the Owner and shall coordinate with the Construction Manager and Architect as directed by the Owner in accordance with the Contract Documents.

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- 1.14 Project Plans: The primarily graphic detailed requirements concerning the Project contained in Volume 3 of the Bid Package and any addenda to the Project Plans signed by authorized Owner representatives and issued prior to bid opening, Equal Product Proposals accepted by the Owner and signed by authorized Owner representatives prior to bid opening, and change orders and other amendments to the Project Plans signed by authorized representatives of the Owner and the Contractor in accordance with the requirements of the Contract Documents.
- 1.15 Subcontractor: A person, firm or corporation that is obligated as a party to a contract with the Contractor to perform part of the Project work. For purposes of these General Provisions Subcontractors include, but are not limited to, those that are obligated as parties to a contract with the Contractor to specially fabricate and install a portion of the Project Work according to the Technical Specifications and/or Project Plans.
- 1.16 Technical Specifications: The detailed Project requirements contained in Volume 3 of the Bid Package and any addenda to the Technical Specifications signed by authorized Owner representatives and issued prior to bid opening, Equal Product Proposals accepted by the Owner and signed by authorized Owner representatives prior to bid opening, and change orders and other amendments to the Technical Specifications signed by authorized representatives of the Owner and the Contractor in accordance with the requirements of the Contract Documents.
- 1.17 Work: The furnishing of all equipment, tools, apparatus, facilities, material, labor and skill necessary to perform and complete in a good and workmanlike manner the Project as shown in the Technical Specifications and Project Plans in accordance with the Contract Documents and applicable law.
- 1.18 Written Notice: Will be deemed to have been duly served for purposes of these General Provisions and any agreement of which they are a part if delivered in person to the individual or to a member of the firm or to any office of the corporation for whom the notice is intended, or if sent by registered or certified mail to the last known business address known to the party giving notice. Unless otherwise specified in the Contract Documents, the last known address of the Contractor shall be that listed in the Contractor's completed Proposal Cover Page and Bid Schedule.

2. SCOPE OF WORK

- 2.1 Documents Furnished by Owner. The Owner will furnish to the Contractor, free of charge, one (1) set of reproducible Project Plans and five (5) sets of prints of the Project Plans and Technical Specifications for execution of the Work. Throughout the performance of the Work the Contractor must keep one copy of the Project Plans and Technical Specifications in good order and available for review by the Construction Manager, the Engineer, the Architect, and any other Owner contractors or representatives.
- 2.2 Ownership of Documents Furnished by Owner. All documents furnished by the Owner, including, but not limited to, the Technical Specifications, Project Plans, and any copies, are the property of the Owner. Documents furnished by the Owner may not to be used on any other work. All documents furnished by the Owner must be returned to

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Owner upon completion of the Work.

- 2.3 Technical Specifications and Project Plans.
 - 2.3.1 The Technical Specifications and Project Plans are complementary and intended to mutually describe the Work necessary to complete the Project in accordance with the Contract Documents.
 - 2.3.2 In general, the Project Plans indicate dimensions, position and kind of construction, and the Technical Specifications indicate qualities and methods. Any Work indicated on the Project Plans and not mentioned in the Technical Specifications or vice versa must be furnished as though fully set forth in both. Work that is not particularly detailed, marked or specified shall be the same as similar Work that is detailed, marked or specified. The Contractor must furnish items necessary for the operation of equipment depicted in the Project Plans or specified in the Technical Specifications that are suitable to allow such equipment to function properly at no extra charge.
 - 2.3.3 The Contractor must notify the Construction Manager and the Engineer as soon as possible of any apparent errors or inconsistencies, including, but not limited to, typographical or notational errors in the Project Plans, Technical Specifications, and/or in work done by others affecting the Work. The Construction Manager will issue instructions concerning any such apparent errors or inconsistencies. If the Contractor proceeds with Work impacted by apparent errors or inconsistencies without instructions from the Construction Manager, the Contractor shall do so at its sole risk and shall have all of the obligations and the Owner shall have all of the rights and remedies specified in Section 11 concerning any resulting damage or defect.
 - 2.3.4 The General Provisions apply with equal force to all of the Work, including extra work authorized by the Construction Manager in accordance with the Contract Documents. The Contractor must submit any required shop diagrams and/or drawings by the times and in the quantities indicated in the Technical Specifications. Any such shop diagrams and/or drawings must show completely the Work to be done, expanding on the Project Plans concerning details not previously shown, field conditions and the condition of the Work. Architect or Engineer review of such shop diagrams and/or drawings will concern conformance with the requirements of the Contract Documents only. The Architect or Engineer assumes no responsibility for the correctness or accuracy of the dimensions or any other contents of any shop diagrams and/or drawings submitted by the Contractor. The Contractor must check all dimensions at the Work site. Shop diagrams and/or drawings must be clearly marked with the name of the Project and the name of the Contractor, subcontractor or supplier making the submittal, and must be stamped and signed by the Contractor and submitted under a signed transmittal letter from the Contractor certifying that all dimensions have been checked at the Work site. These requirements are mandatory. The Architect or Engineer will not review shop diagrams and/or drawings that do not satisfy these requirements. The Contractor will be responsible for any and all discrepancies between dimensions of the actual Project site and/or Work and those shown on shop diagram and/or drawings submitted by the Contractor, and for any other errors contained in or resulting from such shop diagrams and/or drawings, including, but not limited to, errors in material and/or equipment

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quantities and any resulting errors, delays or additional cost in the performance of the Work. The Contractor will have all of the obligations and the Owner will have all of the rights and remedies that are specified in Section 11 concerning any discrepancies or errors in shop diagrams and/or drawings submitted by the Contractor, and concerning any resulting errors, delays or additional costs in the performance of the Work.

3. CONTROL OF WORK AND MATERIAL

- 3.1 Construction Manager's Status. The Construction Manager will administer the Project in accordance with the Contract Documents. After execution of the agreement and issuance of the Notice to Proceed, all correspondence and/or instructions concerning the Project between the Contractor and/or Owner shall be forwarded through the Construction Manager. Except as otherwise provided in the Contract Documents, the Construction Manager will not be responsible for and will not have control or charge of construction means, methods, techniques, or procedures or for safety precautions in connection with the Work. The Construction Manager, however, will have authority to reject materials and/or workmanship that do not conform to the requirements of the Contract Documents. The Construction Manager will also have the authority to require inspection or testing of the Work.
- 3.2 Architect or Engineer's Status. The Architect or Engineer will advise the Construction Manager concerning decisions on all claims of the Contractor and all other matters relating to the execution and progress of the Work or the interpretation of the Contract Documents. The Architect or Engineer will also advise the Construction Manger concerning Work that does not conform to the Contract Documents. Whenever, in the Architect's or Engineer's opinion, it is necessary or advisable in accordance with the Contract Documents, the Architect or Engineer may recommend to the Construction Manager inspection or testing of the Work, whether or not such Work is then fabricated, installed or completed.

3.3 Inspection and Testing of Work and Material.

- 3.3.1 The Owner, the Construction Manager, the Architect or Engineer and their representatives will have access to the Work at all times wherever it is in preparation or progress. The Contractor must provide proper facilities for such access and for inspection.
- 3.3.2 The Contractor must inspect all materials as delivered and promptly return all defective materials without waiting for their rejection by the Construction Manager or Architect or Engineer.
- 3.3.3 If the Construction Manager, the Technical Specifications, or any laws, ordinances, or any public authority require any Work to be tested or approved, the Contractor must give the Construction Manager timely notice of the Contractor's readiness for inspection. Inspections will be promptly made, and where practicable, at the source of supply. Any work subject to such testing that is covered up without timely notice to the Construction Manager or without the approval or consent of the Construction Manager must, if required by the Construction Manager, be uncovered for examination at the Contractor's expense. The Contractor will have all of the obligations and the Owner will have all of the rights and remedies that are specified in Section 11 concerning any work subject to testing that is covered up without timely notice to the Construction Manager and that is not uncovered for examination at the Contractor's Expense if required by the Construction Manager.

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- 3.3.4 Tests of materials or qualification tests required by the Contract Documents must be made in accordance with the Technical Specifications and the requirements of the California Building Standards Code as adopted by the Owner and other applicable law. Copies of all testing reports shall be distributed as required in the Technical Specifications.
- 3.3.5 The Owner or its representatives may order re-examination of questioned Work. If ordered to do so, the Contractor must uncover such Work. If such Work is found to be according to the Contract Documents, the Owner shall pay the cost of uncovering and restoring the Work, unless such Work was subject to testing and covered up without timely notice to or approval of the Construction Manager. If re-examined Work is found not in accordance with the Contract Documents, the Contractor must pay the cost of uncovering and restoring the Work. The Contractor will have all of the obligations and the Owner will have all of the rights and remedies that are specified in Section 11 concerning any re-examined Work not in accordance with the Contract Documents that the Contractor fails to uncover and restore at the Contractor's expense.
- 3.3.6 The Contractor must replace or correct without charge any material or workmanship found not to conform to the requirements of the Contract Documents, unless the Owner consents to accept such material or workmanship with an appropriate adjustment in the Contract Price. The Contractor must promptly segregate and remove non-conforming material from the Work site. The Contractor will have all of the obligations and the Owner will have all of the rights and remedies that are specified in Section 11 concerning any failure by the Contractor to replace or correct without charge any material or workmanship that does not conform to the requirements of the Contract Documents and that the Owner has not consented to accept.
- 3.4 Samples Furnished by the Contractor. The Contractor must furnish all samples for approval as directed in sufficient time to permit the Architect or Engineer to examine, approve and select samples before they are required by the progress of the Work. Portions of the Work for which samples are required and for which the Architect or Engineer has selected samples must be in accordance with such approved samples. Samples must be sent prepaid to the office of the Construction Manager or to such place as the Construction Manager may direct.
- 3.5 Materials and Substitutions.
 - 3.5.1 Materials used for the Work must be new and of the quality specified. When not particularly specified, materials must be the best of their class or kind. The Contractor must, if required, submit satisfactory evidence as to the kind and quality of materials.
 - 3.5.2 If the Contractor submitted complete information to the Public Works Department for products proposed as equals in accordance with the Bid Package, and the Owner approved such products proposed as equals in writing, the Contractor may either furnish such products approved as equals, or furnish the products listed by manufacturer name, brand or model number in the Technical Specifications or Project Plans. The Owner retains the right, in its sole discretion, to accept or reject any other proposed substitution. To be considered, proposals concerning products proposed as equals must include sufficient

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information to permit the Owner to determine whether the products proposed as equals will satisfy the same performance requirements as products listed by manufacturer's name, brand or model number. Such performance requirements may include, but are not limited to, size, strength, function, appearance, ease of maintenance and repair, and useful life requirements. If the Owner does not accept a proposed substitution, the Contractor must furnish the product specified in the Technical Specifications or Project Plans for the Contract Price, regardless of whether the product is specified by manufacturer's name, brand or model number, or otherwise.

- 3.5.3. During the performance of the Work, all materials must be neatly stacked, properly protected from the weather and other adverse impacts, and placed so as to avoid interference with efficient progress of the Work, with other activities of the Owner, or with the use of existing Owner facilities by the public. All materials must be delivered so as to ensure efficient and uninterrupted progress of the Work. Materials must be stored so as to cause no obstruction and so as to prevent overloading of any portion of the Work. The Contractor will be responsible for damage or loss of materials delivered to and/or stored at the Work site due to weather or other causes. The Contractor must promptly remove from the Work site all materials rejected by the Owner or its representatives as failing to conform to the requirements of the Contract Documents, whether such non-conforming materials have been incorporated in the Work or not. If the Owner or its representatives so direct, the Contractor must promptly replace and re-execute Work performed by the Contractor and order the replacement and re-execution of Work performed by subcontractors using non-conforming materials with materials that satisfy the requirements of the Contract Documents without expense to the Owner. The Contractor will bear the expense of making good all Work destroyed or damaged by such removal. The Contractor will have all of the obligations and the Owner will have all of the rights and remedies that are specified in Section 11 concerning any failure by the Contractor to replace or re-execute Work using non-conforming materials, and/or to make good all work destroyed or damaged by such removal and/or execution.
- 3.6 Audit and Examination of Records. The Owner may examine and audit at no additional cost to the Owner all books, estimates, records, contracts, documents, bid documents, bid cost data, subcontract job cost reports and other Project related data of the Contractor, subcontractors engaged in performance of the Work, and suppliers providing supplies, equipment and other materials required for the Work, including computations and projections related to bidding, negotiating, pricing or performing the Work or contract modifications and other materials concerning the Work, including, but not limited to, Contractor daily logs, in order to evaluate the accuracy, completeness, and currency of cost, pricing, scheduling and any other project related data. The Contractor will make available all such Project related data at all reasonable times for examination, audit, or reproduction at the Contractor's business office at or near the Work site, and at any other location where such Project related data may be kept until three years after final payment under the Agreement. Pursuant to California Government Code Section 8546.7, if the amount of public funds to be expended is in excess of \$10,000, this Contract shall be subject to the examination and audit of the State Auditor, at the request of the Owner, or as part of any audit of the Owner, for a period of three (3) years after final payment under the Agreement.
- 3.7 Advertising. No advertising signs of any kind may be displayed on the Work site, or on fences, offices or elsewhere adjacent to the Work site.

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- 3.8 Project Schedule. Prior to the pre-construction meeting, the Contractor shall submit a schedule showing each task of Work, the sequence of each task, the number of days required to complete each task, and the critical path controlling the completion of the entire Work. The schedule shall allow for the completion of the entire Work within the Time for Completion.
 - 3.8.1 Owner Review of Schedule. The Owner may review the Contractor's submitted schedule and may note any exceptions. The Contractor shall correct any exceptions noted by the Owner within five (5) working days of being notified of the exceptions.
 - 3.8.2 Update of Schedule. After submission of a schedule to which the Owner has taken no exceptions, the Contractor shall submit an updated schedule on a biweekly basis until completion of the Work. The updated schedule shall show the progress of Work as of the date specified in the updated schedule.
 - 3.8.3 Float. The schedule shall show early and late completion dates for each task. The number of days between these dates shall be designated as "float". The Float shall be designated to the Project and shall be available to both the Owner and the Contractor as needed to complete the Work in accordance with the Contract.
 - 3.8.4 Failure to Submit Schedule. If the Contractor fails to submit the schedule within the time period specified in this section or submit a schedule to which the Owner has taken uncorrected exceptions, the Owner may withhold payments to the Contractor until such schedules are submitted and/or corrected in accordance with the Contract documents.
 - 3.8.5 Responsibility for Schedule. The Contractor will be solely and exclusively responsible for creating the schedule and properly updating it. The Owner may note exceptions to any schedule submitted by the Contractor. However, the Contractor will be solely responsible for determining the proper method of addressing such exceptions, and the Owner's review of the schedule will not create scheduling obligations for the Owner.
- 3.10 Materials Testing. Materials will be tested by the Owner or its authorized agent, following State of California Test Methods. Statistical testing may not be used. All individual samples must meet the specified test results. Each material used must meet the specified requirements.

The Contractor must request and coordinate all testing. All tests must occur in the presence of the Project Inspector. The Owner will, at its sole discretion, have the right to reject any and/or all test results that do not meet this requirement, and to order a retest in the presence of the Project Inspector. The costs for all retests so ordered will be the responsibility of the Contractor. The cost of all retests will be charged to the Contractor

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at the actual cost plus 30 percent, with a minimum charge of \$150.00 per test to cover staff and administrative costs.

The Owner, at its sole expense, will provide all initial material and compaction tests. Sampling and testing will comply with Chapter 6 of the CalTrans Construction Manual, at a minimum. Where conditions vary, the Owner may perform additional testing. Cost for testing of materials offered in lieu of the specified materials will be the responsibility of the Contractor. Cost for R-value tests when required by the Standard Specifications will be the responsibility of the Contractor.

Testing will only be performed on normal City working days between the hours of 8:00 a.m. and 4:00 p.m. unless other arrangements are made in advance. Tests performed outside of these hours may be subject to increased charges.

The Contractor must request all tests in writing a minimum of two (2) working days in advance of the time desired. A minimum of one working day must be allowed for compilation and reporting of data and test results after tests have been performed. No subsequent layer of material may be placed until a passing test is obtained and acknowledged by the Owner.

Concrete and asphalt may be supplied only from suppliers approved and certified by the State Department of Transportation. Proposed mix designs for all concrete and asphalt concrete to be placed within the City of Fort Bragg must be provided to and approved by the City, prior to placement.

The Contractor must coordinate with the Owner concerning any additional testing as required.

4. CHANGES IN WORK

- 4.1 Owner Directed Change Orders. The Owner may at any time during the progress of the Work direct any amendments to the Work or any of the Contract Documents, including, but not limited to the Technical Specifications, or Project Plans. Such amendments will in no way void the agreement, but will be applied to amend the Contract Price, if such amendments affect the Contract Price, the Project schedule, if such amendments affect the Project schedule, or any other provision of the Contract Documents based on a fair and reasonable valuation of the amendment in accordance with this Section 4.
- 4.2 Writing Requirement. Change orders and other amendments to the Technical Specifications, the Project Plans, or other Contract Documents may be made only by a writing executed by authorized representatives of the Owner and the Contractor.
- 4.3 Contractor Proposed Change Orders. Unless the Construction Manager otherwise authorizes or the Owner and the Contractor otherwise agree, change order proposals submitted by the Contractor must be submitted to the Construction Manager no later than the time of the proposed change.
- 4.4 All Change Orders. All change order proposals must be submitted on completed Change Order forms provided by the Owner. All such change order proposals must itemize all cost impacts of the proposed change order and include a total price for that change order and the amended Contract Price that would become effective upon

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execution of the change order. All change order proposals must specify any change in the Project schedule, or in any project milestone including, but not limited to, the Time for Completion, under the change order. It is understood that change orders that do not specify a change in any milestone, including, but not limited to, the Time for Completion, may be accomplished by the Time for Completion then in effect.

- 4.5 Change Order Pricing. Change order pricing will be governed by the following:
 - 4.5.1 Unit prices specified in the Contract Documents will apply to cost impacts involving items for which the Contract Documents specify unit prices.
 - 4.5.2 Cost impacts involving items for which no unit prices are specified will be calculated by adding the itemized actual direct cost that would be added or reduced under the change order and an allowance for indirect costs in accordance with this Section. Itemization for direct costs for required labor must include the classifications of labor required, the total hours required for each classification, the hourly rate for each classification and other labor related costs such as liability and workers compensation insurance, social security, retirement and unemployment insurance. All other cost impacts for which no unit prices are specified must be itemized as appropriate, including the cost of tools, vehicles, phones and other equipment, and the cost of all required materials or supplies. Indirect costs added under a change order may not exceed an allowance of fifteen (15) percent of the total of combined Contractor and subcontractor direct costs added under the change order. Such allowance covers Contractor overhead and profit under the change order and includes the cost of insurance in addition to that required pursuant to Section 8.8, bond premiums, superintendent labor, clerical labor, home office expenses, worksite office expenses, and utility costs under the change order. Such costs may not be itemized as direct costs under a change order. Indirect costs deducted under a change order will be calculated in exactly the same way as indirect costs added under a change order, except indirect costs deducted under a change order may not exceed an allowance of seven and a half (7.5) percent of the total of combined Contractor and subcontractor direct costs deducted under the change order.
- 4.6 Liability Under Unapproved Change Orders. The Contractor shall be solely responsible for any and all losses, costs, or liabilities of any kind incurred by the Contractor, any subcontractor engaged in the performance of the Work, any party supplying material or equipment for the Work or any third party that are incurred pursuant to Contractor-proposed change orders prior to issuance of an approved change order executed in accordance with this Section 4. The Contractor will have all of the obligations and the Owner will have all of the rights and remedies that are specified in Section 11 concerning any work or resulting losses, costs, or liabilities pursuant to a Contractor proposed change order before issuance of an approved change order executed in accordance with this Section 4.
- 4.7 Changes Subject to Contract Documents. Any changes in the Work and/or the Contract Documents pursuant to change orders and any other amendments issued in accordance with the Contract Documents, including this Section 4, will in all respects be subject to all provisions of the Contract Documents, including, but not limited to, the Technical Specifications and the Project Plans, except as modified by such change

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orders or amendments.

- 4.8 Change Order Disputes.
 - 4.8.1 Disputed City Directed Change Orders. If the Contractor disputes an Owner directed change order following a reasonable effort by the and the Contractor to resolve the dispute including, at a minimum, a meeting between appropriate representatives of the Contractor and the Owner, the Contractor must commence performing the Work consistent with the disputed change order within five (5) working days of the last meeting between representatives of the Contractor and the Owner to resolve the dispute, or within the time specified in the disputed City directed change order, whichever is later. In performing Work consistent with a disputed Owner-directed change order pursuant to this provision the Contractor will have all of the Contractor's rights concerning claims pursuant to the Contract Documents and applicable law.
 - 4.8.2 Disputed Contractor Proposed Change Orders. If the Owner disputes a Contractor proposed change order, the Owner and the Contractor will use reasonable efforts to resolve the dispute including, at a minimum, holding a meeting between appropriate representatives of the Contractor and the Owner. Regardless of and throughout any such efforts to resolve the dispute the Contractor must continue performing the Work irrespective of and unmodified by the disputed change order. In continuing to perform the Work, the Contractor will retain all of the Contractor's rights under contract or law pertaining to resolution of disputes and protests between contracting parties. Disputes between the Owner and the Contractor concerning any Contractor-proposed change order or other amendment do not excuse the Contractor's obligation to perform the Work in accordance with the Contract Documents excluding such Contractor-proposed change order or other amendment by the Time for Completion or waive any other Project milestone or other requirement of the Contract Documents.

5. TRENCHING AND UTILITIES

- 5.1 Excavation More Than Four Feet Deep. In accordance with California Public Contract Code Section 7104, if the Work involves excavation more than four feet deep the Contractor must promptly notify the Owner in writing before disturbing: any material that the Contractor believes may be 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; any subsurface or latent physical conditions at the Work site differing from those indicated; or any unknown physical conditions at the Work 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 Documents. The Owner will promptly investigate any such conditions for which notice is given. If the Owner finds that the conditions do materially differ, or involve hazardous waste, and would cause a decrease or increase in the cost or time of performance of the Work, the Owner will issue a change order pursuant to Section 4 of these General Provisions. If a dispute arises between the Owner and the Contractor concerning whether the conditions materially differ, or involve hazardous waste, or cause a decrease of increase in the cost or time of performance, the Contractor will not be excused from any completion date provided in the Contract Documents, but shall proceed with all Work to be performed. The Contractor will retain all rights under contract or law pertaining to resolution of disputes and protests between

contracting parties.

- 5.2 Excavation of Five Feet or More. In accordance with California Labor Code Section 6705, contractors performing contracts exceeding \$25,000 in cost and involving excavation five or more feet deep must submit for the Owner's acceptance, prior to excavation, a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during excavation. If the plan varies from the shoring system standards, it must be prepared by a registered civil or structural engineer.

5.3 Utility Relocation Costs.

- 5.3.1 In accordance with California Government Code Section 4215, the Owner assumes the responsibility for the timely removal, relocation or protection of existing main or trunkline utility facilities located on the Work site if such utilities are not identified by the Owner in the Technical Specifications and/or Project Plans. The Owner will compensate the Contractor for the costs of locating, repairing damage not due to the Contractor's failure to exercise reasonable care, and removing or relocating existing main or trunkline utility facilities located at the Work site and not identified with reasonable accuracy in the Technical Specifications and/or Project Plans. The Owner will also compensate the Contractor for the cost of equipment on the Project necessarily idled during such work. The Contractor will not be assessed liquidated damages for Work completion delays caused by the Owner's failure to provide for removal or relocation of such main or trunkline utility facilities.
- 5.3.2 Nothing in this provision or the Contract Documents will be deemed to require the Owner to indicate the presence of existing service laterals or appurtenances whenever the presence of such utilities on the Work site can be inferred from the presence of other visible facilities, such as buildings, meter and junction boxes, on or adjacent to the Work site; provided, however, that nothing in this provision or the Contract Documents shall relieve the Owner from identifying main or trunklines in the Technical Specifications and/or Project Plans.
- 5.3.3 Nothing in this provision or the Contract Documents will preclude the Owner from pursuing any appropriate remedy against the utility for delays which are the responsibility of the utility.
- 5.3.4 Nothing in this provision or the Contract Documents will be construed to relieve the utility from any obligation as required either by law or by contract to pay the cost of removal or relocation of existing utility facilities.
- 5.3.5 If the Contractor while performing the Work discovers utility facilities not identified by the Owner in the Technical Specifications and/or Project Plans, the Contractor must immediately notify the Owner and utility in writing.
- 5.3.6 Either the Owner or the utility, whichever owns existing main or trunkline utility facilities located on the Work site, shall have sole discretion to affect repairs or relocation

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work or to permit the Contractor to perform such repairs or relocation work at a reasonable price.

6. PROJECT FACILITIES

- 6.1 Work Site Offices. Any Work site office facilities used by the Contractor and/or its privities must conform to all applicable codes, ordinances and regulations. The cost of such Work site office facilities shall be paid from the included in the Contract Price.
- 6.2 Owner Rights of Access and Ownership. The Owner and its authorized representatives will at all reasonable times while such office facilities are located at the Work site (including, at a minimum, all times during which the Work is performed), have access to any such Work site office facilities used by the Contractor and/or its privities. With respect to the right of access of the Owner and its authorized representatives, neither the Contractor nor its privities shall have a reasonable expectation of privacy pursuant to the Fourth Amendment to the Unites States Constitution or other applicable law concerning such Work site office facilities used by the Contractor and/or its privities. Without exception, any and all Project related materials located at such Work site facilities will be deemed at all times to be Owner property subject to inspection and copying by the Owner and its authorized representatives at all reasonable times while such facilities are located at the Work site (including, at a minimum, all times during which the Work is performed). Any interference by the Contractor or its privities with the Owner's rights of access and/or ownership pursuant to this Section 6 will constitute a material breach of the Agreement subject to any and all remedies available pursuant to the Contract Documents and at law and equity.

7. PROSECUTION AND PROGRESS OF THE WORK

- 7.1 Liquidated Damages. Time is of the essence in the Agreement. The Owner and the Contractor agree that it will be difficult and/or impossible to determine the actual damage which the Owner will sustain in the event of the Contractor's failure to fully perform the Work or to fully perform all of the Contractor's obligations that have accrued pursuant to the Agreement by the Time for Completion. Accordingly, the Owner and the Contractor agree in accordance with California Government Code Section 53069.85 that the Contractor will forfeit and pay to the Owner liquidated damages in the sum of \$500 per day for each and every calendar day completion of the Work and/or performance of all of the Contractor's obligations that have accrued pursuant to the Agreement is delayed beyond the Time for Completion. The Owner and the Contractor further agree in accordance with California Government Code Section 53069.85 that the liquidated damages sum specified in this provision is not manifestly unreasonable under the circumstances existing at the time the Agreement was made, and that the Owner may deduct liquidated damages sums in accordance with this provision from any payments due or that may become due the Contractor under the Agreement.

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- 7.2 No Damage for Avoidable Delays. All delays in the Work that might have been avoided by the exercise of care, prudence, foresight and diligence of the Contractor or any privities of the Contractor will be deemed avoidable delays. Delays in the Work that may be unavoidable but that do not necessarily affect other portions of the Work or prevent completion of all Work within the Time for Completion, including, but not limited to, reasonable delays in Engineer approval of shop drawings, placement of construction survey stakes, measurements and inspection, and such interruption as may occur in prosecution of the Work due to reasonable interference of other contractors of the Owner, will be deemed avoidable delays. The Contractor will not be awarded a change in the Project schedule, the Time for Completion, and/or additional compensation in excess of the contract price for avoidable delays.
- 7.3 Unavoidable Delays. All delays in the Work that result from causes beyond the control of the Contractor and that the Contractor could not have avoided through exercise of care, prudence, foresight, and diligence will be deemed unavoidable delays. Orders issued by the Owner changing the amount of Work to be done, the quantity of materials to be furnished, or the manner in which the work is to be prosecuted, and unforeseen delays in the prosecution of the Work due to causes beyond the Contractor's control, such as strikes, lockouts, labor disturbances, fires, epidemics, earthquakes, acts of God, neglect by utility owners or other contractors that are not privities of the Contractor will be deemed unavoidable delays to the extent they actually delay the Contractor's completion of the Work. The Contractor will be awarded a change in the Project schedule, the Time for Completion, and/or additional compensation in excess of the Contract Price for unavoidable delays to the extent such delays actually delay the Contractor's completion of the Work and/or result in the Contractor incurring additional costs in excess of the Contract Price.
- 7.4 No Damage for Contractor Caused Delay. Contractor shall not be entitled to additional compensation for extended field or home office overhead, field supervision, costs of capital, interest, escalation charges, acceleration costs or other impacts for any delays to the extent such delays are caused by the failure of the Contractor or any subcontractor or other entity engaged in performance of the Work to perform the Work in accordance with the Contract Documents. Contractor may be eligible for additional compensation in excess of the Contract Price for delays caused by the Owner and/or its privities.
- 7.5 No Damage for Other Delay. Contractor will not be entitled to damages for delay to the Work caused by the following, which the Owner and Contractor agree will be deemed for purposes of California Public Contract Code Section 7102 either not caused by the Owner, and/or within the contemplation of the Owner and the Contractor, and/or reasonable under the circumstances:
 - 7.5.1 Exercise of the Owner's right to sequence the Work in a manner that would avoid disruption to the City and other contractors based on: the failure of the Contractor or any subcontractor or other entity engaged in the performance of the Work to perform the Work in accordance with the Contract Documents, enforcement by the Owner or any other governmental agency of competent jurisdiction of any

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government act or regulation, or enforcement by the Owner of any provisions of the Agreement.

- 7.5.2 Requests for clarification or information concerning the Contract Documents or proposed change orders or modifications to the Contract Documents, including extensive and/or numerous such requests for clarification or information or proposed change orders or modifications, provided such clarifications or information or proposed change orders or modifications are processed by the Owner or its representatives in a reasonable time in accordance with the Contract Documents.
- 7.6 Delays Caused by the Owner and/or Its Privities. Delay caused by the Owner and/or other Contractors of the Owner will be deemed unavoidable delays. Either the Owner or the Contractor may propose a change in the Time for Completion for delays that are purported to be caused by the Owner and/or its privities and that are not reasonable under the circumstances involved and/or that are not within the contemplation of the Owner and the Contractor. Such proposed changes in the Time for Completion will constitute change order proposals subject to Section 4. In accordance with Section 4, the Owner and the Contractor may agree upon pricing for the cost impacts, if any, resulting from such delays. If such pricing is in anticipation of cost impacts that may, but have not yet occurred, the Owner will be obligated to pay the Contractor for such anticipated impacts in accordance with the Agreement and any applicable, approved change orders only to the extent the Contractor actually incurs the anticipated cost impacts. Notwithstanding anything to the contrary in Section 4.5.2, the Owner and the Contractor may agree to a daily rate or cap or lump sum that will apply to the cost impacts, if any, resulting from delay purportedly caused by the Owner and/or its privities subject to this provision. However, if such daily rate or cap or lump sum is in anticipation of cost impacts that have not yet occurred, the Owner will be obligated to pay such daily rate or cap or lump sum only to the extent the Contractor actually incurs such cost impacts.
- 7.7 Weather Delays. Extensions of the Time for Completion will not be allowed for weather conditions that are consistent with the following list of anticipated rain days based on historical weather data of the National Oceanographic and Atmospheric Administration of the U.S. Department of Commerce for the record station that is nearest or most applicable to the Work site. Extensions of the Time for Completion for delays due to adverse weather will be allowed only if the number of rain days exceeds those listed in the following table and the Contractor can verify to the Owner's reasonable satisfaction that such adverse weather caused actual delay in the timely completion of the Work. No extensions of the Time for Completion will be granted for rain days in addition to those listed in the following table that merely result in delays that do not or would not, themselves, result in failure to complete the Work by the Time for Completion. Anticipated rain days are as follows: January, [2]; February, [6]; March, [2]; April, [0]; May, [0]; June, [0]; July, [0]; August, [0]; September, [0]; October, [1]; November, [2]; December, [3].
- 7.8 Delay Claims. Whenever the Contractor claims a delay for which the Time for Completion may be extended, the Contractor must request an extension of time within five (5) days of the start of the delay. The request must be in writing and describe in detail the cause for the delay, and, if possible, the foreseeable extent of the delay.

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- 7.9 Contractor Coordination of the Work.
 - 7.9.1 The Owner reserves the right to do other work in connection with or in the vicinity of the Project by contract or otherwise, and Contractor shall at all times conduct the Work so as to impose no hardship on the Owner, others engaged in the Work or other contractors working at the Work site. The Contractor will adjust, correct and coordinate the Work with the work of others so that no delays result in the Work or other work at or near the Work site.
 - 7.9.2 If any part of the Work depends for proper execution or results upon the work of the Owner or any other contractor, the Contractor will, before proceeding with such Work, promptly report to the Owner any apparent discrepancies or defects in such other Work. Failure of the Contractor to promptly report any apparent discrepancy or defect will be deemed an acceptance of the Owner's or other contractor's Work as fit and proper.
 - 7.9.3 The Contractor will anticipate the relations of the various trades to the progress of the Work and will ensure that required anchorage or blocking is furnished and set at proper times. Anchorage and blocking necessary for each trade shall be part of the Work except where stated otherwise.
 - 7.9.4 The Contractor will provide proper facilities at all times for access of the Owner, the Construction Manager, Architect or Engineer, and other authorized Owner representatives to conveniently examine and inspect the Work.

8. CONTRACTOR RESPONSIBILITIES

- 8.1. Eligibility. By executing the Agreement, the Contractor certifies that the Contractor is not ineligible to perform work on public works projects pursuant to California Labor Code Sections 1777.1 or 1777.7. In accordance with California Public Contract Code Section 6109(a), contractors who are ineligible to perform work on public works projects pursuant to California Labor Code Sections 1777.1 or 1777.7 may neither bid on, be awarded or perform the Work. To the fullest extent permitted by law, the Contractor shall hold harmless and indemnify the Owner from and against any and all damages, costs, and liability arising from or as a consequence of any violation of Public Contract Code Section 6109.
- 8.2 Supervision of the Work. The Contractor will be solely responsible for the performance of the Work, including portions of the Work to be performed by subcontractors. The Contractor is charged with ensuring that all orders or instructions from the Owner, Construction Manager or Architect are disseminated to and followed by all subcontractors engaged in performance of the Work. The Contractor will supervise the Work using the Contractor's best skill and attention. At any time during the progress of the Work, the Owner, the Construction Manager, or the Architect may require the Contractor and/or subcontractors engaged in performance of the Work to attend a project meeting and the Contractor will attend, and ensure the attendance of any subcontractors whose attendance is required by the Owner and/or advisable in light of

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the matters to be addressed at the meeting.

- 8.3 Contractor's Superintendent. The Contractor will keep on the Work, throughout its progress, a competent superintendent and any necessary assistants, all satisfactory to the Owner. The superintendent may not be changed without the consent of the Owner. The superintendent will represent the Contractor and all directions given by the Owner to the superintendent will bind the Contractor in accordance with the Agreement. Superintendent time included in Contractor's completed bid schedule and/or in approved change orders, if any, must be included in Contractor's approved overhead rate and may not be charged as a direct cost.
- 8.4 Competent Employees. The Contractor must at all times enforce strict discipline and good order among the Contractor's employees and may not employ on the Work any unfit person or anyone not skilled in the Work assigned, or anyone incompetent or unfit for the duties of that person. When the Owner determines that a Contractor employee does not satisfy the requirements of this provision, upon notice from the Owner, the Contractor must ensure that employee performs no further Work and is no longer present at the Work site. Any such Contractor employee may not again be employed on the Work without Owner approval.
- 8.5 Items Necessary for Proper Completion of the Work. Except as otherwise noted in the Contract Documents, the Contractor will provide and pay for all labor, materials, equipment, permits, fees, licenses, facilities and services necessary for the proper execution and timely completion of the Work in accordance with the Contract Documents.
- 8.6 Construction Reports. The Contractor must submit daily construction reports detailing the daily progress of the Work to the Construction Manager on a weekly basis.
- 8.7 Subcontracting. The Contractor must perform with his or her own organization, a value of work amounting to not less than fifty percent (50%) of the Contract amount, except that the bid amount for subcontracted "Specialty Items" so designated in the Special Provisions may be eliminated from the Contract amount and not considered as sub-contracted for the purposes of calculating the value of work to be performed by the Contractor. For the purposes of determining the value of work to be performed by the Contractor pursuant to this provision, materials, equipment, incidentals, etc., shall be considered to have been purchased by the Contractor or Subcontractor that is to install them. Where a portion of an item is subcontracted, the value of work subcontracted will be based on the estimated cost of such portion of the subcontracted item, as determined from information submitted by the Contractor, subject to approval by the Engineer.
- 8.7.1 By executing the Contract, the Contractor certifies that no subcontractor included on the list of proposed subcontractors submitted with the Contractor's bid is ineligible to perform work on public works projects pursuant to California Labor Code Sections 1777.1 or 1777.7. In accordance with California Public Contract Code Section 6109(a), subcontractors who are ineligible to perform work on public works projects pursuant to California Labor Code Sections 1777.1 or 1777.7 may neither bid on, be awarded or perform as a subcontractor on the Work. In accordance with California Public Contract Code Section 6109(b), any contract on a public works project entered into between a

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contractor and a debarred subcontractor is void as a matter of law. The Contractor will ensure that no debarred subcontractor receives any public money for performing the Work, and any public money that may have been paid to a debarred subcontractor for the Work is returned to the Owner. The Contractor will be responsible for payment of wages to workers of a debarred subcontractor who has been allowed to perform the Work.

- 8.7.2 The Agreement and the performance of the Work are subject to the requirements of the Subletting and Subcontracting Fair Practices Act codified at California Public Contract Code Section 4100 and following. If the Contractor fails to specify a subcontractor or specifies more than one subcontractor for the same portion of the Work in excess of one-half of 1 percent of the Contractor's total bid, the Contractor agrees that the Contractor is fully qualified to perform that portion of the Work with the Contractor's own forces, and that the Contractor will perform that portion of the Work with the Contractor's own forces. If after award of the Agreement the Contractor subcontracts, except as provided for in California Public Contract Code Sections 4107 or 4109, any such portion of the Work, the Contractor will be subject to the penalties set forth in California Public Contract Code Sections 4110 and 4111, including cancellation of the Agreement, assessment of a penalty of up to 10 percent of the amount of the subcontract, and disciplinary action by the Contractors State License Board.
- 8.7.3. No contractual relationship exists between the Owner and any subcontractor engaged in performance of the Work.
- 8.7.4 Incorporation of Contract Documents. The Contractor must incorporate the Contract Documents in each contract with a subcontractor engaged in the performance of the Work including the indemnity and insurance requirements to the extent they apply to the scope of the subcontractor's work. The Contractor shall be solely responsible for any delay or additional costs incurred as a result of its failure to provide adequate or accurate project information to a subcontractor that results in improper submittals and/or work, or time or other impacts is the sole responsibility of the Contractor. The Contractor will have all of the obligations and the Owner will have all of the remedies that are specified in Section 11.
- 8.7.5 Subcontractor agrees to be bound to General Contractor and Owner in the same manner and to the same extent as General Contractor is bound to City under the Contract Documents. Subcontractor further agrees to include the same requirements and provisions of this agreement, including the indemnity and Insurance requirements, with any Sub-subcontractor to the extent they apply to the scope of the Sub-subcontractor's work. A copy of the Owner's Contract Document Indemnity and Insurance provisions will be furnished to the Subcontractor upon request. The Contractor shall require all subcontractors to provide a valid certificate of insurance with the required endorsements included in the agreement prior to commencement of any work and General Contractor will provide proof of compliance to the Owner.
- 8.7.6 Coordination of Subcontract Work: The Contractor is responsible for scheduling the Work of subcontractors so as to avoid delay or injury to either Work or materials.
- 8.8 Insurance. 8.8 Insurance.

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- 8.8.1 All required insurance shall be provided in the form of “occurrence”-type policies underwritten by admitted insurers in the State of California with a rating of A or better from the current year Best Rating Guide. All policies must be issued at the expense of the Contractor and must be maintained at the Contractor’s expense throughout the performance of the Work.
- 8.8.2 The Contractor and any subcontractors engaged in performance of the Work must secure payment of workers compensation in accordance with California Labor Code Section 3700 and other applicable law. The Contractor must verify that all Subcontractors comply with this requirement.
- 8.8.3 Within ten (10) working days following notice of award the Contractor must submit to the Owner along with executed copies of all other documents specified in the Contract Check List certificates of insurance and endorsements evidencing that the Contractor has in effect and will maintain throughout the performance of the Work the following kinds and amounts of insurance:
 - 8.8.3.1 Worker’s Compensation Insurance. Workers Compensation and Employers Liability insurance as required by any applicable law, regulation or statute, including the provisions of Division IV of the Labor Code of the State of California, and any act or acts amending it. Worker’s Compensation insurance must be for Statutory Limits and must cover the full liability of the Contractor. The Contractor’s Employer’s Liability Insurance must be in an amount no less than \$1,000,000.00 per occurrence. The insurance must be endorsed to waive all rights of subrogation against Owner and its officials, officers, employees, and volunteers for loss arising from or related to the work performed under this agreement.
 - 8.8.3.2 Commercial General Liability and Automobile Liability Insurance. Coverage for liability because of Bodily Injury and Property Damage including, but not limited to the following coverage:
 - Completed Operations and Products Liability
 - Bodily Injury
 - Personal Injury
 - Broad Form Property Damage Liability
 - Contractual Liability insuring the obligations assumed by the Contractor under the Contract Documents
 - Automobile Liability, including owned, non-owned and hired automobiles
 - Coverage for the XCU hazards of Explosion, Collapse and Underground

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- 8.8.3.3 Commercial General Liability Self-Insured Retentions:
 - All self-insured retentions (SIR) must be disclosed to City for approval and shall not reduce the limits of liability.
 - Policies containing any self-insured retention (SIR) provision shall provide or be endorsed to provide that the SIR may be satisfied by either the named insured or the City.
 - Public Entity reserves the right to obtain a full certified copy of any insurance policy and endorsements. Failure to exercise this right shall not constitute a waiver of right to exercise later.
- 8.8.3.4 Commercial Umbrella Policy. The limits of insurance required in these Contract Documents may be satisfied by a combination of primary and umbrella or excess insurance. Any umbrella or excess insurance shall contain or be endorsed to contain a provision that such coverage shall also apply on a primary and non-contributory basis for the benefit of Owner (if agreed to in a written contract or agreement) before the Owner’s own Insurance or self- insurance shall be called upon to protect it as a named insured.
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- 8.8.4 The Additional Insured coverage under the Contractor’s policy shall be “primary and non-contributory” and will not seek contribution from the Owner’s insurance or self-insurance and shall be at least as broad as CG 20 01 04 13.
- 8.8.5 The limits of the insurance required above will be t least

Comprehensive General Liability

Bodily Injury Liability	\$2,000,000	each occurrence
	\$4,000,000	aggregate
Property Damage Liability	\$2,000,000	each occurrence
	\$4,000,000	aggregate

Comprehensive Automobile Liability

Bodily Injury Liability	\$2,000,000	each person
	\$4,000,000	each occurrence
Property Damage Liability	\$2,000,000	each occurrence

- 8.8.6 For each insurance policy required under the Agreement except for the required workers compensation insurance policy, the Contractor must provide endorsements that add the Owner, its officials, officers, employees, agents and volunteers as an additional

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insured ("Additional Insured"). Such endorsements must: provide that the insurance required to be furnished by the Contractor will be primary as regards the Owner, and that the Owner's insurance will be excess of and not contribute to the insurance required to be furnished by the Contractor; that the Owner will receive 30 day written notice of any reduction or cancellation of such insurance required to be furnished by the Contractor; and include a severability of interest clause acceptable to the Owner. Said endorsement shall be at least as broad as Insurance Services Office form number CG2010 (Ed. 11/85).

- 8.8.7 It shall be a requirement under these Contract Documents that any available insurance proceeds broader than or in excess of the specified minimum insurance coverage requirements and/or limits shall be available to the Additional Insured. Furthermore, the requirements for coverage and limits shall be (1) the minimum coverage and limits specified in this Agreement; or (2) the broader coverage and maximum limits of coverage of any insurance policy or proceeds available to the named insured; whichever is greater.
- 8.8.8 Contractor shall maintain insurance as required by these Contract Documents to the fullest amount allowed by law and shall maintain insurance for a minimum of five years following the completion of this project. In the event contractor fails to obtain or maintain completed operations coverage as required by this Agreement, the Owner at its sole discretion may purchase the coverage required and the cost will be paid by Contractor.
- 8.9 Indemnities.
- 8.9.1 The Contractor will take all responsibility for the Work, and will bear all losses and damages directly or indirectly resulting to the Contractor, any subcontractors engaged in performance of the Work, the Owner, its officials, officers, employees, agents, volunteers and consultants, and to third parties on account of the performance or character of the Work, unforeseen difficulties, accidents, or occurrences of other causes predicated on active or passive negligence of the Contractor or of any subcontractor engaged in performance of the Work. To the fullest extent permitted by law the Contractor will indemnify, defend and hold harmless the Owner, its officials, officers, employees, agents, volunteers and consultants from and against any or all loss, liability, expense, claims, costs (including costs of defense), suits, and damages of every kind, nature and description (including, but not limited to, penalties resulting from exposure to hazards in violation of the California Labor Code) directly or indirectly arising from the performance of the Work ("Claims").
- 8.9.2 The Contractor will indemnify, defend and hold harmless the Owner, the Owner's officials, officers, employees, volunteers, agents and the Construction Manager and Architect for all liability on account of any patent rights, copyrights, trade names or other intellectual property rights that may apply to the Contractor's performance of the Work. The Contractor will pay all royalties or other charges as a result of intellectual property rights that may apply to methods, types of construction, processes, materials, or equipment used in the performance of the Work, and will furnish written assurance satisfactory to the Owner that any such charges have been paid.
- 8.9.3 The Contractor assumes all liability for any accident or accidents resulting to any person or property as a result of inadequate protective devices for the prevention of

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accidents in connection with the performance of the Work. The Contractor will indemnify, defend, and hold harmless the Owner and its officials, officers, employees, agents, volunteers and consultants from such liability.

- 8.9.4 Approval of the Contractor's certificates of insurance and/or endorsements does not relieve the Contractor of liability under this Section 8.9. The Contractor will defend, with legal counsel reasonably acceptable to the Owner, any action or actions filed in connection with any Claims and will pay all related costs and expenses, including attorney's fees incurred. The Contractor will promptly pay any judgment rendered against the Owner, its officials, officers, employees, agents, volunteers or consultants for any Claims. In the event the Owner, its officials, officers, employees, agents, volunteers or consultants is made a party to any action or proceeding filed or prosecuted against Contractor for any Claims, Contractor agrees to pay the Owner, its officials, officers, employees, agents, volunteers and consultants any and all costs and expenses incurred in such action or proceeding, including but not limited to, reasonable attorneys' fees.
- 8.9.5 Subject to the requirements of Section 5 of the General Provisions, the Contractor will indemnify, hold harmless and defend, with legal counsel reasonably acceptable to the Owner, the Owner and its officials, officers, employees, agents and volunteers from and against any and all claims related to damage to surface or underground facilities caused by the Contractor or any of the Contractor's privities or agents.
- 8.9.6 The Contractor will indemnify, hold harmless and defend, with legal counsel reasonably acceptable to the Owner, the Owner and its officials, officers, employees, agents and volunteers from and against any and all claims, including any fines or other penalties, related to failure of the Contractor and/or privities or agents of the Contractor to comply with the requirements of the General Permit, or to implement the Stormwater Pollution Prevention Plan ("SWPPP") in accordance with provision 12 of the Special Provisions. The Owner may withhold from amounts due or that may become due to the Contractor under this Contract amounts that equal or are estimated to equal the amount of claims, including fines, resulting from failure of the Contractor and/or privities or agents of the Contractor to comply with the requirements of the General Permit, or to implement the SWPPP in accordance with provision 12 of the Special Provisions.
- 8.9.7 In accordance with California Civil Code Section 2782(a), nothing in the Contract will be construed to indemnify the Owner for its sole negligence, willful misconduct, or for defects in design furnished by the Owner. In accordance with California Civil Code Section 2782(b), nothing in the Contract will be construed to impose on the Contractor or to relieve the Owner from liability for the Owner's active negligence. By execution of the Contract Documents the Contractor acknowledges and agrees that the Contractor has read and understands the insurance and indemnity requirements of the Contract Documents, which are material elements of consideration.
- 8.9.8 The defense and indemnification obligations of these Contract Documents are undertaken in addition to, and shall not in any way be limited by, the insurance obligations contained in these Contract Documents.

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- 8.9.9 Contractor/Subcontractor's responsibility for such defense and indemnity obligations shall survive the termination or completion of these Contract Documents for the full period of time allowed by law.
- 8.10 Licenses/Permits. The Contractor must, without additional expense to the Owner, obtain all licenses, permits and other approvals required for the performance of the Work.
- 8.11 California Labor Code Requirements.
 - 8.11.1 In accordance with California Labor Code Section 1771.1, this Project is subject to compliance monitoring and enforcement by the Department of Industrial Relations (DIR). The Contractor and subcontractors engaged in performance of the Work must comply with Labor Code Section 1771.1.
 - 8.11.2 In accordance with California Labor Code Section 1810, eight (8) hours of labor in performance of the Work shall constitute a legal day's work under the Agreement.
 - 8.11.3 In accordance with California Labor Code Section 1811, the time of service of any worker employed in performance of the Work is limited to eight hours during any one calendar day, and forty hours during any one calendar week, except in accordance with California Labor Code Section 1815, which provides that work in excess of eight hours during any one calendar day and forty hours during any one calendar week is permitted upon compensation for all hours worked in excess of eight hours during any one calendar day and forty hours during any one calendar week at not less than one-and-one-half times the basic rate of pay.
 - 8.11.4 The Contractor and its subcontractors will forfeit as a penalty to the Owner \$25 for each worker employed in the performance of the Work for each calendar day during which the worker is required or permitted to work more than eight (8) hours in any one calendar day, or more than forty (40) hours in any one calendar week, in violation of the provisions of California Labor Code Section 1810 et seq.
 - 8.11.5 In accordance with California Labor Code Section 1773.2, the Owner has determined the general prevailing wages in the locality in which the Work is to be performed for each craft or type of work needed to be as published by the State of California Department of Industrial Relations, Division of Labor Statistics and Research, a copy of which is on file in the Public Works Department and shall be made available on request. The Contractor and subcontractors engaged in the performance of the Work shall pay no less than these rates to all persons engaged in performance of the Work.
 - 8.11.6 In accordance with California Labor Code Section 1775, the Contractor and any subcontractors engaged in performance of the Work must comply Labor Code Section 1775 which establishes a penalty of up to \$50 per day for each worker engaged in the performance of the Work that the Contractor or any subcontractor pays less than the specified prevailing wage. The amount of such penalty shall be determined by the Labor Commissioner. The Contractor or subcontractor shall pay

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the difference between the prevailing wage rates and the amount paid to each worker for each calendar day or portion thereof for which each worker was paid less than the prevailing wage rate. If a subcontractor worker engaged in performance of the Work is not paid the general prevailing per diem wages by the subcontractor, the Contractor is not liable for any penalties therefore unless the Contractor had knowledge of that failure or unless the Contractor fails to comply with all of the following requirements:

- 8.11.6.1 The contract executed between the Contractor and the subcontractor for the performance of part of the Work must include a copy of the provisions of California Labor Code Sections 1771, 1775, 1776, 1777.5, 1813, and 1815.
- 8.11.6.2 The Contractor must monitor payment of the specified general prevailing rate of per diem wages by the subcontractor by periodic review of the subcontractor's certified payroll records.
- 8.11.6.3 Upon becoming aware of a subcontractor's failure to pay the specified prevailing rate of wages, the Contractor must diligently take corrective action to halt or rectify the failure, including, but not limited to, retaining sufficient funds due the subcontractor for performance of the Work.
- 8.11.6.4 Prior to making final payment to the subcontractor, the Contractor must obtain an affidavit signed under penalty of perjury from the subcontractor that the subcontractor has paid the specified general prevailing rate of per diem wages employees engaged in the performance of the Work and any amounts due pursuant to California Labor Code Section 1813.
- 8.11.7 In accordance with California Labor Code Section 1776, the Contractor and each subcontractor engaged in performance of the Work, must keep accurate payroll records 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 in performance of the Work. Each payroll record must contain or be verified by a written declaration that it is made under penalty of perjury, stating that the information contained in the payroll record is true and correct and that the employer has complied with the requirements of Sections 1771, 1811, and 1815 for any work performed by the employer's employees on the public works project. The payroll records required pursuant to California Labor Code Section 1776 must be certified and must be available for inspection by the City and its authorized representatives, the Division of

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Labor Standards Enforcement, and the Division of Apprenticeship Standards of the Department of Industrial Relations and must otherwise be available for inspection in accordance with California Labor Code Section 1776.

- 8.11.8 In accordance with California Labor Code Section 1777.5, the Contractor, on behalf of the Contractor and any subcontractors engaged in performance of the Work, will be responsible for ensuring compliance with California Labor Code Section 1777.5 governing employment and payment of apprentices on public works contracts.
- 8.11.9 In case it becomes necessary for the Contractor or any subcontractor engaged in performance of the Work to employ on the Work any person in a trade or occupation (except executive, supervisory, administrative, clerical, or other non manual workers as such) for which no minimum wage rate has been determined by the Director of the Department of Industrial Relations, the Contractor must pay the minimum rate of wages specified therein for the classification which most nearly corresponds to Work to be performed by that person. The minimum rate thus furnished will 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.
- 8.12 Laws and Ordinances. The Contractor and all subcontractors engaged in the performance of the Work must conform to the following specific rules and regulations as well as all other laws, ordinances, rules and regulations that apply to the Work. Nothing in the Technical Specifications or Project Plans is to be construed to permit Work not conforming to these codes:
 - National Electrical Safety Code, U. S. Department of Commerce
 - National Board of Fire Underwriters' Regulations
 - California Building Standards Code as adopted by the City
 - Manual of Accident Prevention in Construction, latest edition, published by A.G.C. of America
 - Industrial Accident Commission's Safety Orders, State of California
 - Regulations of the State Fire Marshall (Title 19, California Code of Regulation) and Applicable Local Fire Safety Codes
 - Labor Code of the State of California - Division 2, Part 7, Public Works and Public Agencies.

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- Federal, state, and local air pollution control laws and regulations applicable to the Contractor and/or Work.

- 8.13 Guaranty. The Contractor guarantees all of the Work for one year from the date the City accepts the Work. Upon receiving written notice of a need for repairs which are directly attributable to defective materials or workmanship the Contractor must make good any defects arising or discovered in any part of the Work by diligently commencing the necessary repairs within seven (7) days from the date of notice from the Owner. If the Contractor fails to make good any defects in the Work in accordance with this provision, in addition to any other available remedy under the contract or at law or equity, the Owner may make good or have made good such defects in the Work and deduct the cost from amounts that may be due or become due the Contractor, and/or call on the Contractor's maintenance bond for the cost of making good such defects and for the Owner's reasonable legal costs, if any, of recovering against the bond. The Contractor shall remain responsible for repairing any Work found to be defective regardless of when such defect is discovered by the Owner.

- 8.14 Safety.

- 8.14.1 In accordance with generally accepted construction practices and applicable law, the Contractor will be solely and completely responsible for conditions of the Work site, including safety of all persons and property during performance of the Work. This requirement will apply continuously and not be limited to normal working hours. For purposes of California Labor Code Section 6400 and related provisions of law, the Contractor and the Contractor's privities and any other entities engaged in the performance of the Work will be "employers" responsible for furnishing employment and a place of employment that is safe and healthful for the employees, if any, of such entities engaged in the performance of the Work. Neither the Owner nor its officials, officers, employees, agents, volunteers or consultants will be "employers" pursuant to California Labor Code Section 6400 and related provisions of law with respect to the Contractor, the Contractor's privities or other entities engaged in the performance of the Work. The Contractor agrees that neither the Owner, the Construction Manager, the Architect, nor the Engineer will be responsible for having hazards corrected and/or removed at the Work site. The Contractor agrees that the Owner will not be responsible for taking steps to protect the Contractor's employees from such hazards, or for instructing the Contractor's employees to recognize such hazards or to avoid the associated dangers. The Contractor agrees with respect to the Work and the Work site, the Contractor will be responsible for not creating hazards and for having hazards corrected and/or removed, for taking appropriate, feasible steps to protect the Contractor's employees from such hazards and that the Contractor has instructed and/or will instruct its employees to recognize such hazards and how to avoid the associated dangers.

- 8.14.2 Review and inspection by the Owner, the Construction Manager, the Architect or Engineer, and/or other representatives of the Owner of the Contractor's performance of the Work will not constitute review of the adequacy of the Contractor's safety measures in, on, or near the Work site. Such reviews and inspections do not relieve the Contractor of any of the Contractor's obligations under the Contract Documents and applicable law to ensure that the Work site is maintained and the Work is performed in a safe manner.

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- 8.14.3 The Contractor will be solely responsible for the implementation and maintenance of safety programs to ensure that the Work site is maintained and the Work is performed in a safe manner in accordance with the Contract Documents and applicable law.
- 8.14.4 Within ten (10) working days following notice of award the Contractor must submit to the Owner a copy of the Contractor's Safety Plan.
- 8.14.5 The Contractor must furnish and place proper guards and systems for the prevention of accidents, including, but not limited to, those systems required pursuant to Title 8, Section 1670 and following of the California Code of Regulations concerning safety belts and nets. The Contractor must provide and maintain any other necessary systems or devices required to secure safety of life or property at the Work site in accordance with accepted standards of the industry and applicable law. The Contractor must maintain during all night hours sufficient lights to prevent accident or damage to life or property.
- 8.15 Assignment of Unfair Business Practice Claims. In accordance with California Public Contract Code Section 7103.5, the Contractor and any subcontractors offer and agree to assign to the Owner all rights, title, and interest in and to all causes of action the Contractor or any subcontractors may have under Section 4 of the Clayton Act (15 U.S.C. § 15) or under the Cartwright Act (Chapter 2 (commencing with § 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, services or materials pursuant to this contract. This assignment shall be made and become effective at the time the Owner tenders final payment to the Contractor, without further acknowledgement by the parties.
- 8.16 Contractor shall be responsible for properly notifying residents and property owners impacted by this project in accordance with City standards. Specific notification procedures vary with the type of work and shall be coordinated with the City before work begins. The City will furnish a list of impacted property owners.

9. MEASUREMENT AND PAYMENT

- 9.1 F.O.B. All shipments must be F.O.B. destination to the Work site and/or other sites indicated in the Contract Documents. The Contract Price is all-inclusive (including sales tax). There shall be no additional compensation paid for containers, packing, unpacking, drayage or insurance.
- 9.2 Payment
 - 9.2.1 On or about the first day of each calendar month the Contractor will submit to the Construction Manager a verified application for payment and schedule of values supported by a statement showing all materials actually installed during the preceding month and the cost of labor actually expended in the performance of the Work. Unless otherwise provided in the Contract Documents, no allowances or payments will be made for material or equipment not placed at the

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Work site.

- 9.2.2 To be eligible for payment the Contractor's applications for payment must include certified payroll reports prepared in accordance with California Labor Code Section 1776 and the Agreement for each employee of the Contractor and any subcontractors engaged in the performance of the Work during the preceding months, applications for payment will not be processed without certified payroll reports.
- 9.2.3 In accordance with California Public Contract Code Section 20104.50, the Owner will review applications for payment as soon as practicable after receipt. Any application or part of an application that is determined to be improper will be returned to the Contractor as soon as practicable, but no later than seven (7) days after receipt by the Owner, along with a written description of the reasons why the application is improper. The Contractor's failure to submit a schedule in the time specified in Section 3.8, or its submission of a schedule to which the Owner has taken any uncorrected exception, shall serve as a basis for returning an application for payment in its entirety.
- 9.2.4 Unless the Contractor has elected to post securities in lieu of retention in accordance with California Public Contract Code Section 22300 and the Agreement, and the Contractor and the Owner have executed an escrow agreement in accordance with the Public Contract Code and the Agreement, the Owner will make progress payments to the Contractor in accordance with applicable law in the amount of ninety five (95) percent of the value of the labor actually performed and the material incorporated in the Work as specified in Contractor's verified application for payment upon approval by the Owner's authorized representative(s). Payment of progress payments will not be construed as acceptance of the Work performed. If the Contractor has elected to post securities in lieu of retention in accordance with Public Contract Code Section 22300 and the Agreement and the Contractor and the Owner have executed an escrow agreement in accordance with the Public Contract Code and the Agreement, the Owner will make payments to the Contractor or the Contractor's escrow agent in accordance with such escrow agreement.
- 9.2.5 The Owner will pay the Contractor's final invoice in accordance with applicable law and this Section 9 following acceptance of the Work provided that:
 - 9.2.5.1 The Contractor has furnished evidence satisfactory to the Owner that all claims for labor and material have been paid, or the time for filing valid stop notices has passed and no stop notices have been filed, or all stop notices filed have been released by valid release or release bond acceptable to the Owner.
 - 9.2.5.2 No claim has been presented to the Owner by any person based upon any acts or omissions of the Contractor or any subcontractor engaged in the performance of the Work.
 - 9.2.5.3 No other claim or dispute exists under the Agreement or applicable law concerning payment of the Contractor's final invoice and/or release of the

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Agreement retention.

- 9.2.5.4 The Contractor has filed with the Owner the Maintenance Bond provided in the Contract Documents with duly notarized signatures of an authorized representative of the Contractor and an attorney-in-fact of an admitted surety insurer acceptable to the Owner and such Maintenance Bond binds the Contractor as Principal and the Surety in accordance with its terms in the amount of 10% of the final Contract Price.

- 9.2.6 In accordance with California Public Contract Code Section 20104.50, if the Owner fails to make a progress payment within thirty (30) days of receipt of an undisputed, properly submitted application for payment, the Owner will pay the Contractor interest equivalent to the legal rate set forth in subdivision (a) of California Code of Civil Procedure Section 685.010. The number of days available to the City to make a payment without incurring an interest obligation pursuant to this provision and California Public Contract Code Section 20104.50 will be reduced by the number of days, if any, by which the Owner has delayed return of an application for payment beyond the seven day return requirement set forth in Section 9.2.5.

- 9.3 Non-Allowable Direct Charges. The following costs are not allowable direct charges under the Agreement. The following costs may only be paid under the Agreement, if at all, as part of any allowance for contractor overhead and/or profit established under the Agreement.

- 9.3.1 Labor costs in excess of applicable prevailing wages pursuant to the Agreement and applicable law, liability and workers compensation insurance, social security, retirement and unemployment insurance and other employee compensation and benefits pursuant to bona fide compensation plans in effect at the time specified for the opening of Project bids for contractor and subcontractor employees engaged in the performance of the Work or in excess of the labor costs specified in Section 4.5 of this Contract in the case of cost impacts involving items for which the Contract Documents do not specify prices and for which no lump sum amount has been approved by the Owner. However, in no event will allowable direct labor charges under the agreement include employee bonuses, employee vehicles or vehicle allowances, employee telephones or telephone allowances, or employee housing or housing allowances, whether or not such benefits are part of a bona fide compensation plan in effect at the time specified for the opening of Project bids.

- 9.3.2 Superintendent labor and clerical labor.

- 9.3.3 Bond premiums

- 9.3.4 Insurance in excess of that required under Section 8.8

- 9.3.5 Utility costs

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- 9.3.6 Work Site office expenses
- 9.3.7 Home office expenses.
- 9.3.8 Permit or license costs

- 9.4 Retention. The Owner or its agent may, in accordance with the Contract Documents and applicable law, withhold any payment of monies due or that may become due the Contractor because of:
 - 9.4.1 Defective work not remedied or uncompleted work.
 - 9.4.2 Claims filed or reasonable evidence indicating probable filing of claims.
 - 9.4.3 Failure to properly pay subcontractors or to pay for material or labor.
 - 9.4.4 Reasonable doubt that the Work can be completed for the balance then unpaid.
 - 9.4.5 Damage to another contractor.
 - 9.4.6 Damage to the Owner.
 - 9.4.7 Damage to a third party.
 - 9.4.8 Delay in the progress of the Work, which, in the Owner's judgment, is due to the failure of the Contractor to properly expedite the Work.
 - 9.4.9 Liquidated damages or other charges that apply to the Contractor under the Agreement.
 - 9.4.10 Any other lawful basis for withholding payment under the contract.

- 9.5 Securities in Lieu of Retention.
 - 9.5.1 In accordance with Public Contract Code Section 22300, except where federal regulations or polices do not permit substitution of securities, the Contractor may substitute securities for any moneys withheld by the Owner to ensure performance of the Work. At the Contractor's request and expense,

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securities equivalent to the amount withheld will be deposited with the Owner, or with a state or federally chartered bank in California as the escrow agent, who will then pay those moneys to the Contractor under the terms of an Escrow for Security Deposit agreement. The Escrow for Security Deposit agreement is provided in the Contract Documents. Upon satisfactory completion of the Work, the securities will be returned to the Contractor.

- 9.5.2 Alternatively, at the Contractor's request and expense, the Owner will pay retentions earned directly to the escrow agent. At the Contractor's expense, the Contractor may direct investment of the payments into securities. Upon satisfactory completion of the Work, the Contractor will receive from the escrow agent all securities, interest, and payments received by the escrow agent from the Owner pursuant to this provision and the terms of the Escrow for Security Deposit agreement. The Contractor will, within 20 days of receipt of payment, pay to each subcontractor the respective amount of interest earned, less costs of retention withheld from each Subcontractor, on monies withheld to ensure the Contractor's performance of the Work.
- 9.5.3 Securities eligible for investment in accordance with this provision include those listed in Government Code Section 16430, bank or savings and loan certificates of deposit, interest bearing demand deposit accounts, standby letters of credit, or any other security mutually agreed to by the Contractor and the Owner.
- 9.5.4 The Contractor will be the beneficial owner of any securities substituted for moneys withheld and will receive any interest thereon.

10. PROJECT ACCEPTANCE AND CLOSEOUT

- 10.1 Occupancy. The Owner reserves the right to occupy or use any part or parts or the entire of the Work before the Work is fully performed. Subject to applicable law, exercising this right will in no way constitute acceptance of any part of the Work so occupied or used or acceptance of the entire Work, nor will such occupancy or use in any way affect the times when payments will become due the Contractor, nor will such occupancy or use in any way prejudice the Owner's rights under the Agreement, any Agreement bonds, or at law or equity. Occupancy or use shall not waive the Owner's rights to assess liquidated damages in accordance with Section 7 after the date of such occupancy or use.
- 10.2 Work Completion and Final Inspection. When the Contractor considers the Work is completed, the Contractor will submit written certification to the Construction Manager specifying that: the Contract Documents have been reviewed; the Work has been inspected for compliance with the Contract Documents; the Work has been completed in accordance with the Contract Documents; and that equipment and systems have been tested in the presence of the Owner's representative and are operational. The Owner and/or the Owner's authorized representatives will make an inspection to verify that the Work is complete and will notify the Contractor in writing of any incomplete or deficient Work. The Contractor will take immediate steps to remedy the stated deficiencies and give notice of correction to the Construction Manager. Upon receiving a notice of correction, the Owner or the Owner's authorized representatives will re-inspect the Work. The Contractor must correct all punch list items within 15 working days after the

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issuance of the punch list. Before acceptance of the Work the Contractor must submit: one set of reproducible mylars of the Project Record Drawings (As-Built), and any equipment operating and maintenance instructions and data, warranties.

- 10.3 Work Acceptance.
 - 10.3.1 All finished Work will be subject to inspection and acceptance or rejection by the Owner, the Construction Manager, and the Architect or Engineer and other government agencies having jurisdiction over the Work. Final acceptance of the Work will be at the discretion of the Owner.
 - 10.3.2 The Owner will accept the Work in writing only when the Work has been completed to the Owner's reasonable satisfaction. Progress payments will in no way be construed as acceptance of any part of the Work.
 - 10.3.3 In evaluating the Work, no allowance will be made for deviations from the Technical Specifications, Project Plans or other Contract Documents unless already approved in writing in accordance with the requirements of Section 4, above.
 - 10.3.4 The fact that the Work and materials have been inspected from time to time and that progress payments have been made does not relieve the Contractor of the responsibility of replacing and making good any defective or omitted work or materials in accordance with the requirements of the Contract Documents.

11. REMEDIES AND DISPUTES

- 11.1 Failure to Correct Work. Within ten (10) working days of receiving written notice from the Owner describing Work that is defective or that is otherwise not in accordance with the requirements of the Agreement and/or applicable law and directing that such Work be corrected, the Contractor and/or the Contractor's sureties must give the Owner written notice of the intent of the Contractor and/or the Contractor's sureties to correct such Work and commence correction of such Work in accordance with the City's notice and the Agreement. If the Contractor and/or the Contractor's sureties do not give the Owner written notice of intent to correct such Work and commence correction of such Work within ten (10) working days of receipt of the Owner's notice, then the Owner may correct such work and/or have such work corrected for the account and at the expense of the Contractor and/or its sureties, and the Contractor and/or its sureties will be liable to the Owner for any resulting excess cost. The Owner may, in addition to all other remedies that the Owner may have under the Agreement and at law or equity, deduct any such excess cost of completing the Work from amounts that are due or that may become due the Contractor.
- 11.2 Termination.
 - 11.2.1 In accordance with California Public Contract Code Section 7105, in addition to all other available remedies that the Owner may have under the Agreement, and at law or equity, the Owner may terminate the Contractor's control of the Work:
 - 11.2.1.1 If the Contractor or any of its subcontractors engaged in the performance of the Work fails to timely perform the Work and/or any of the

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Contractor's material obligations under the Contract Documents, including but not limited to submission of an acceptable schedule, that have accrued except for due

- 11.2.1.2 If the Contractor is adjudged bankrupt, or if it should make a general assignment for the benefit of creditors, or if a receiver should be appointed on account of its creditors.
 - 11.2.1.3 If the Contractor or any of the subcontractors engaged in the performance of the Work persistently or repeatedly refuses or fails to supply enough properly skilled workmen or proper materials for the timely completion of the Work.
 - 11.2.1.4 If the Contractor fails to make prompt payment to subcontractors engaged in the performance of the Work or for material or labor used in the performance of the Work in accordance with the Contract Documents and applicable law.
 - 11.2.1.5 If the Contractor or any subcontractors engaged in the performance of the Work persistently disregards laws or ordinances applicable to the performance of the Work, or the instructions of the Owner, the Construction Manager, the Architect, or other authorized representatives of the Owner.
 - 11.2.1.6 For any reason or for no reason, at the Owner's sole discretion.
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- 11.2.2 If the Owner intends to terminate the Contractor's control of the Work for any of the reasons specified in Sections 11.2.1.1 through 11.2.1.5, above, the Owner will immediately serve written notice to the Contractor and its sureties in accordance with the Contract Documents. Notice of the Owner's intent to terminate the Contractor's control of the Work will be given by registered or certified mail and specify the grounds for termination, the required cure and the time by which the cure must be effected. Upon receipt of notice of the Owner's intent to terminate the Contractor's control of the Work for any of the reasons specified in provisions 11.2.1.1 through 11.2.1.5, above, the Contractor will have ten (10) days from receipt of the notice or a longer time specified in the notice to cure its default. If the Contractor does not affect the required cure by the time specified in the notice, the Owner will issue a written notice of termination to the Contractor and its sureties by registered or certified mail. The notice of termination will specify: that upon receipt of the notice the Contractor's right to perform or complete the Work, including on behalf of the Contractor's sureties, is terminated; that the Contractor's sureties will have the right to take over and complete the Work and perform all of the Contractor's remaining obligations that have accrued under the Agreement; and that if the Contractor's sureties do not both give the Owner written notice of their intention to take over and perform the Agreement and commence completion of the Work and performance of all of the Contractor's remaining obligations that have accrued under the Agreement within ten (10) days after receipt of notice of termination that the Owner may declare the Contractor's sureties in default and take over the completion of the Work or have the Work completed for the account and at the expense of the Contractor and its sureties, and the Contractor and its sureties will be liable to the Owner for any resulting excess cost. The Owner may, in addition to all other available remedies that the Owner may have under the Contract Documents and at law or equity, deduct

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any such excess cost of completing the Work from amounts that are due or that may become due the Contractor.

- 11.2.3 Upon termination of the Contractor's control of the Work for any of the reasons specified in Sections 11.2.1.1 - 11.2.1.5, the Contractor will, if so directed by the Owner, immediately remove from the Work site any and all materials and personal property belonging to the Contractor which have not been incorporated in the Work and the Contractor and its sureties will be liable upon their bond for all damages caused the Owner by reason of the Contractor's failure to complete the Work.
- 11.2.4 Upon termination of the Contractor's control of the Work for any of the reasons specified in provisions 11.2.1.1 through 11.2.1.5, above, the Owner reserves the right to refuse tender of the Contractor by any surety to complete the Work.
- 11.2.5 If the Owner completes or has completed any portion of, or the whole of the Work, following termination of the Contractor's control of the Work for any of the reasons specified in Sections 11.2.1.1 through 11.2.1.5, above, the Owner will neither be liable for nor account to the Contractor or the Contractor's sureties in any way for the time within which, or the manner in which such Work is performed, or for any changes made in such Work or for the money expended in satisfying claims and/or suits and/or other obligations in connection with completing the Work. If, following termination of the Contractor's control of the Work for any of the reasons specified in Sections 11.2.1.1 through 11.2.1.5, above, the unpaid balance of the Contract Price exceeds the expense of completing the Work, including compensation for additional legal, managerial and administrative services and all other amounts due for the completion of the Work and/or satisfaction of claims of the Owner and/or others arising out of the Agreement and any other charges that apply to the Contractor under the Agreement, the difference will be paid to the Contractor. If such expenses of completing the Work exceed the unpaid balance of the Contract Price, the Contractor or its sureties will pay the difference to the Owner.
- 11.2.6 If the Agreement or Contractor's control of the Work is terminated for any reason, no allowances or compensation will be granted for the loss of any anticipated profit by the Contractor.
- 11.2.7 In accordance with California Government Code Section 4410, in the event a national emergency occurs, and public work being performed by contract is stopped, directly or indirectly, because of the freezing or diversion of materials, equipment or labor, as the result of an order or a proclamation of the President of the United States, or of an order of any federal authority, and the circumstances or conditions are such that it is impracticable within a reasonable time to proceed with a substantial portion of the work, then the Owner and the Contractor may, by written agreement, terminate the Agreement. In accordance with California Government Code Section 4411, such an agreement will include the terms and conditions of the termination of the contract and provision for the payment of compensation or money, if any, which either party will pay to

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the other or any other person, under the facts and circumstances in the case. Compensation to the Contractor will be determined on the basis of the reasonable value of the work done, including preparatory work. As an exception to the foregoing, in the case of any fully completed separate item or portion of the Work for which there is a separate contract price, the contract price shall control. The parties may in any other case adopt the contract price as the reasonable value of the work or any portion of the work done.

11.3 Disputes.

- 11.3.1 In accordance with California Public Contract Code Section 20104.2, the following procedures apply to claims of \$375,000 or less between the Contractor and the Owner:
 - 11.3.1.1 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.
 - 11.3.1.2 For claims of less than fifty thousand dollars (\$50,000), the Owner 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 Owner may have against the Contractor.
 - 11.3.1.2.1 If additional information is thereafter required, it shall be requested and provided pursuant to this subdivision, upon mutual agreement of the Owner and the Contractor.
 - 11.3.1.2.2 The Owner's written response to the claim, as further documented, shall be submitted to the Contractor within 15 days after receipt of the further documentation or within a period of time no greater than that taken by the Contractor in producing the additional information, whichever is greater.
 - 11.3.1.3 For claims of over fifty thousand dollars (\$50,000) and less than or equal to three hundred seventy-five thousand dollars (\$375,000), the Owner 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 Owner may have against the Contractor.
 - 11.3.1.3.1 If additional information is thereafter required, it shall be requested and provided pursuant to this subdivision, upon mutual agreement of the Owner and the Contractor.
 - 11.3.1.3.2 The Owner's written response to the claim, as further documented, shall be submitted to the Contractor within 30 days after receipt of the further documentation, or within a period of time no greater

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than that taken by the Contractor in producing the additional information or requested documentation, whichever is greater.

- 11.3.1.4 If the Contractor disputes the Owner's written response, or the Owner fails to respond within the time prescribed, the Contractor may so notify the Owner, in writing, either within 15 days of receipt of the Owner's response or within 15 days of the Owner's failure to respond within the time prescribed, respectively, and demand an informal conference to meet and confer for settlement of the issues in dispute. Upon a demand, the Owner shall schedule a meet and confer conference within 30 days for settlement of the dispute.
- 11.3.1.5 Following the meet and confer conference, if the claim or any portion remains in dispute, the Contractor may file a claim as provided in Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the Government Code. For purposes of those provisions, the running of the period of time within which a claim must be filed shall be tolled from the time the Contractor 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.
- 11.3.1.6 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 Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the Government Code.
- 11.3.2 In accordance with California Public Contract Code Section 20104.4, the following procedures apply to civil actions to resolve claims of \$375,000 or less between the Owner and the Contractor:
 - 11.3.2.1 Within 60 days, but no earlier than 30 days, following the filing or responsive pleadings, the court shall submit the matter to non-binding 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.
 - 11.3.2.2 If the matter remains in dispute, the case shall be submitted to judicial arbitration pursuant to Chapter 2.5 (commencing with Section 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, notwithstanding Section 1141.11 of that code. The Civil Discovery Act of 1986 (Article 3 (commencing with Section 2016) of Chapter 3 of Title 3 of Part 4 of the Code of Civil Procedure) shall apply to any proceeding brought under this subdivision consistent with the rules pertaining to judicial arbitration.
 - 11.3.2.2.1 Notwithstanding any other provision of law, upon stipulation of the parties, arbitrators appointed for purposes of this article shall be

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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.

- 11.3.2.2.2 In addition to Chapter 2.5 (commencing with Section 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.

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

- 11.3.3 In accordance with California Public Contract Code Section 20104.6:
 - 11.3.3.1 The Owner shall not fail to pay money as to any portion of a claim which is undisputed except as otherwise provided in the contract.
 - 11.3.3.2 In any suit filed under Public Contract Code Section 20104.4 concerning this contract, the Owner shall pay interest at the legal rate on any arbitration award or judgment. Such interest shall accrue from date the suit was filed.

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CONTRACT, PART 3 SPECIAL PROVISIONS

The Work in general consists of site preparation, Utilities, new buildings, hardscaping, parking, site work, and landscaping, and other such items of work as are required to complete the project in accordance with this Contract, the Project Plans and Technical Specifications.

The estimate of the quantities of work to be done is approximate only, being as a basis for the comparison of bids, and the Owner does not expressly or by implication agree that the actual amount of work will correspond therewith, but reserves the right to increase or decrease the amount or any portion of the work as directed by the Construction Manager.

Incidental items of construction necessary to complete the whole Work in a satisfactory and acceptable manner as shown on the Project Plans and as provided for in the Technical Specifications and not specifically referred to in this section, will be understood to be furnished by the Contractor.

12.1.02 Construction Limitations.

The Contractor will be expected to conduct his or her operations in a manner that creates a minimum of damage to the natural vegetation and landscape. Ingress and egress must be via the existing driveways. Care must be exercised to avoid hazards that may cause injury to persons, animals or property either during working hours or after work hours, which will include dust control, backfilling trenches immediately following pipe laying and temporary fencing as required. Excavation made under this Contract must be backfilled before leaving the Work for the night.

The Contractor will be responsible for obtaining permission from the property owners for any construction outside of the Work site or easements as shown on the plans. Equipment will be restricted to the immediate area of construction, pipe trenches will be backfilled as soon as possible.

Receptacles for construction residue, including oil, cleaning fluids, and litter, must be covered. Such residues must be disposed of in a proper manner.

Construction activity within the existing right-of-way must be scheduled to minimize traffic inconvenience and safety hazards to motorists, pedestrians and cyclists.

12.1.03 Storm Water Pollution Prevention.

The Contractor must perform the Work in compliance with all applicable requirements of the California State Water Resources Control Board pursuant to Order No. 99-08-DWQ, National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000002 ("General Permit") adopted pursuant to regulations adopted by the U.S. Environmental Protection Agency (USEPA) on November 16, 1990 and codified in 40 Code of Federal Regulations Parts 122, 123, 124. The General Permit applies to storm water discharges from construction sites that disturb land equal to or greater than one acre, and to construction activity that results in soil disturbances of less than one acre if the construction activity is part of a larger common plan of development that encompasses one or more acre of soil disturbance or if there is significant water quality impairment resulting from the activity. The General Permit requirements that may apply to the Contractor's performance of the Work include, but are not limited to:

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- Development and implementation of a Storm Water Pollution Prevention Plan (“SWPPP”) that specifies Best Management Practices (“BMPs”) that will prevent all construction pollutants from contacting storm water and with the intent of keeping all products of erosion from moving off site into receiving waters.
- Elimination or reduction of non-storm water discharges to storm sewer systems and other waters of the nation.
- Inspection of all BMPs.

Portions of the Work that may be subject to the General Permit include, but are not limited to clearing, grading, stockpiling and excavation.

Prior to commencing performance of the Work, the Contractor must prepare and file a Notice of Intent to obtain coverage under the General Permit, a vicinity map, and the applicable fee, with the California State Water resources Control Board, Division of Water Quality, Storm Water Permit Unit, P.O. Box 1977, Sacramento, California 95812- 1977.

Prior to commencing performance of the Work, the Contractor must also prepare an SWPPP in accordance with all applicable requirements of the General Permit and submit the SWPPP to the Construction Manager for approval.

The Contractor must also develop and implement a monitoring program to verify compliance with the General Permit.

The SWPPP must include a Project site map. Geometric equations, notes, details, and all data not related to water pollution control work shall be removed to provide clarity. A copy of the Project Plans must be used as a base plan, with the pertinent stage of construction shown as an overlay to accurately reflect Project Site conditions at various phases of construction.

The Contractor must revise and update the SWPPP whenever there is a change in construction operations that may affect the site drainage patterns or discharge of pollutants to surface waters, groundwaters, or a separate municipal storm sewer system.

Any fines, damages, Work delays or other impacts that result from failure of the Contractor or privities or agents of the Contractor to fully comply with the requirements of the General Permit or to fully implement the SWPPP will be solely the responsibility of the Contractor.

The Contractor must keep a copy of the General Permit, together with updates and revisions, at the Project Site and provide copies of the SWPPP at the request of the Owner.

12.1.04 Maintaining Traffic and Pedestrian Operations.

The Contractor must conduct his or her operations so as to cause the least possible obstruction and inconvenience to public traffic. Unless otherwise approved by the Construction Manager, all traffic must be permitted to pass through the Work.

Due to the need to accommodate and minimize inconvenience to the public, unless expressly specified or approved in writing by the Construction Manager, no road closures will be permitted. Public vehicular and pedestrian traffic must be allowed to travel through the Work

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area with an absolute minimum of interruption or impedance unless otherwise provided for in the Special Provisions or approved in writing by the Construction Manager. The Contractor must make provisions for the safe passage of pedestrians around the area of Work at all times.

Residents affected by construction must be provided passage and access through the Work area to the maximum extent possible. Where existing driveways occur on the street, the Contractor must make provisions for the trench crossings at these points, either by means of backfill or by temporary bridges acceptable to the Construction Manager, so that the length of shut-down of any driveway is kept to a minimum. In addition, all driveways must be accessible at the end of each workday, and no driveway or property access may be closed for more than four (4) hours during the workday.

Access to driveways, houses, and buildings along the road or street must be as convenient as possible and well maintained, and all temporary crossings must be maintained in good condition. To minimize the need for and complexity of detours, not more than one crossing or street intersection or road may be closed at any one time without the written approval of the Construction Manager.

The Contractor must provide multiple, advance written notices of closures to all affected property owners in a form approved by the Construction Manager.

Except as otherwise approved by the Construction Manager, the stockpiling or storing of material in City streets or rights of way shall be prohibited. Where this is unavoidable, all such materials must be piled or stored in a manner that will not obstruct sidewalks, driveways, or pedestrian crossings. Gutters and drainage channels must be kept clear and unobstructed at all times. All such materials shall be stored and handled in a manner that protects City streets, sidewalks, or other facilities from damage.

Where approved in advance by the Construction Manager, the Contractor must construct and maintain detours for the use of public traffic at his or her own expense. Failure or refusal of the Contractor to construct and maintain detours so approved at the proper time will be a material breach of the Contract subject to any and all remedies available pursuant to the Contract Documents and at law and equity. Such remedies include, but are not limited to, termination pursuant to Section 11.

Throughout performance of the Work, the Contractor must construct and adequately maintain suitable and safe crossings over trenches and such detours as are necessary to care for the public and private traffic at all times including Saturdays, Sundays and holidays.

The Contractor will be responsible for keeping all emergency services, including the Fort Bragg police and fire departments informed of obstructions to, or detours around any public or private roads caused by reasons of his or her operations.

The Contractor must comply with the State of California, Department of Transportation Manual of warning signs, lights, and devices for use and performance of work within the job site.

The fact that rain or other causes, either within or beyond the control of the Contractor, may force suspension or delay of the Work, shall in no way relieve the Contractor of his or her responsibility of maintaining traffic through the Project and providing local access as specified in this section. The Contractor must, at all times, keep on the job such materials, force and equipment as may be necessary to keep roads, streets and driveways within the Project open to traffic and in good repair and shall expedite the passage of such traffic, using such force and equipment as may be necessary.

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Full compensation for conforming to the requirements of this section will be deemed included in the prices paid or the various Contract items of Work, and no additional allowances will be made therefore.

12.1.05 Public Safety.

The Contractor must at all times conduct the Work in accordance with Construction Safety Orders of the Division of Industrial Safety, State of California, to ensure the least possible obstruction to traffic and inconvenience to the general public, and adequate protection of persons and property in the vicinity of the Work.

No pedestrian or vehicle access way may be closed to the public without first obtaining permission of the Construction Manager.

Should the Contractor fail to provide public safety as specified or if, in the opinion of the Construction Manager, the warning devices furnished by the Contractor are not adequate, the Owner may place any warning lights or barricades or take any necessary action to protect or warn the public of any dangerous condition connected with the Contractor's operations, and the Contractor will be liable to the Owner for, and the Owner may deduct from amounts due or that may become due to the Contractor under the Contract, all costs incurred including, but not limited to, administrative costs.

Nothing in this section will be construed to impose tort liability on the Owner or Construction Manager.

12.1.06 Protection of Existing Facilities and Property.

The Contractor must notify Underground Service Alert (USA) for marking the locations of existing underground facilities.

Subject to Section 5 of the General Provisions, the Contractor must take all necessary measures to avoid injury to existing surface and underground utility facilities in and near the Work site. Subject to Section 5 of the General Provisions, no error or omission of utility markouts will be construed to relieve the Contractor from his responsibility to protect all underground pipes, conduits, cables or other structures affected by the Work.

The existing underground facilities in the area of Work may include telephone, television and electrical cables, gas mains, water mains, sewer pipe and drainage pipe. The various utility companies must be notified before trenching begins and at such other times as required to protect their facilities. Subject to Section 5 of the General Provisions, all underground facilities must be located and exposed ahead of trenching to prevent damage to the facilities, and to determine the depth and character of all facilities that cross or infringe on the trench prism. The Contractor must immediately notify the Construction Manager of any facilities found. If damage should occur to the existing facilities, the utility company and the Owner must be notified immediately and, subject to Section 5 of the General Provisions, repairs acceptable to the utility company must be made at the Contractor's expense.

The Project Plans show the underground utilities on the site of the construction insofar as they are known to the Owner. The drawings may not show facilities apparent from visual inspection of the site or service laterals or appurtenances, the existence of which can be inferred from the presence of other visible facilities such as buildings, meters, junction boxes, etc. on or adjacent to the construction site.

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If in the performance of the Work an existing utility is encountered that is not shown on the Project Plans and is not apparent or inferable from visual inspection of the Project site, the Project Inspector must be notified immediately. The Construction Manager will determine, subject to Section 5 of the General Provisions, whether the Project Plans or Technical Specifications should be modified, or whether the existing utility should be relocated or whether the Contractor must work around the existing utility. Subject to Section 5 of the General Provisions, the Contractor must replace, at his or her own expense, in as good condition as they were prior to the start of construction, all existing improvements and surroundings damaged by his or her operation. Reconstruction of all existing improvements must conform to City of Fort Bragg Public Works Standard Specifications and Details under the direction of and subject to the acceptance by the Construction Manager.

Subject to Section 5 of the General Provisions, should the Contractor fail to take adequate measures to avoid injury or damage to the facilities described above, the Owner may take any actions necessary to protect such facilities from the Contractor's operations. Subject to Section 5 of the General Provisions, the Owner may withhold the cost of injury to existing surface and underground utility facilities in and near the Work site from amounts due or that may become due the Contractor.

12.1.07 Preconstruction Conference.

A pre-construction conference will be scheduled, at which time the Contractor must present his or her proposed work schedule in accordance with Section 3.8 of the General Provisions, information concerning offsite yards, Subcontractors, location of disposal and stock pile areas, and traffic control plans. All such schedules will be subject to the approval of the Construction Manager and the applicable agencies.

12.1.08 Owner Notification.

The Contractor must notify all property owners and businesses affected by the Work at least 48 hours before Work is to begin. The notice must be in writing in the form of a door hanger, and must indicate the Contractor's name and phone number, type of work, day(s) and time when Work will occur. Notices must be reviewed in advance and approved by the Construction Manager.

12.1.09 Emergency Service Providers Notifications.

The Contractor must furnish the name and phone number of a representative that can be contacted in the event of an emergency. Said information must be reported to the City Police Department dispatcher, and updated as required to provide 24-hour phone access.

12.1.10 Clean up.

Attention is directed to Section 4-1.13 of the Caltrans Standard Specifications, which section is made a part of this Contract.

Before final inspection of the Work, the Contractor must clean the construction site and all ground occupied by him in connection with the Work, of all rubbish, excess material, falsework, temporary structures and equipment. All parts of the Work shall be left in a neat and presentable condition.

Nothing herein shall require the Contractor to remove warning, regulatory, and guide signs prior to formal acceptance by the Construction Manager.

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12.1.11 Payment.

Payment for all work and work requirements specified in these Special Provisions shall be considered as included in the Contract Price and no additional allowances shall be made therefore.

12.1.12 Construction Staking.

Attention is directed to Section 3.9 of the General Provisions for information on Construction Staking.

12.1.13 Materials Testing Allowance.

Attention is directed to Section 3.10 of the General Provisions for information on Materials Testing Allowance.

12.1.14 Obstructions.

Attention is directed to Section 15, "Existing Facilities," of the CalTrans Standard Specifications, which section is made a part of this Contract.

Attention is directed to the existence of overhead and underground power, telephone, and television cable poles, underground sewer mains and laterals, underground gas mains, and underground water mains and laterals within the area in which construction is to be performed.

Prior to starting the Work, the Contractor must (a minimum of 2 working days in advance) call Underground Service Alert (USA) toll free at 811, and provide USA with all necessary data relative to the proposed work. USA will accept calls and process information to participating agencies who have underground facilities in the area between the hours of 7:30 a.m. and 5:00 p.m. daily, except Saturdays, Sundays, and holidays. Between the hours of 5:00 p.m. and 7:30 a.m. calls will be recorded and then processed after 7:30 a.m. For emergency situations, after hours and on Saturdays, Sundays and holidays, the Contractor shall contact the organization owning the affected facility. Upon notification, agencies having facilities in the area of the proposed excavation will mark their locations in the field using USA standard colors and codes to identify the facility.

The Contractor will be required to work around public and private utility facilities and other improvements that are to remain in place within the construction area, and he will be held liable to the owners of such facilities for interference with service resulting from his operations.

12.1.15 Hours of Work.

Unless otherwise specified herein, all construction activity, except for emergency situations, will be confined to Monday through Friday between the hours of 7:30 a.m. and 6:00 p.m., to minimize nuisances to local residents. Mufflers and/or baffles will be required on all construction equipment to control and minimize noise. The Contractor must comply with all applicable noise regulations in the City's Zoning Ordinance.

Saturdays, Sundays, holidays and overtime shall not be regarded as working days. Work shall not be allowed on non-working days without the expressed approval of the Construction Manager. The Contractor shall make a request for approval in writing with the stipulation (implied or expressed) that the Contractor shall pay for all overtime labor charges at the rate of \$65 per hour per inspector and/or resident engineer. All overtime labor charges shall be deducted from the final payment along with any liquidated damages.

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Work necessary for the proper care and protection of work already performed or in case of emergency may be allowed without permission of the Construction Manager.

12.1.16 Dust Control.

The Contractor must furnish all labor, equipment, and means required and carry out effective measures wherever and as often as necessary to prevent its operation from producing dust in amounts damaging to property, cultivated vegetation, or domestic animals, or causing a nuisance. The Contractor will be responsible for any damage resulting from any dust originating from the performance of the Work. The use of water resulting in mud on streets, sidewalks, or driveways, will not be permitted as a substitute for sweeping or other methods of dust control. The Contractor may not discharge smoke, dust, or any other air contaminants into the atmosphere in such quantity as will violate the regulations of any legally constituted authority.

Dust control must conform to the provisions in Section 10, "Dust Control," of the Caltrans Standard Specifications, which section is made a part of this Contract, except that references to Section 7 of the Standard Specifications are hereby deleted. Except as otherwise expressly provided in this Contract, Section 7 of the Standard Specifications is not a part of this Contract.

In lieu of the provisions of the second paragraph in Section 10-1.04, "Payment," of the Caltrans Standard Specifications, no separate payment will be made to the Contractor for controlling dust, whether caused by construction traffic or by public traffic only. Full compensation for dust control will be considered as included in the Contract Price, and no additional compensation will be allowed therefore.

12.1.17 Water For Construction and Dust Control.

Unless otherwise provided, the Contractor will be responsible for applying to the City's Utility Department to establish utility accounts for all water necessary to perform the Work. The Contractor must comply with all City requirements for construction water, including provision of deposits and provision of backflow prevention devices. In accordance with State law, backflow prevention devices for construction water connections must be re-tested when relocated. The Contractor will be responsible for the cost of any re-testing.

The Contractor is prohibited from operating gate valves, fire hydrants, pumps or any other components of the City water system. The Contractor must contact the City's utilities staff, a minimum of twenty-four (24) hours in advance, to operate these or any other components on the City water system.

12.1.18 Protection and Restoration of Vegetation.

Trees, lawns, shrubbery and vegetation that are not to be removed must be protected from damage or injury. Existing trees, shrubs, and other plants, that are not to be removed and are injured or damaged by reason of the Contractor's operations, must be replaced by the Contractor in accordance with the requirements in Section 20-4.03F, "Replacement Plants" of the Caltrans Standard Specifications. Section 20-4.03F of the Caltrans Standard Specifications is made a part of this Contract.

When it is necessary to excavate adjacent to existing trees, shrubs, or hedges, the Contractor must use all possible care to avoid injury to the trees, shrubs, or hedges and their roots. No roots or limbs two inches (2") or larger in diameter may be cut without the express approval of the Construction Manager.

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All roots two inches (2") in diameter and larger left in place must be wrapped with burlap to prevent scarring or excessive drying. When it is necessary to cut limbs and branches of trees to provide clearance for equipment used in construction, the Contractor must repair the damaged areas by properly painting with an emulsified asphalt type seal. All cuts through 1/2" or larger roots and limbs must be hand trimmed and cleanly cut before being repaired.

12.1.19 Surplus Material.

All material removed or excavated during the course of construction will be surplus. All surplus material will be the property of the Contractor and be disposed of outside the right-of-way, unless the Owner elects to salvage certain objects that are determined to be of historical interest. The Owner reserves the right of ownership of all objects that it elects to salvage, and the Contractor must protect such objects from subsequent damage until delivered unto the care of the owner.

12.1.20 Cultural Resources.

In accordance with the National Historic Preservation Act of 1966 (16 U.S.C. 470), the following procedures are implemented to insure historic preservation and fair compensation to the Contractor for delays attendant to the cultural resources investigation. The Contractor hereby agrees to comply with these procedures.

12.1.21 Historical Finds.

In the event potential historical, architectural, archeological, or cultural resources (hereinafter called cultural resources) are discovered during subsurface excavations at the site of construction, the following procedures will apply:

1. The Contractor must immediately notify the Construction Manager and stop any Work that may jeopardize the find pending an investigation of its significance;
2. The Construction Manager will select a qualified archeologist (such as through the Northwest Information Center at Sonoma State University or other official contact) and wait for an archaeologist to complete an evaluation of significance before continuing Work in that area.
3. The Construction Manager will supply the Contractor with a "Stop Work Order" directing the Contractor to cease all portions of the Work that the Construction Manager determines may impact the find. The "Stop Work Order" will be effective until a qualified archaeologist assesses the value of the potential cultural resources. The "Stop Work Order" will contain the following:
 - A clear description of the Work to be suspended;
 - Any instructions regarding issuance of further orders by the Contractor for materials services;
 - Guidance as to action to be taken regarding Subcontractors;

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- Any direction to the Contractor to minimize costs; and
 - Estimated duration of the temporary suspension.
4. If the archaeologist determines the potential find is a bona fide cultural resource, the Construction Manager may extend the duration of the "Stop Work Order" in writing, and if so the "Stop Work Order" will remain in effect and Work subject to the "Stop Work Order" may not resume until authorized by the Construction Manager.

12.1.22 Cultural Resources Defined.

Possible indicators that a cultural resource has been found include, but are not limited to the following:

1. Prehistoric-era archaeological site indicators: obsidian tools, tool manufacture waste flakes, grinding and other implements, dwelling sites, animal or human bones, fossils, and/or locally darkened soil containing dietary debris such as bone fragments and shellfish remains;
2. Historic-era site indicators: ceramic, glass, and/or metal.

12.1.23 Construction Manager's Discretion.

Once possible cultural resources are found at the Work site, the Construction Manager may use discretion to continue the Work, regardless of the cultural resource find, if the Construction Manager determines that there are overriding considerations such as the instability of the excavation site, the existence of adverse weather or other conditions that would preclude leaving the site exposed, or if the site would be unsafe to workers who would retrieve cultural resource items from therein.

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EXHIBIT E
REQUIRED CONTRACT PROVISIONS
for CDBG-Aided Construction Contracts

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1.0 GENERAL

- 1.1. This project is funded wholly or in part by the State of California Community Development Block Grant Program and is subject to both Federal and State regulatory requirements. The contractor and its subcontractors shall perform the project in compliance with all applicable Federal and State required contract provisions identified herein.
- 1.2. These contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.
- 1.3. Except as otherwise provided for in each section, the contractor shall insert in each subcontract all of the stipulations contained in these Required Contract Provisions for CDBG-Aided Construction Contracts, and further require their inclusion in any lower tier subcontract or purchase order that may in turn be made. The Required Contract Provisions for CDBG-Aided Construction Contracts shall not be incorporated by reference in any case. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with these Required Contract Provisions for CDBG-Aided Construction Contracts.
- 1.4. The contractor and its subcontractors shall perform the project in accordance with Federal Labor Standards Provisions and State Labor Standards Provisions found in Sections 15 and 16, respectively, of the Required Contract Provisions. Each worker classification must be compared for its State Prevailing Wage and its Federal Prevailing Wage, including fringe benefits for each. The higher of the two must be paid.
- 1.5. The contractor and its subcontractors shall perform the project in accordance with Federal, State and local housing and building codes as are applicable.
- 1.6. The contractor and its subcontractors shall maintain at least the minimum State-required Worker's Compensation Insurance.
- 1.7. The contractor and its subcontractors shall maintain, if so required by law, unemployment insurance, disability insurance and liability insurance in an amount to be determined by the State which is reasonable to compensate any person, firm, or corporation who may be injured or damaged by the contractor or any subcontractor in performing the project or any part of it.

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- 1.8. The contractor and its subcontractors shall retain all books, records, accounts, documentation, and all other materials relevant to the agreement for a period of five (5) years from date of termination of the agreement, or five (5) from the conclusion or resolution of any and all audits or litigation relevant to the agreement and any amendments, whichever is later.
- 1.9. The contractor and its subcontractors shall permit the State, Federal government, the Bureau of State Audits, the Department of Housing and Community Development, the City of Fort Bragg and/or their representatives, upon reasonable notice, unrestricted access to any or all books, records, accounts, documentation, and all other materials relevant to the agreement for the purpose of monitoring, auditing, or otherwise examining said materials.

2. CONFLICT OF INTEREST PROVISIONS

- 2.1. Conflict of Interest of Members, Officers, or Employees of Contractors, Members of Local Governing Body, or other Public Officials

No member, officer, or employee of Project Administrator City of Fort Bragg, or its designees or agents, no member of the governing body of the locality in which the project is situated, and no other public official of such locality or localities who exercise any functions or responsibilities with respect to the program during his/her tenure or for one year thereafter, shall have any interest, direct or indirect, in any contract or subcontract, or the proceeds thereof, for grant activities to be performed in connection with the project assisted under this Contract.

- 2.2. Conflict of Interest of Certain Federal Officials

No member of or delegate to the Congress of the United States, and no resident commissioner, shall be admitted to any share or part of this Contract or to any benefit to arise from the same.

3. EQUAL OPPORTUNITY STANDARD CONTRACT LANGUAGE FOR ALL CONTRACTS AND SUBCONTRACTS

- 3.1. The Civil Rights, HCD, and Age Discrimination Acts Assurances:

During the performance of this Contract, the contractor assures that no otherwise qualified person shall be excluded from participation or employment, denied program benefits, or be subjected to discrimination based on race, color, national origin, sex, age, or handicap, under any

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program or activity funded by this contract, as required by Title VI of the Civil Rights Act of 1964, Title I of the Housing and Community Development Act of 1974, as amended, and the Age Discrimination Act of 1975, and all implementing regulations.

3.2. The Training, Employment, and Contracting Opportunities for Business and Lower Income Persons Assurance of Compliance:

3.2.1. The work to be performed under this Contract is on a project assisted under a program providing direct Federal financial assistance from the Department of Housing and Urban Development and is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701u. Section 3 requires that to the greatest extent feasible, opportunities for training and employment be given lower income residents of the project area and contracts for Work in connection with the project be awarded to business concerns which are located in, or owned in substantial part by persons residing in the area of the project.

3.2.2. The parties to this Contract will comply with the provisions of said Section 3 and the regulations issued pursuant thereto by the Secretary of Housing and Urban Development set forth in 24 CFR Part 135, and all applicable rules and orders of the Department issued thereunder prior to the execution of this contract. The parties to this contract certify and agree that they are under no contractual or other disability which would prevent them from complying with these requirements.

3.2.3. The contractor will send to each labor organization or representative of workers with which he has a collective bargaining agreement or other contract or understanding, if any, a notice advertising the said labor organization or worker's representative of his commitments under this Section 3 clause and shall post copies of the notice in conspicuous places available to employees and applicants for employment or training.

3.2.4. The contractor will include these Section 3 clauses in every contract and subcontract for Work in connection with the project and will, at the direction of the State, take appropriate action pursuant to the contract upon a finding that any contractor or subcontractor is in violation of regulations issued by the Secretary of Housing and Urban Development, 24 CFR Part 135 and, will not let any contract unless the Grantee or contractor or subcontractor has first provided it with a preliminary statement of ability to comply with the requirements of these regulations.

3.2.5. Compliance with the provisions of Section 3, the regulations set forth in 24 CFR Part 135, and all applicable rules and orders of the Department issued

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thereunder prior to the execution of the Agreement shall be a condition of the Federal financial assistance provided to the project, binding upon the contractor, its successors, and assigns. Failure to fulfill these requirements shall subject the contractor and its subcontractors, its successors, and assigns to those sanctions specified by the grant or contract through which Federal assistance is provided, and to such sanctions as are specified by 24 CFR Part 135.

3.3. State Nondiscrimination Clause:

3.3.1. During the performance of this contract, contractor and its subcontractors shall not unlawfully discriminate against any employee or applicant for employment because of race, religion, color, national origin, ancestry, physical handicap, medical condition, marital status, age (over 40) or sex. Contractors and subcontractors shall ensure that the evaluation and treatment of their employees and applicants for employment are free of such discrimination. Contractors and subcontractors shall comply with the provisions of the Fair Employment and Housing Act (Government Code, Section 12900 et seq.) and the applicable regulations promulgated thereunder (California Code of Regulations, Title 2, Section 7258.0 et seq.) The applicable regulations of the Fair Employment and Housing Commission implementing Government Code, Section 12990, 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 if set forth in full. Contractor and its subcontractors shall give written notice of their obligations under this clause to labor organizations with which they have a collective bargaining or other agreement.

3.3.2. This contractor shall include the nondiscrimination and compliance provisions of this clause in all subcontracts to perform work under the contract.

3.3.3. The Contractor hereby agrees to abide by the requirement of executive order 11246 and all implement regulations of the Department of Labor.

4. SECTION 3 CLAUSE FOR CONSTRUCTION CONTRACTS AND SUBCONTRACTS AT OR ABOVE \$100,000

4.1. The work to be performed under this contract is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C 1701u (Section 3). The purpose of Section 3 is to ensure that employment and other economic opportunities generated by HUD assistance or HUD-assisted projects covered by Section 3, shall to the

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greatest extent feasible, be directed to low- and very low-income persons, particularly persons who are recipients of HUD assistance for housing.

- 4.2. The parties to this contract agree to comply with HUD's regulations in 24 CFR part 135, which implement Section 3. As evidence by their execution of this contract, the parties to this contract certify that they are under no contractual or other impediment that would prevent them from complying with part 135 regulations.
- 4.3. The contractor agrees to send to each labor organization or representative of workers with which the contractor has a collective bargaining agreement or other understanding, if any, a notice advising the labor organization or workers' representative of the contractor's commitments under this Section 3 clause, and will post copies of the notice in conspicuous places at the work site where both employees and applicants for training and employment positions can see the notice. The notice shall describe the Section 3 preference, shall set forth minimum number and job titles subject to hire, availability of apprenticeship and training positions, the qualifications for each; and the name and location of the person(s) taking applications for each of the positions, and the anticipated date the work shall begin.
- 4.4. The contractor agrees to include this Section 3 clause in every subcontract subject to compliance with regulations in 24 CFR part 135, and agrees to take appropriate action, as provided in an applicable provision of the subcontract or in this Section 3 clause, upon a finding that the subcontractor is in violation of the regulations in 24 CFR part 135. The contractor will not subcontract with any subcontractor where the contractor has notice or knowledge that the subcontractor has been found in violation of the regulations in 24 CFR part 135.
- 4.5. The contractor will certify that any vacant employment positions, including training positions, that are filled (1) after the contractor is selected but before the contract is executed, and (2) with persons other than those to whom the regulations of 24 CFR part 135 require employment opportunities to be directed, were not filled to circumvent the contractor's obligations under 24 CFR part 135.
- 4.6. Noncompliance with HUD's regulations in 24 CFR part 135 may result in sanctions, termination of this contract for default, and debarment or suspension from future HUD-assisted contracts.
- 4.7. Section 3 Numerical Goals/Targets:
 - 4.7.1. The Target for New Hires & Training Opportunities is 30% of the aggregate # of new hires

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4.7.2. Targets for Contracts with Section 3 Business Concerns are: Construction 10% of the total dollar amount. All Other contracts, 3% of the total dollar amount of all other Section 3 covered contracts.

5. EQUAL OPPORTUNITY STANDARD SOLICITATION FOR BID AND CONTRACT LANGUAGE – CONSTRUCTION OVER \$10,000

5.1. Equal Opportunity Clause: During the performance of this contract, the contractor agrees as follows:

5.1.1. The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

5.1.2. The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.

5.1.3. The contractor will send to each labor union or representative of workers with which the contractor has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

5.1.4. The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

5.1.5. The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to its books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

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- 5.1.6. In the event of the contractor's noncompliance with the discrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further government contracts or Federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rules, regulations, or orders of the Secretary of Labor, or as otherwise provided by law.
- 5.1.7. The contractor will include the portion of the sentence immediately preceding paragraph 5.1.1. and the provisions of paragraphs 5.1.1. through 5.1.7. in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 504 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance; provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

The applicant further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in Federally assisted construction work; provided, that if the applicant so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality, or subdivision of such government which does not participate in work on or under the contract.

The applicant agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of contractors and subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance.

The applicant further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated

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eligibility for, government contracts and Federally assisted construction contracts, pursuant to the Executive Order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order. In addition, the applicant agrees that if it fails or refuses to comply with these undertakings, the administering agency may take any or all of the following actions: cancel, terminate, or suspend in whole or in part this grant (contract, loan, insurance, guarantee); refrain from extending any further assistance to the applicant under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such applicant; and refer the case to the Department of Justice for appropriate legal proceedings.

5.2. FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION CONTRACT SPECIFICATIONS

5.2.1. As used in these specifications:

- 5.2.1.1. "Covered area" means the geographical area described in the solicitation from which this contract resulted.
- 5.2.1.2. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority.
- 5.2.1.3. "Employer identification number" means the Federal social security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.
- 5.2.1.4. "Minority" includes:
- 5.2.1.5. Black (all persons having origins in any of the Black African racial groups not of Hispanic origin).
- 5.2.1.6. Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish culture or origin, regardless of race).
- 5.2.1.7. Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, southeast Asia, the Indian subcontinent or the Pacific Islands).

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- 5.2.1.8. American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).
- 5.2.2. Whenever the contractor, or any subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.
- 5.2.3. If the contractor is participating (pursuant to 41 CFR 604.5) in a Hometown Plan approved by the U. S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the plan area (including goals and timetables) shall be in accordance with that plan for those trades which have unions participating in the plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each contractor or subcontractor participating in an approved plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the plan in each trade in which it has employees. The overall good faith performance by other contractors or subcontractors toward a goal in an approved plan does not excuse any covered contractor's or subcontractor's failure to take good faith efforts to achieve the plan's goals and timetables.
- 5.2.4. The contractor shall implement the specific affirmative action standards provided in paragraphs 5.2.7.1. through 5.2.7.16. of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered construction contractors performing construction work in geographical areas where they do not have a Federal or Federally-assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form and such notices may be obtained from any Office of Federal Contract Compliance Programs or from Federal procurement contracting officers. The contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

- 5.2.5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.
- 5.2.6. In order for the non-working training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the contractor during the training period, and the contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.
- 5.2.7. The contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The contractor shall document these efforts fully and shall implement affirmative action steps at least as extensive as the following:
- 5.2.7.1. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the contractor's employees are assigned to work. The contractor, where possible, will assign two or more women to each construction project. The contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.
 - 5.2.7.2. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.
 - 5.2.7.3. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the contractor by the union or, if referred, not employed by the contractor, this shall be

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documented in the file with the reason therefore, along with whatever additional actions the contractor may have taken.

- 5.2.7.4. Provide immediate written notification to the Director when the union or unions with which the contractor has a collective bargaining agreement has not referred to the contractor a minority person or woman sent by the contractor or when the contractor has other information that the union referral process has impeded the contractor's efforts to meet its obligations.
- 5.2.7.5. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the contractor's employment needs, especially those programs funded or approved by the Department of Labor. The contractor shall provide notice of these programs to the sources compiled under 7.b. above.
- 5.2.7.6. Disseminate the contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.
- 5.2.7.7. Review at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions, including specific review of these items with on-site supervisory personnel such as superintendents, general foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.
- 5.2.7.8. Disseminate the contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the contractor's EEO policy with other contractors and subcontractors with whom the contractor does or anticipates doing business.

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- 5.2.7.9. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.
 - 5.2.7.10. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after-school summer and vacation employment to minority and female youth both on the site and in other areas of a contractor's workforce.
 - 5.2.7.11. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60.3.
 - 5.2.7.12. Conduct at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.
 - 5.2.7.13. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the contractor's obligations under these specifications are being carried out.
 - 5.2.7.14. Ensure that all facilities and company activities are non-segregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.
 - 5.2.7.15. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.
 - 5.2.7.16. Conduct a review, at least annually, of all supervisors' adherence to and performance under the contractor's EEO policies and affirmative action obligations.
- 5.2.8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations

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(paragraphs 5.2.7.1. through 5.2.7.16.). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under paragraphs 5.2.7.1. through 5.2.7.16. of these specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the contractor. The obligation to comply, however, is the contractor's and failure of such a group to fulfill an obligation shall not be a defense for the contractor's noncompliance.

- 5.2.9. A single goal for minorities and a separate single goal for women have been established. The contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the contractor has achieved its goals for women generally, the contractor may be in violation of the Executive Order if a specific minority group of women is under-utilized).
- 5.2.10. The contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex or national origin.
- 5.2.11. The contractor shall not enter into any subcontract with any person or firm debarred from government contracts pursuant to Executive Order 11246.
- 5.2.12. The contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.
- 5.2.13. The contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those

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standards prescribed in paragraph 5.2.7. of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.

- 5.2.14. The contractor shall designate a responsible official to monitor all employment related activity to ensure that the company's EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the government and to keep records. Records shall at least include for each employee the name, address, telephone number, construction trade, union affiliation, if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.
- 5.2.15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area resident (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).
- 5.2.16. By the submission of this bid, the bidder, offeror, applicant, or subcontractor certifies that he/she does not maintain or provide for his/her employees any segregated facility at any of his/her establishments, and that he/she does not permit employees to perform their services at any location under his/her control where segregated facilities are maintained. He/she certifies further that he/she will not maintain or provide for employees any segregated facilities at any of his/her establishments, and he/she will not permit employees to perform their services at any location under his/her control where segregated facilities are maintained. The bidder, offeror, applicant, or subcontractor agrees that a breach of this certification is a violation of the Equal Opportunity Clause of this contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms, and other storage or dressing areas,* transportation and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, or national origin, habits, local custom, or otherwise. He/she further agrees that (except where he/she has obtained identical certifications from

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proposed subcontractors for specific time periods) he/she will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity Clause; that he/she will retain such certifications in his/her files; and that he/she will forward the following notice to such proposed subcontractors (except where proposed subcontractors have submitted identical certifications for specific time periods).

**Parking lots, drinking fountains, recreation or entertainment areas.*

6. NON-DISCRIMINATION CLAUSE

6.1. During the performance of this Contract, the Contractor and its subcontractors shall not 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, marital status, denial of family and medical care leave and denial of pregnancy disability leave. Contractor and subcontractors shall insure that the evaluation and treatment of their employees and applicants for employment are free from such discrimination and harassment. The Contractor and subcontractors shall comply with the provisions of the Fair Employment and Housing Act (Government Code, Section 12900 et seq.) and the applicable regulations promulgated thereunder (California Code of Regulations, Title 2, Section 7285.0 et seq.) 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 if 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.

6.2. Contractor shall include the nondiscrimination and compliance provisions of this clause in all subcontracts to perform work under the agreement.

7. WBE/MBE STANDARD BID DOCUMENT LANGUAGE FOR CONSTRUCTION CONTRACTS OVER \$10,000 - NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY (EXECUTIVE ORDER 11246)

7.1. The offeror or bidder's attention is called to the "Equal Opportunity Clause" (Paragraph 5.1 of the Required Contract Provisions for CDBG-Aided Construction Contracts) and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" (Paragraph 5.2 of the

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- 7.2. The goals and timetables for minority and female participation, expressed in percentage terms for the contractor's aggregate workforce in each trade on all construction work in the covered areas are as follows:

Timetables	Goals for Minority Participation in Each Trade	Goals for Female Participation in Each Trade
April 1, 1981, until further notice	23.2%	6.9%

These goals are applicable to all contractor's construction work (whether or not it is Federal or Federally assisted) performed in the covered area. If the contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the contractor also is subject to the goals for both its Federally involved and non-Federally involved construction.

- 7.3. The contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts to meet the goals established for the geographical area where the contract resulting from this solicitation is to be performed. The hours of minority and female employment and training must be substantially uniform through the length of the contract, and in each trade, and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from contractor to contractor or from project to project for the sole purpose of meeting the contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.
- 7.4. The contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs, U.S. Department of Labor, within 10 working days of award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address, and telephone number of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the contract is to be performed.

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7.5. As used in this notice, and in the contract resulting from this solicitation, the "covered area" is the City of Fort Bragg, Mendocino County, in the State of California.

8. FEMALE AND MINORITY GOALS AND TIMETABLES: WBE/MBE STANDARD CONTRACT LANGUAGE – CONSTRUCTION OVER \$10,000

8.1. The following goals and timetables for female utilization shall be included in all Federal and Federally-assisted construction contracts and subcontracts in excess of \$10,000. The goals are applicable to the contractor's aggregate on-site construction workforce whether or not part of that workforce is performing work on a Federal or Federally-assisted construction contract or subcontract.

8.2. Goals for females apply nationwide – 6.9%.

8.3. Timetable is from April 1, 1981, until further notice.

8.4. Until further notice, the following goals for minority utilization in each construction craft and trade shall be included in all Federal or Federally-assisted construction contracts and subcontracts in excess of \$10,000 to be performed in the respective geographical areas. The goals are applicable to each nonexempt contractor's total on-site construction workforce, regardless of whether or not part of that workforce is performing work on a Federal, Federally-assisted, or non-Federally related project, contract, or subcontract.

8.5. Construction contractors participating in an approved Hometown Plan (see 41 CFR 60-4.5) are required to comply with the goals of the Hometown Plan with regard to construction work they perform in the area covered by the Hometown Plan. With regard to all their other covered construction work, such contractors are required to comply with the applicable SMSA or EA goal contained in this appendix.

8.6. San Francisco-Oakland-San Jose Economic Area: Lake County, Mendocino County, San Benito County - 23.2%

9. EQUAL OPPORTUNITY

9.1. The Civil Rights, Housing and Community Development, and Age Discrimination Acts Assurances:

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During the performance of this Contract, the contractor and its subcontractors assure that no otherwise qualified person shall be excluded from participation or employment, denied program benefits, or be subjected to discrimination based on race, color, national origin, sex, age, handicap, religion, familial status, or religious preference, under any grant activity funded by this Contract, as required by Title VI of the Civil Rights Act of 1964, Title I of the Housing and Community Development Act of 1974, as amended, the Age Discrimination Act of 1975, the Fair Housing Amendment Act of 1988, and all implementing regulations.

9.2. Rehabilitation Act of 1973 and the “504 Coordinator”:

The contractor further agrees to implement the Rehabilitation Act of 1973, as amended, and its regulations, 24 CFR Part 8, including, but not limited to, for contractors with 15 or more permanent full or part time employees, the local designation of a specific person charged with local enforcement of this Act, as the “504 Coordinator.”

9.3. The Training, Employment, and Contracting Opportunities for Business and Lower Income Persons Assurance of Compliance

9.3.1. The work to be performed under this Contract is on a project assisted under a program providing direct Federal financial assistance from the Department of Housing and Urban Development and is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701u. Contractors and subcontractors shall direct their efforts to provide, to the greatest extent feasible, training and employment opportunities generated from the expenditure of Section 3 covered assistance to Section 3 residents in the order of priority provided in 24 CFR 135.34 (a)(2)

9.3.2. The parties to this Contract will comply with the provisions of said Section 3 and the regulations issued pursuant thereto by the Secretary of Housing and Urban Development set forth in 24 CFR Part 135, and all applicable rules and orders of the Department issued thereunder prior to the execution of this contract. The parties to this contract certify and agree that they are under no contractual or other disability which would prevent them from complying with these requirements.

9.3.3. The Contractor will include these Section 3 clauses in every contract and subcontract for Work in connection with the project and will, at the direction of the State, take appropriate action pursuant to the contract or subcontract upon a finding that the contractor or subcontractor is in violation of regulations issued by the Secretary of Housing and Urban Development, 24 CFR Part 135 and, will not let any contract unless the contractor or subcontractor has

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first provided it with a preliminary statement of ability to comply with the requirements of these regulations.

9.3.4. Compliance with the provisions of Section 3, the regulations set forth in 24 CFR Part 135, and all applicable rules and orders of the Department issued thereunder prior to the execution of the Agreement shall be a condition of the Federal financial assistance provided to the project, binding upon the Grantee, its successors, and assigns. Failure to fulfill these requirements shall subject the Grantee, its contractors and subcontractors, its successors, and assigns to those sanctions specified by the grant or contract through which Federal assistance is provided, and to such sanctions as are specified by 24 CFR Part 135.

9.4. Americans with Disabilities Act (ADA) of 1990:

By signing this Contract, the Contractor assures the State that it complies with the Americans with Disabilities Act (ADA) of 1990 (42 U.S.C. 12101 et seq.), which prohibits discrimination on the basis of disability, as well as all applicable regulations and guidelines issued pursuant to the ADA.

9.5. Assurance of Compliance with Requirements Placed on Construction Contracts of \$10,000 or more:

The Contractor hereby agrees to place in every subcontract for construction exceeding \$10,000 the Notice of Requirement for Affirmative Action to ensure Equal Opportunity (Executive Order 11246), the Standard Equal Employment Opportunity, and the Construction Contract Specifications. The contractor further agrees to insert the appropriate Goals and Timetables issued by the U.S. Department of Labor in such subcontracts.

10. COPELAND "ANTI-KICKBACK" ACT (18 U.S.C. 874)

Contractor shall comply with the Copeland "Anti-Kickback" Act (18 U.S.C. 874) as supplemented in Department of Labor regulations (29 CFR Part 3).

11. COMPLIANCE WITH CLEAN AIR ACT AND CLEAN WATER ACT.

Contractor shall comply with all applicable standards, orders and requirements issued under Section 306 of the Clean Air Act (42 U.S.C. 1857(h)).

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11.1. Contractor shall comply with all applicable standards, orders and requirements issued under Section 508 of the Clean Air Act (33 U.S.C. 1368).

11.2. Contractor shall comply with Executive Order 11738 and Environmental Protection Agency regulations (40 CFR Part 15).

12. COMPLIANCE WITH ENERGY POLICY AND CONSERVATION ACT (PUB. L. 94-163, 89 STAT. 871)

The Contractor shall comply with the mandatory standards and policies relating to energy efficiency which are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act (Pub. L. 94-163, 89 Stat. 871).

13. COMPLIANCE WITH SECTIONS 103 AND 107 OF THE CONTRACT WORK HOURS AND SAFETY STANDARDS ACT (40 U.S.C. 327-330)

Contractor will comply with Sections 103 and 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 327-330) as supplemented by Department of Labor regulations (29 CFR part 5). Requires the contracting officer to insert the clauses set forth in 29 CFR part 5, Construction contracts awarded by grantees and subgrantees in excess of \$2000, and in excess of \$2500 for other contracts which involve the employment of mechanics or laborers)

14. BONUS OR COMMISSION, PROHIBITION AGAINST PAYMENTS OF

The assistance provided under this Agreement shall not be used in the payment of any bonus or commission for the purpose of:

14.1. Obtaining the Department's approval of the application for such assistance; or

14.2. The Department's approval of the applications for additional assistance; or

14.3. Any other approval or concurrence of the Department required under this agreement, Title I of the Housing and Community Development Act of 1974, or the State regulations with respect thereto; provided, however, that reasonable fees for bona fide technical, consultant, managerial or other such services, other than actual solicitation, are not hereby prohibited if otherwise eligible as program costs.

15. FEDERAL LABOR STANDARDS PROVISIONS

Applicability:

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The Project or Program to which the construction work covered by this contract pertains is being assisted by the United States of America and the following Federal Labor Standards Provisions are included in this Contract pursuant to the provisions applicable to such Federal assistance.

1. (i) Minimum Wages. All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFFT Part 3), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of 29 CFR-5.5(a)(1)(iv); also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period.

Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR Part 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under 29 CFR Part 5.5(a)(1)(ii) and the Davis-Bacon poster (WH-1 321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(ii) (a) Any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. HUD shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

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(2) The classification is utilized in the area by the construction industry;
and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(b) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and HUD or its designee agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by HUD or its designee to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary (Approved by the Office of Management and Budget under OMB control number 1215-0140).

(c) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and HUD or its designee do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), HUD or its designee shall refer the questions, including the views of all interested parties and the recommendation of HUD or its designee, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary (Approved by the Office of Management and Budget under OMB Control Number 1215-0140).

(d) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (1) (b) or (c) of this paragraph, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable

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standards of the Davis-Bacon Act have been met The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program (Approved by the Office of Management and Budget under OMB Control Number 1215-0140).

2. Withholding. HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract In the event of failure to pay any laborer or mechanic, including any apprentice, trainee or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the contract HUD or its designee may, after written notice to the contractor, sponsor, applicant or owner, take such action as may be necessary to cause the suspension of any further payment advance, or guarantee of funds until such violations have ceased. HUD or its designee may, after written notice to the contractor, disburse such amounts withheld for and on account of the contractor or sub- contractor to the respective employees to whom they are due. The Comptroller General shall make such disbursements in the case of direct Davis-Bacon Act contracts.

3. (i) Payrolls and basic records. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker. his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in Section I (b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5 (a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or pro- gram described in Section I (b)(2)(B) of the Davis-Bacon Act the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred

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in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs (Approved by the Office of Management and Budget under OMB Control Numbers 1215-0140 and 1215-0017).

- (ii) (a)** The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to HUD or its designee if the agency is a party to the contract but if the agency is not such a party, the contractor will submit the payrolls to the applicant sponsor, or owner, as the case may be, for transmission to HUD or its designee. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR Part 5.5(a)(3)(i). This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal Stock Number 029-005-WO14-1), U.S. Government Printing Office, Washington, DC. 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors (Approved by the Office of Management and Budget under OMB Control Number 1215-0149).
- (b)** Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:
- (1)** That the payroll for the payroll period contains the information required to be maintained under 29 CFR Part 5.5 (a)(3)(i) and that such information is correct and complete;
 - (2)** That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR Part 3;
 - (3)** That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract
- (c)** The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph A.3.(ii)(b) of this section.

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(d) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph A.3.(i) of this section available for inspection, copying, or transcription by authorized representatives of HUD or its designee or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, HUD or its designee may, after written notice to the contractor, sponsor, applicant or owner, take such action as may be necessary to cause the suspension of any further payment advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR Part 5.1 2.

4. (i) Apprentices and Trainees. Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe

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benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training, or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR Part 3 which are incorporated by reference in this contract.

6. Subcontracts. The contractor or subcontractor will insert in any sub- contracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as HUD or its designee may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR Part 5.5.

7. Contract Termination; debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act Requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract

9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and HUD or its designee, the U.S. Department of Labor, or the employees or their representatives.

10. (i) Certification of Eligibility. By entering into this contract the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001. Additionally, U.S. Criminal Code, Section 1010, Title 18, U.S.C., "Federal Housing Administration transactions", provides in part "Whoever, for the purpose of . . . influencing in any way the action of such Administration . . .

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For CDBG-Aided Construction Contracts

. .makes, utters or publishes any statement knowing the same to be false . .
.shall be fined not more than \$5,000 or imprisoned not more than two years, or
both."

11. Complaints, Proceedings, or Testimony by Employees. No laborer or mechanic to whom the wage, salary, or other labor standards provisions of this Contract are applicable shall be discharged or in any other manner discriminated against by the Contractor or any subcontractor because such employee has filed any complaint or instituted or caused to be instituted any proceeding or has testified or is about to testify in any proceeding under or relating to the labor standards applicable under this Contract to his employer.

B. Contract Work Hours and Safety Standards Act. As used in this paragraph, the terms "laborers" and "mechanics" include watchmen and guards.

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of eight hours in any calendar day or in excess of forty hours in such workweek, whichever is greater.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in subparagraph (1) of this paragraph, the contractor and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory, for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in subparagraph (1) of this paragraph, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of eight hours or in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in subparagraph (1) of this paragraph.

(3) Withholding for unpaid wages and liquidated damages. HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contract or any other Federally-assisted contract subject to the Contract Work Hours and Safety

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Standards Act which is held by the same prime contractor such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in subparagraph (2) of this paragraph.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in subparagraph (1) through (4) of this paragraph and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in subparagraphs (1) through (4) of this paragraph.

C. Health and Safety

(1) No laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health and safety as determined under construction safety and health standards promulgated by the Secretary of Labor by regulation.

(2) The Contractor shall comply with all regulations issued by the Secretary of Labor pursuant to Title 29 Part 1926 (formerly part 1518) and failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act (Public Law 91 -54, 83 Stat 96).

(3) The Contractor shall include the provisions of this Article in every subcontract so that such provisions will be binding on each subcontractor. The Contractor shall take such action with respect to any subcontract as the Secretary of Housing and Urban Development or the Secretary of Labor shall direct as a means of enforcing such provisions.

16. STATE LABOR STANDARDS PROVISIONS

State prevailing wage rates shall apply when the State wage rate is higher than the Federal wage rate. All contractors and subcontractors are subject to the application of Section 1720 et seq. of the California Labor Code which details the regulations and procedures governing the payment of State prevailing wages.

All contractors and subcontractors are subject to the provisions of Section 3700 of the California Labor Code which requires that every employer be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of the code.

All contractors and subcontractors are subject to the provisions of Sections 1810-1814 of the California Labor Code which provide that the maximum hours a worker

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is to be employed is limited to eight hours a day and 40 hours a week and the contractor or subcontractor shall forfeit, as a penalty, \$25 for each worker employed in the execution of the contract for each calendar day during which a worker is required or permitted to labor more than eight hours in any calendar day or more than 40 hours in any calendar week and is not paid overtime.

Section 1815 of the California Labor Code requires that notwithstanding the provisions of Sections 1810-1814, employees of contractors who work in excess of eight hours per day and 40 hours per week shall be compensated for all hours worked in excess of eight hours per day at not less than 1-1/2 times the basic rate of pay.

FORM 1

**CONTRACTOR'S CERTIFICATION
CONCERNING CONFLICT OF INTEREST**

By submitting its proposal the Contractor certifies as follows:

I am aware and in compliance with the following provisions regarding Conflict of Interest of Contractors:

1. Conflict of Interest of Members, Officers, or Employees of Contractors, Members of Local Governing Body, or other Public Officials

Pursuant to 24 CFR 570.611, no member, officer, or employee of Parents & Friends, Inc. (PFI) or the City of Fort Bragg, or their designees or agents, no member of the governing body of the locality in which the project is situated, and no other public official of such locality or localities who exercise or have exercised any functions or responsibilities with respect to CDBG activities assisted under this part, or who are in a position to participate in a decision-making process or gain inside information with regard to such activities, may obtain a financial interest or benefit from a CDBG-assisted activity, or have a financial interest in any contract, subcontract or agreement with respect to a CDBG-assisted activity or its proceeds, either for themselves or those with whom they have business or immediate family ties, during their tenure or for one (1) year thereafter.

2. Conflict of Interest of Certain Federal Officials

No member of or delegate to the Congress of the United States, and no resident commissioner, shall be admitted to any share or part of this Contract or to any benefit to arise from the same.

Signed _____
(Contractor representative)

By _____
Print Name and Title

Date: _____

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FORM 2

**CONTRACTOR'S/SUBCONTRACTOR'S CERTIFICATION
CONCERNING STATE LABOR STANDARDS AND PREVAILING
WAGES**

All contractors and subcontractors shall give the following certification to the grantee and forward this certification to the grantee within 10 days after the execution of any contract or subcontract.

- A. "I am aware of the provisions of Section 1720 et seq. of the California Labor Code which requires that the State prevailing wage rate shall be paid to employees where this rate exceeds the Federal wage rate."

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

- C. "It is further agreed that, except as may be provided in Section 1815 of the California Labor Code, the maximum hours a worker is to be employed is limited to eight hours a day and 40 hours a week and the subcontractor shall forfeit, as a penalty, \$25 for each worker employed in the execution of the subcontract for each calendar day during which a worker is required or permitted to labor more than eight hours in any calendar day or more than 40 hours in any calendar week."

(Contractor/Subcontractor)

By _____
Signature

Typed Name and Title

Date

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Form 3
PAYROLL FORM WH-347 PAGE 1 OF 2

U.S. Department of Labor
Employment Standards Administration
Wage and Hour Division

PAYROLL
(For Contractor's Optional Use; See Instructions, Form WH-347 Inst.)
Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number.



(1) NAME, ADDRESS, AND SOCIAL SECURITY NUMBER OF EMPLOYEE	(2) JOB TITLE OR CLASSIFICATION	(3) FOR WEEK ENDING							(4) TOTAL HOURS	(5) RATE OF PAY	(6) GROSS AMOUNT EARNED	(7) DEDUCTIONS			(8) NET WAGES PAID FOR WEEK
		1	2	3	4	5	6	7				WITH-HOLDING TAX	OTHER	TOTAL DEDUCTIONS	
		(9) DAY AND DATE													
		1	2	3	4	5	6	7							
		HOURS WORKED EACH DAY													
									0.00	\$0.00					\$0.00
									0.00	\$0.00					\$0.00
									0.00	\$0.00					\$0.00
									0.00	\$0.00					\$0.00
									0.00	\$0.00					\$0.00
									0.00	\$0.00					\$0.00
									0.00	\$0.00					\$0.00
									0.00	\$0.00					\$0.00
									0.00	\$0.00					\$0.00
									0.00	\$0.00					\$0.00
									0.00	\$0.00					\$0.00
									0.00	\$0.00					\$0.00

We estimate that it will take an average of 56 minutes to complete this collection of information, including time for reviewing instructions searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. If you have any comments regarding these estimates or any other aspect of this collection of information, including suggestions for reducing this burden, send them to the Administrator, Wage and Hour Division, ESA, U. S. Department of Labor, Room S3802, 200 Constitution Avenue, N. W., Washington, D. C. 20210.

FORM WH-347 (REV. 10/14) USE PREVIOUS EDITIONS - PURCHASE THIS FORM DIRECTLY FROM THE SUPPLY OF DOCUMENTS

FORM 3 CONTINUED
U.S. DEPARTMENT OF LABOR
WAGE AND HOUR DIVISION

INSTRUCTIONS FOR COMPLETING PAYROLL FORM, WH-347

General: The use of WH-347, payroll form, is not mandatory. This form has been made available for the convenience of contractors and subcontractors required by their Federal or Federally-aided construction-type contracts and subcontracts to submit weekly payrolls. Properly filled out, this form will satisfy the requirements of Regulations, Parts 3 and 5 (29 CFR, Subtitle A), as to payrolls submitted in connection with contracts subject to Davis-Bacon and related Acts. This form meets need resulting from the amendment of the Davis-Bacon Act to include fringe benefits provisions. Under this amended law, the contractor is required to pay not less than fringe benefits as predetermined by the Department of Labor, in addition to payment of not less than the predetermined rates. The contractor's obligation to pay fringe benefits may be met either by payment of the fringes to the various plans, funds, or programs, or by making these payments to the employees as cash in lieu of fringes. This payroll provides for the contractor's showing on the face of the payroll all monies paid to the employees, whether as basic rates or as cash in lieu of fringes and provides for the contractor's representation in the statement of compliance on the rear of the payroll that he is paying to others fringes required by the contract and not paid as cash in lieu of fringes. Detailed instructions concerning the preparation of the payroll follow:

Contractor or Subcontractor: Fill in your firm's name and check appropriate box.

Address: Fill in your firm's address.

Column 1. Name, Address, and Social Security Number of Employee: The employee's full name must be shown on each weekly payroll submitted. The employee's address must also be shown on the payroll covering the first week in which the employee works on the project. The address need not be shown on subsequent weekly payrolls unless his address changes. Although not required by Regulations, Parts 3 and 5, space is available in the name and address section so that social security numbers may be listed.

Column 2. Withholding Exemptions: This column is merely inserted for the employer's convenience and is not a requirement of Regulations, Parts 3 and 5.

Column 3. Work Classifications: List classification descriptive of work actually performed by employees. Consult are deemed necessary, see contracting officer or agency representative. The employee may be shown as having worked in more than one classification, provided accurate breakdown of hours so worked is maintained and shown on submitted payroll by use of separate line entries.

Column 4. Hours Worked: On all contracts subject to the Contract Work Hours Standards Act, enter as overtime hours all hours worked in excess 40 hours a week.

Column 5. Total: Self-explanatory.

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Column 6. Rate of Pay, including Fringe Benefits: In straight time box, list actual hourly rate paid the employee for straight time worked plus any cash in lieu of fringes paid the employee. When recording the straight time hourly rate, any cash paid in lieu of fringes may be shown separately from the basic rate. This is of assistance in correctly computing overtime (see "Fringe Benefits" below). In the overtime box, show overtime hourly rate paid, plus any cash in lieu of fringes paid the employee (see "Fringe Benefits" below). Payment of not less than time and one-half the basic or regular rate paid is required for overtime under the Contract Work Hours Standards Act of 1962. In addition to paying not less than the predetermined rate for the classification in which the employee works, the contractor shall pay to approved plans, funds, or programs or shall pay as cash in lieu of fringes, amounts predetermined as fringe benefits in the wage decision made part of the contract (see "Fringe Benefits" below).

FRINGE BENEFITS - Contractors Who Pay All Required Fringe Benefits: A contractor who pays fringe benefits to approved plans, funds, or programs in amounts not less than were determined in the applicable wage decision of the Secretary of Labor shall continue to show on the face of the payroll the basic cash hourly rate and overtime rate paid to his employees just as he has always done. Such a contractor shall check paragraph 4(a) of the statement on the reverse of the payroll to indicate that he is also paying to approved plans, funds, or programs not less than the amount predetermined as fringe benefits for each craft. Any exceptions shall be noted in Section 4(c).

Contractors Who Pay No Fringe Benefits: A contractor who pays no fringe benefits shall pay to the employee, and insert in the straight time hourly rate column of the payroll, an amount not less than the predetermined rate for each classification plus the amount of fringe benefits determined for each classification in the applicable wage decision. Inasmuch as it is not necessary to pay time and a half on cash paid in lieu of fringes, the overtime rate shall be not less than the sum of the basic predetermined rate, plus the half-time premium on basic or regular rate, plus the required cash in lieu of fringes at the straight time rate. In addition, the contractor shall check paragraph 4(b) of the statement on the reverse of the payroll to indicate that he is paying fringe benefits in cash directly to his employees. Any exceptions shall be noted in Section 4(c).

Use of Section 4(c), Exceptions: Any contractor who is making payment to approved plans, funds, or programs in amounts less than the wage determination required, is obliged to pay the deficiency directly to the employees as cash in lieu of fringes. Any exceptions to Section 4(a) or 4(b), whichever the contractor may check, shall be entered in Section 4(c). Enter in the Exception column the craft, and enter in the Explanation column the hourly amount paid the employee as cash in lieu of fringes and the hourly amount paid to plans, funds, or programs as fringes. The contractor shall pay and shall show that he is paying to each such employee for all hours (unless otherwise provided by applicable determination) worked on a Federal or Federally assisted project, an amount not less than the predetermined rate plus cash in lieu of fringes as shown in Section 4(c). The rate paid and amount of cash paid in lieu of fringe benefits per hours should be entered in column 6 on the payroll. See paragraph on "Contractors Who Pay No Fringe Benefits" for computation of overtime rate.

Column 7. Gross Amount Earned: Enter the gross amount earned on this project. If part of the employee's weekly wage was earned on projects other than the project described on this payroll,

enter in column 7 the amount earned on the Federal or Federally assisted project and then the gross amount earned during the week on all projects, thus \$63.00/120.00.

Column 8. Deductions: Five columns are provided for showing deductions made. If more than five deductions should be involved, use the first four columns; show the balance of deductions under "Other" column; show actual total under "Total Deductions" column; and in the attachment to the payroll, describe the deductions contained in the "Other" column. All deductions must be in accordance with the provisions of the Copeland Act Regulations, 29 CFR Part 3. If the employee worked on other jobs in addition to this project, show actual deductions from this weekly gross wage, but indicate that deductions are based on his gross wages.

Column 9. Net Wages Paid for Week: Self-explanatory.

Total: Space has been left at the bottom of columns so totals may be shown if the contractor so desires.

Statement Required by Regulations, Parts 3 and 5: While this form need not be notarized, the statement on the back of the payroll is subject to the penalties provided by 18 US 1001, namely, possible imprisonment for five years, or a \$10,000 fine, or both. Accordingly, the party signing this required statement should have knowledge that the facts represented are true.

Space has been provided between items (1) and (2) of the statement for describing any deductions made. If all deductions made are adequately described in the "Deductions" column above, state "see Deductions column in this payroll." See paragraph entitled "Fringe Benefits" above for instructions concerning filling out paragraph 4 of the statement.

FORM 4

**CONTRACTOR'S/SUBCONTRACTOR'S CERTIFICATION
CONCERNING ANTI-LOBBYING**

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and no more than \$100,000 for such failure.

The undersigned certifies, to the best of his or her knowledge or belief, that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of it, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement;
2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, it will complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(Contractor/Subcontractor)

By _____
Signature

Typed Name and Title

Date

**FORM 4 CONTINUED
DISCLOSURE OF LOBBYING ACTIVITIES**

COMPLETE THIS FORM TO DISCLOSE LOBBYING ACTIVITIES PURSUANT TO 31 U.S.C. 1352

<p>1. Type of Federal Action:</p> <p><input type="checkbox"/> a. contract <input type="checkbox"/> b. grant <input type="checkbox"/> c. cooperative agreement <input type="checkbox"/> d. loan <input type="checkbox"/> e. loan guarantee <input type="checkbox"/> f. loan insurance</p>	<p>2. Status of Federal Action:</p> <p><input type="checkbox"/> a. bid/offer/application <input type="checkbox"/> b. initial award <input type="checkbox"/> c. post-award</p>	<p>3. Report Type:</p> <p><input type="checkbox"/> a. initial <input type="checkbox"/> b. material change</p> <p align="right">For Material Change Only: year ____ quarter ____ date of last report _____</p>
<p>4. Name and Address of Reporting Entity</p> <p><input type="checkbox"/> Prime <input type="checkbox"/> Subawardee Tier _____, if known</p> <p align="center">Congressional District, if known</p>	<p>5. If Reporting Entity in No. 4 is Subawardee, Enter Name and Address of Prime:</p> <p align="center">Congressional District, if known</p>	
<p>6. Federal Department/Agency:</p>	<p>7. Federal Program Name/Description:</p> <p align="right">CFDA Number, if applicable _____</p>	
<p>8. Federal Action Number, if known:</p>	<p>9. Award Amount, if known:</p>	
<p>10. a. Name and Address of Lobby Entity (If individual, last name, first name, MI)</p>	<p>b. Individuals Performing Services (including address if different from No. 10a) (last name, first name, MI)</p>	
(attach Continuation Sheet(s) if necessary)		
<p>11. Amount of Payment (check all that apply)</p> <p>\$ _____ <input type="checkbox"/> actual <input type="checkbox"/> planned</p>	<p>13. Type of Payment (check all that apply)</p> <p><input type="checkbox"/> a. retainer <input type="checkbox"/> b. one-time fee <input type="checkbox"/> c. commission <input type="checkbox"/> d. contingent fee <input type="checkbox"/> e. deferred <input type="checkbox"/> f. other, specify _____</p>	
<p>12. Form of Payment (check all that apply):</p> <p><input type="checkbox"/> a. cash <input type="checkbox"/> b. in-kind; specify: nature _____ value _____</p>		
<p>14. Brief Description of Services Performed or to be performed and Date(s) of Service, including officer(s), employee(s), or member(s) contacted, for Payment Indicated in Item 11:</p> <p align="center">(attach Continuation Sheet(s) if necessary)</p>		
<p>15. Continuation Sheet(s) attached: Yes <input type="checkbox"/> No <input type="checkbox"/></p>		
<p>16. Information requested through this form is authorized by Title 31 U.S.C. Section 1352. This disclosure of lobbying reliance was placed by the tier above when his transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be reported to Congress semiannually and will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.</p>		
<p>Signature: _____ Print Name: _____ Title: _____ 0 Telephone No.: _____ Date: _____</p>		

FORM 4 CONTINUED
INSTRUCTIONS FOR COMPLETION OF SF-LLL,
DISCLOSURE OF LOBBYING ACTIVITIES

This disclosure form shall be completed by the reporting entity, whether subawardee or prime Federal recipient, at the initiation or receipt of covered Federal action or a material change to previous filing pursuant to title 31 U.S.C. Section 1352. The filing of a form is required for such payment or agreement to make payment to lobbying entity for influencing or attempting to influence an officer or employee of any agency, a Member of Congress an officer or employee of Congress or an employee of a Member of Congress in connection with a covered Federal action. Attach a continuation sheet for additional information if the space on the form is inadequate. Complete all items that apply for both the initial filing and material change report. Refer to the implementing guidance published by the Office of Management and Budget for additional information.

1. Identify the type of covered Federal action for which lobbying activity is and/or has been secured to influence, the outcome of a covered Federal action.
2. Identify the status of the covered Federal action.
3. Identify the appropriate classification of this report. If this is a follow-up report caused by a material change to the information previously reported, enter the year and quarter in which the change occurred. Enter the date of the last, previously submitted report by this reporting entity for this covered Federal action.
4. Enter the full name, address, city, State and zip code of the reporting entity. Include Congressional District if known. Check the appropriate classification of the reporting entity that designates if it is or expects to be a prime or subaward recipient. Identify the tier of the subawardee, e.g., the first subawardee of the prime is the first tier. Subawards include but are not limited to subcontracts, subgrants and contract awards under grants.
5. If the organization filing the report in Item 4 checks "Subawardee" then enter the full name, address, city, State and zip code of the prime Federal recipient. Include Congressional District, if known.
6. Enter the name of the Federal agency making the award or loan commitment. Include at least one organization level below agency name, if known. For example, Department of Transportation, United States Coast Guard.
7. Enter the Federal program name or description for the covered Federal action (item 1). If known, enter the full Catalog of Federal Domestic Assistance (CFDA) number for grants, cooperative agreements, loans and loan commitments.
8. Enter the most appropriate Federal identifying number available for the Federal action identification in item 1 (e.g., Request for Proposal (RFP) number, Invitation for Bid (IFB) number, grant announcement number, the contract grant. or loan award number, the application/proposal control number assigned by the Federal agency). Include prefixes, e.g., "RFP-DE-90-001."
9. For a covered Federal action where there has been an award or loan commitment by the Federal agency, enter the Federal amount of the award/loan commitments for the prime entity identified in item 4 or 5.

Parents & Friends, Inc.
Cypress Street RCFE
Anti-Lobbying Certification

10. (a) Enter the full name, address, city, State and zip code of the lobbying entity engaged by the reporting entity identified in item 4 to influenced the covered Federal action.
(b) Enter the full names of the individual(s) performing services and include full address if different from 10 (a). Enter Last Name, First Name and Middle Initial (MI).
11. Enter the amount of compensation paid or reasonably expected to be paid by the reporting entity (item 4) to the lobbying entity (item 10). Indicate whether the payment has been made (actual) or will be made (planned). Check all boxes that apply. If this is a material change report, enter the cumulative amount of payment made or planned to be made.
12. Check the appropriate box(es). Check all boxes that apply. If payment is made through an in-kind contribution, specify the nature and value of the in-kind payment.
13. Check the appropriate box(es). Check all boxes that apply. If other, specify nature.
14. Provide a specific and detailed description of the services that the lobbyist has performed or will be expected to perform and the date(s) of any services rendered. Include all preparatory and related activity not just time spent in actual contact with Federal officials. Identify the Federal officer(s) or employee(s) contacted or the officer(s) employee(s) or Member(s) of Congress that were contacted.
15. Check whether or not a continuation sheet(s) is attached.
16. The certifying official shall sign and date the form, print his/her name title and telephone number.

Public reporting burden for this collection of information is estimated to average 30 minutes per response, including time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0046), Washington, D.C. 20503.

FORM 5
SECTION 3 ASSURANCES

[FORM MUST BE COMPLETED AND SUBMITTED PRIOR TO AWARD]

1. I/We, the undersigned _____(representative), as official representative of _____(contractor) agree to comply with Section 3 requirements for the **Cypress Street Residential Care Facility for the Elderly** (Project). It is understood that failure to comply may result in the following sanctions: cancellation, termination, or suspension in whole or in part of this contract. A copy of this executed form and the charts for hires and contractors will be provided to the **Parents & Friends, Inc.** for the City of Fort Bragg along with any back up documentation requested prior to execution of contract.

2. Complete for Staffing
 - A. How many **new full time** (permanent, temporary, seasonal) positions will be needed on this project? _____
 - B. How many new employment training positions will be created?

 - C. If New Hires and Employment Training will take place, how many positions are projected to be filled by local low income area residents? _____(see goal below).
If new hires or employment training are anticipated then contractor must provide copies of outreach efforts, any preferences given, and any actual Section 3 hires completed. If there were no Section 3 residents hired or the goals were not met, then an explanation of why this happened will be provided.
 - D. If new hires or training were made available, did contractor reach 30% Section 3 goal/target? _____

USE FORM 5.4 TO LIST ALL NEW HIRES/TRAINEES FOR THIS PROJECT

3. Complete for construction subcontractors and non-construction contracts
 - A. How many construction subcontractors will be utilized for this project?

 - B. Of these subcontractors, how many are Section 3 subcontractors? _____
 - 1) Was the Section 3 Goal/target of 10% of project dollar amount reached? _____
 - C. How many non-construction contracts will be utilized? _____
 - D. Of these, how many are Section 3 businesses? _____
 - 1) Was the Section 3 Goal/target of 3% of project dollar amount reached? _____

USE FORM 5.6 and Form 5.7 TO LIST ALL CONTRACTORS/SUBCONTRACTORS HIRED FOR THIS PROJECT

Authorized Signature _____ Date: _____

Parents & Friends, Inc.
Cypress Street RCFE
Section 3 Assurances

FORM 5.1
SECTION 3 AFFIRMATIVE ACTION PLAN

[FORM MUST BE COMPLETED AND SUBMITTED **ONLY** IF NEW HIRES OR
TRAINING POSITIONS ARE ANTICIPATED]

In accordance with the Housing and Urban Development Act of 1968, as amended, and the regulations pursuant to that Act.

(Contractor)

Agrees to comply with Section 3 of that Act by assuring that to the greatest extent feasible:

1. Training and employment opportunities will be given to lower income residents of the project; and
2. Contracts in connection with the project will be awarded to business concerns which are located in or owned in substantial part by persons residing in the area of the project.

_____ will initiate the following actions to insure utilization of lower income project residents as employees or trainees and to incorporate project area small businesses as subcontractors and suppliers.

1. The Contractor will establish and maintain a directory of service organization, job referral agencies and manpower training programs operating within, or servicing, project area residents.
2. The Contractor will submit prior to the award of a contract, a signed assurance that it will comply with Section 3 regulations and requirements.
3. The Contractor will provide, prior to the signing of a contract, a statement of work force needs, including trainee positions (see Form 5.4).
4. The Contractor will notify community-based organizations of available employment opportunities, and shall maintain records of response from such organizations.
5. The Contractor will make continuing personal recruitment efforts directed to such service organizations and to schools with lower income resident training programs with which he is familiar.
6. The Contractor will maintain a file of the names and addresses of each low-income resident workers referred to him and that action was taken with respect to each such referred worker and if the worker was not employed, the reasons therefore.

Parents & Friends, Inc.
Cypress Street RCFE
Section 3 Assurances

7. The Contractor will include the Section 3 clauses in every subcontract for work in connection with HUD-assisted projects.
8. For each subcontract, the Prime Contractor will submit, prior to contract award, the Section 3 Affirmative Action Plans of its subcontractors.
9. The Contractor will not attempt to circumvent Section 3 provisions.
10. The Contractor will, to the greatest extent feasible, attempt to employ or fill training positions with lower income project area residents; it will, as a minimum, provide evidence of the following:
 - a. Attempts to recruit from the project area through local advertising media, community organizations, public and private agencies operating within or serving the project area, such as the State Employment Department, and the Private Industry Council.
 - b. Maintain a list of all lower income area residents who have applied either on their own or on referral from any source, and that he has employed such persons if otherwise qualified and if an opening exists.
11. The Contractor will, to the greatest extent feasible, attempt to incorporate project area businesses as subcontractors and suppliers.
12. The Contractor will provide the Section 3 workforce and business utilization reports required under this contract.

_____ fully realizes failure or refusal to comply and give satisfactory assurances of future compliance with the requirements of this Affirmative Action Plan shall be proper basis for any and all of the following actions: cancellation, termination or suspension in whole or in part of the contract; a determination of ineligibility or debarment from any further contracts under any Federal program with respect to which the failure or future occurred until satisfactory assurances of future compliance have been received.

Authorized Signature _____ Date: _____

FORM 5.2
Section 3 Resident Eligibility Certification

The U.S. Department of Housing and Urban Development (HUD) monitors our hiring practices on Section 3-funded projects. It is important, therefore that the information below be provided. Please be aware that your response, though needed, is voluntary and has no effect on your employment status.

Because these questions are personal in nature, your answers will be treated with confidentiality. Thank you for assisting us.

Sincerely,

Parents & Friends, Inc.

1. Name:

Address:

2. Number of individuals living in your household (include yourself): _____

3. Total annual household income (please check one):

[Complete this using current HUD income limits for your county]

_____ Less than \$_____ _____ Between \$_____ - \$_____

\$_____ _____ Between \$_____ - \$_____ Between \$_____ -

\$_____ _____ Between \$_____ - \$_____ Between \$_____ -

\$_____ _____ Between \$_____ - \$_____ Between \$_____ -

_____ Above \$_____

4. Are you currently employed? _____ Yes _____ No

I certify that the statements made on this sheet are true, complete and correct to be best of my knowledge and belief, and made in good faith.

Parents & Friends, Inc.
Cypress Street RCFE
Section 3 Assurances

Date: _____ Signature: _____

FORM 5.3
Section 3 Business Eligibility Certification

The U.S. Department of Housing and Urban Development (HUD) monitors our hiring practices on Section 3-covered projects. It is important, therefore that the information below be provided. Please be aware that your response, though needed, is voluntary and has no affect on your contracting.

Your answers will be treated with confidentiality. Thank you for assisting us.

Sincerely,

Parents & Friends, Inc.

Business Name: _____

Address: _____

1. Are 51% of business owners qualified Section 3 Residents? _____ If **YES** stop, if **NO** proceed.
2. Are at least 30% of your employees Section 3 Residents (or were they when they stated less three years ago)? _____ If **YES** then stop, if **NO** then proceed.
3. Does the business subcontract in excess of 25% of the dollar award of all subcontracted to be awarded to business concerns that meet the qualification set forth in number 1 & 2 above? _____ If **YES** stop, if **NO** proceed.

We currently do not qualify as a Section 3 business _____

I certify that the statements made on this sheet are true, complete and correct to be best of my knowledge and belief, and made in good faith.

Date: _____ Signature: _____

Parents & Friends, Inc.
Cypress Street RCFE
Section 3 Assurances

Form 5.4
SECTION 3 PROJECT WORK FORCE BREAKDOWN

Job Category	Total Positions Needed for Project	No. Positions Occupied by Permanent Employees	Number of Positions not Occupied	Number of Positions filled with Section 3 residents
Supervisor				
Professional				
Technical				
Office/Cleric.				
Others				
TRADE:				
Journeyman				
Apprentices				
Trainees				
Others				
TRADE:				
Journeyman				
Apprentices				
Trainees				
Others				

Section 3 Resident:

Individual residing within the Section 3 Area whose family income does not exceed 80% of the median income in the Metropolitan Statistical Area or the county if not within a MSA in which The Section 3-covered project is located. See Form 5.5 for income schedule.

_____ Company

Cypress Street Residential
 Care Facility for the Elderly
 Project

NOTE: This document must be submitted with executed contract documents.

Date: _____ Person completing Form _____

CURRENT CDBG and SECTION 3 INCOME LIMITS

EFFECTIVE JUNE 1, 2021*

Income Category	Number of persons in household							
	1	2	3	4	5	6	7	8
"30%" Limit	\$14,700	\$16,800	\$18,900	\$20,950	\$22,650	\$24,350	\$26,000	\$27,700
"50%" Limit	\$24,500	\$28,000	\$31,500	\$34,950	\$37,750	\$40,550	\$43,350	\$46,150
"60%" Limit	\$29,400	\$33,600	\$37,800	\$41,940	\$45,300	\$48,660	\$52,020	\$55,380
"80%" Limit	\$39,150	\$44,750	\$50,350	\$55,900	\$60,400	\$64,850	\$69,350	\$73,800

PROGRAM PARTICIPANTS' HOUSEHOLD INCOME MUST NOT EXCEED THE "80%" LIMIT FOR THE HOUSEHOLD SIZE

***The above income limits are periodically updated. For the most current income limits, please visit the following link at the California Department of Housing and Community Development website:**

<http://www.hcd.ca.gov/fa/home/homelimits.html>

FORM 5.6
SECTION 3 CONTRACTS/SUBCONTRACTS BREAKDOWN

Type of Contract (Business or Profession)	Total Number	Total Approx. Dollar Amount	Estimated No. of Contracts to Section 3 Businesses	Estimated Dollar Amount to Sec. 3 Businesses

NOTE:

This document is to be submitted by the contractor with the executed contract documents.

 Company

Cypress Street Residential
Care Facility for the Elderly
 Project

14-CDBG-9881
 CDBG Grant Number

 Date

 Person Completing Form

FORM 5.7
SECTION 3 BUSINESS UTILIZATION REPORT

Total Dollar Amount of Contract _____ Federal ID No. _____

Name of Prime Contractor _____ Address _____

Name of Subcontractor	Sec3*	Address/Telephone	Trade/Service or Supply	Contract Amount	Award Date	Competitive or Negotiated Bid	Federal ID No.

*Check if Section 3

Total Dollar Amount Awarded to
 Section 3 Businesses \$ _____

 Company
Cypress Street Residential Care Facility for the Elderly Project

NOTE: This report must be completed and submitted by
 the Contractor (monthly) with each payment request.

 Date

 Person Completing Form

Parents & Friends, Inc.
 Cypress Street
 Section 3 Assurances

FORM 1

CONTRACTOR'S CERTIFICATION CONCERNING CONFLICT OF INTEREST

By submitting its proposal the Contractor certifies as follows:

I am aware and in compliance with the following provisions regarding Conflict of Interest of Contractors:

1. Conflict of Interest of Members, Officers, or Employees of Contractors, Members of Local Governing Body, or other Public Officials

Pursuant to 24 CFR 570.611, no member, officer, or employee of the City of Fort Bragg, or their designees or agents, no member of the governing body of the locality in which the project is situated, and no other public official of such locality or localities who exercise or have exercised any functions or responsibilities with respect to CDBG activities assisted under this part, or who are in a position to participate in a decision-making process or gain inside information with regard to such activities, may obtain a financial interest or benefit from a CDBG-assisted activity, or have a financial interest in any contract, subcontract or agreement with respect to a CDBG-assisted activity or its proceeds, either for themselves or those with whom they have business or immediate family ties, during their tenure or for one (1) year thereafter.

2. Conflict of Interest of Certain Federal Officials

No member of or delegate to the Congress of the United States, and no resident commissioner, shall be admitted to any share or part of this Contract or to any benefit to arise from the same.

Signed _____ (Contractor representative)

By
Print Name and Title

Date:

FORM 2

CONTRACTOR'S/SUBCONTRACTOR'S CERTIFICATION CONCERNING STATE LABOR STANDARDS AND PREVAILING WAGES

All contractors and subcontractors shall give the following certification to the grantee and forward this certification to the grantee within 10 days after the execution of any contract or sub-contract.

- "I am aware of the provisions of Section 1720 et seq. of the California Labor Code which requires that the State prevailing wage rate shall be paid to employees where this rate exceeds the Federal wage rate."
- "I am aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that Code, and I will comply with such provisions before commencing the performance of the work of this contract."
- "It is further agreed that, except as may be provided in Section 1815 of the California Labor Code, the maximum hours a worker is to be employed is limited to eight hours a day and 40 hours a week and the subcontractor shall forfeit, as a penalty, \$25 for each worker employed in the execution of the subcontract for each calendar day during which a worker is required or permitted to labor more than eight hours in any calendar day or more than 40 hours in any calendar week."

(Contractor/Subcontractor)

By. _____
Signature

Typed Name and Title Date

FORM 3 CONTINUED
U.S. DEPARTMENT OF LABOR
WAGE AND HOUR DIVISION

INSTRUCTIONS FOR COMPLETING PAYROLL FORM, WH-347

General: The use of WH-347, payroll form, is not mandatory. This form has been made available for the convenience of contractors and subcontractors required by their Federal or Federally-aided construction-type contracts and subcontracts to submit weekly payrolls. Properly filled out, this form will satisfy the requirements of Regulations, Parts 3 and 5 (29 CFR, Subtitle A), as to payrolls submitted in connection with contracts subject to Davis-Bacon and related Acts. This form meets need resulting from the amendment of the Davis-Bacon Act to include fringe benefits provisions. Under this amended law, the contractor is required to pay not less than fringe benefits as predetermined by the Department of Labor, in addition to payment of not less than the predetermined rates. The contractor's obligation to pay fringe benefits may be met either by payment of the fringes to the various plans, funds, or programs, or by making these payments to the employees as cash in lieu of fringes. This payroll provides for the contractor's showing on the face of the payroll all monies paid to the employees, whether as basic rates or as cash in lieu of fringes and provides for the contractor's representation in the statement of compliance on the rear of the payroll that he is paying to others fringes required by the contract and not paid as cash in lieu of fringes. Detailed instructions concerning the preparation of the payroll follow:

Contractor or Subcontractor: Fill in your firm's name and check appropriate box.

Address: Fill in your firm's address.

Column 1. Name, Address, and Social Security Number of Employee: The employee's full name must be shown on each weekly payroll submitted. The employee's address must also be shown on the payroll covering the first week in which the employee works on the project. The address need not be shown on subsequent weekly payrolls unless his address changes. Although not required by Regulations, Parts 3 and 5, space is available in the name and address section so that social security numbers may be listed.

Column 2. Withholding Exemptions: This column is merely inserted for the employer's convenience and is not a requirement of Regulations, Parts 3 and 5.

Column 3. Work Classifications: List classification descriptive of work actually performed by employees. Consult are deemed necessary, see contracting officer or agency representative. The employee may be shown as having worked in more than one classification, provided accurate breakdown of hours so worked is maintained and shown on submitted payroll by use of separate line entries.

Column 4. Hours Worked: On all contracts subject to the Contract Work Hours Standards Act, enter as overtime hours all hours worked in excess 40 hours a week.

Column 5. Total: Self-explanatory.

PARENTS AND FRIENDS INC.

Column 6. Rate of Pay, including Fringe Benefits: In straight time box, list actual hourly rate paid the employee for straight time worked plus any cash in lieu of fringes paid the employee. When recording the straight time hourly rate, any cash paid in lieu of fringes may be shown separately from the basic rate. This is of assistance in correctly computing overtime (see "Fringe Benefits" below). In the overtime box, show overtime hourly rate paid, plus any cash in lieu of fringes paid the employee (see "Fringe Benefits" below). Payment of not less than time and one-half the basic or regular rate paid is required for overtime under the Contract Work Hours Standards Act of 1962. In addition to paying not less than the predetermined rate for the classification in which the employee works, the contractor shall pay to approved plans, funds, or programs or shall pay as cash in lieu of fringes, amounts predetermined as fringe benefits in the wage decision made part of the contract (see "Fringe Benefits" below).

FRINGE BENEFITS - Contractors Who Pay All Required Fringe Benefits: A contractor who pays fringe benefits to approved plans, funds, or programs in amounts not less than were determined in the applicable wage decision of the Secretary of Labor shall continue to show on the face of the payroll the basic cash hourly rate and overtime rate paid to his employees just as he has always done. Such a contractor shall check paragraph 4(a) of the statement on the reverse of the payroll to indicate that he is also paying to approved plans, funds, or programs not less than the amount predetermined as fringe benefits for each craft. Any exceptions shall be noted in Section 4(c).

Contractors Who Pay No Fringe Benefits: A contractor who pays no fringe benefits shall pay to the employee, and insert in the straight time hourly rate column of the payroll, an amount not less than the predetermined rate for each classification plus the amount of fringe benefits determined for each classification in the applicable wage decision. Inasmuch as it is not necessary to pay time and a half on cash paid in lieu of fringes, the overtime rate shall be not less than the sum of the basic predetermined rate, plus the half-time premium on basic or regular rate, plus the required cash in lieu of fringes at the straight time rate. In addition, the contractor shall check paragraph 4(b) of the statement on the reverse of the payroll to indicate that he is paying fringe benefits in cash directly to his employees. Any exceptions shall be noted in Section 4(c).

Use of Section 4(c), Exceptions: Any contractor who is making payment to approved plans, funds, or programs in amounts less than the wage determination required, is obliged to pay the deficiency directly to the employees as cash in lieu of fringes. Any exceptions to Section 4(a) or 4(b), whichever the contractor may check, shall be entered in Section 4(c). Enter in the Exception column the craft, and enter in the Explanation column the hourly amount paid the employee as cash in lieu of fringes and the hourly amount paid to plans, funds, or programs as fringes. The contractor shall pay and shall show that he is paying to each such employee for all hours (unless otherwise provided by applicable determination) worked on a Federal or Federally assisted project, an amount not less than the predetermined rate plus cash in lieu of fringes as shown in Section 4(c). The rate paid and amount of cash paid in lieu of fringe benefits per hours should be entered in column 6 on the payroll. See paragraph on "Contractors Who Pay No Fringe Benefits" for computation of overtime rate.

Column 7. Gross Amount Earned: Enter the gross amount earned on this project. If part of the employee's weekly wage was earned on projects other than the project described on this payroll, enter in column 7 the amount earned on the Federal or Federally assisted project and then the gross amount earned during the week on all projects, thus \$63.00/120.00.

Column 8. Deductions: Five columns are provided for showing deductions made. If more than five deductions should be involved, use the first four columns; show the balance of deductions under "Other" column; show actual total under "Total Deductions" column; and in the attachment to the payroll, describe the deductions contained in the "Other" column. All deductions must be in accordance with the provisions of the Copeland Act Regulations, 29 CFR Part 3. If the em-

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ployee worked on other jobs in addition to this project, show actual deductions from this weekly gross wage, but indicate that deductions are based on his gross wages.

Column 9. Net Wages Paid for Week: Self-explanatory.

Total: Space has been left at the bottom of columns so totals may be shown if the contractor so desires.

Statement Required by Regulations, Parts 3 and 5: While this form need not be notarized, the statement on the back of the payroll is subject to the penalties provided by 18 US 1001, namely, possible imprisonment for five years, or a \$10,000 fine, or both. Accordingly, the party signing this required statement should have knowledge that the facts represented are true.

Space has been provided between items (1) and (2) of the statement for describing any deductions made. If all deductions made are adequately described in the "Deductions" column above, state "see Deductions column in this payroll." See paragraph entitled "Fringe Benefits" above for instructions concerning filling out paragraph 4 of the statement.

FORM 4

CONTRACTOR'S/SUBCONTRACTOR'S CERTIFICATION CONCERNING ANTI-LOBBYING

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and no more than \$100,000 for such failure.

The undersigned certifies, to the best of his or her knowledge or belief, that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of it, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement;

2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, it will complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(Contractor/Subcontractor)

By _____
Signature

Typed Name and Title

Date

FORM 4 CONTINUED - DISCLOSURE OF LOBBYING ACTIVITIES COMPLETE THIS FORM TO DISCLOSE LOBBYING ACTIVITIES PURSUANT TO 31 U.S.C. 1352

<p>1. Type of Federal Action:</p> <p><input type="checkbox"/> a. contract <input type="checkbox"/> b. grant <input type="checkbox"/> c. cooperative agreement <input type="checkbox"/> d. loan <input type="checkbox"/> e. loan guarantee <input type="checkbox"/> f. loan insurance</p>	<p>2. Status of Federal Action:</p> <p><input type="checkbox"/> a. bid/offer/application <input type="checkbox"/> b. initial award <input type="checkbox"/> c. post-award</p>	<p>3. Report Type:</p> <p><input type="checkbox"/> a. initial <input type="checkbox"/> b. material change</p> <p style="text-align: right;">For Material Change Only: year _____ quarter _____ date of last report _____</p>
<p>4. Name and Address of Reporting Entity</p> <p><input type="checkbox"/> Prime <input type="checkbox"/> Subawardee Tier _____, if known</p> <p style="text-align: center;">Congressional District, if known</p>	<p>5. If Reporting Entity in No. 4 is Subawardee, Enter Name and Address of Prime:</p> <p style="text-align: center;">Congressional District, if known</p>	
<p>6. Federal Department/Agency:</p>	<p>7. Federal Program Name/Description:</p> <p style="text-align: right;">CFDA Number, if applicable _____</p>	
<p>8. Federal Action Number, if known:</p>	<p>9. Award Amount, if known:</p>	
<p>10. a. Name and Address of Lobby Entity (If individual, last name, first name, MI)</p>	<p>b. Individuals Performing Services (including address if different from No. 10a) (last name, first name, MI)</p>	
<p>(attach Continuation Sheet(s) if necessary)</p>		
<p>11. Amount of Payment (check all that apply)</p> <p>\$ _____ <input type="checkbox"/> actual <input type="checkbox"/> planned</p>	<p>13. Type of Payment (check all that apply)</p> <p><input type="checkbox"/> a. retainer <input type="checkbox"/> b. one-time fee <input type="checkbox"/> c. commission <input type="checkbox"/> d. contingent fee <input type="checkbox"/> e. deferred <input type="checkbox"/> f. other, specify _____</p>	
<p>12. Form of Payment (check all that apply):</p> <p><input type="checkbox"/> a. cash <input type="checkbox"/> b. in-kind; specify: nature _____ value _____</p>		
<p>14. Brief Description of Services Performed or to be performed and Date(s) of Service, including officer(s), employee(s), or member(s) contacted, for Payment Indicated in Item 11:</p> <p style="text-align: center;">(attach Continuation Sheet(s) if necessary)</p>		
<p>15. Continuation Sheet(s) attached: Yes <input type="checkbox"/> No <input type="checkbox"/></p>		
<p>16. Information requested through this form is authorized by Title 31 U.S.C. Section 1352. This disclosure of lobbying reliance was placed by the tier above when his transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be reported to Congress semiannually and will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.</p>		
		<p>Signature: _____</p> <p>Print Name: _____</p> <p>Title: _____</p> <p>Telephone No.: _____ Date: _____</p>

FORM 4 CONTINUED INSTRUCTIONS FOR COMPLETION OF SF-LLL, DISCLOSURE OF LOBBYING ACTIVITIES

This disclosure form shall be completed by the reporting entity, whether subawardee or prime Federal recipient, at the initiation or receipt of covered Federal action or a material change to previous filing pursuant to title 31 U.S.C. Section 1352. The filing of a form is required for such payment or agreement to make payment to lobbying entity for influencing or attempting to influence an officer or employee of any agency, a Member of Congress an officer or employee of Congress or an employee of a Member of Congress in connection with a covered Federal action. Attach a continuation sheet for additional information if the space on the form is inadequate. Complete all items that apply for both the initial filing and material change report. Refer to the implementing guidance published by the Office of Management and Budget for additional information.

1. Identify the type of covered Federal action for which lobbying activity is and/or has been secured to influence, the outcome of a covered Federal action.
2. Identify the status of the covered Federal action.
3. Identify the appropriate classification of this report. If this is a follow-up report caused by a material change to the information previously reported, enter the year and quarter in which the change occurred. Enter the date of the last, previously submitted report by this reporting entity for this covered Federal action.
4. Enter the full name, address, city, State and zip code of the reporting entity. Include Congressional District if known. Check the appropriate classification of the reporting entity that designates if it is or expects to be a prime or subaward recipient. Identify the tier of the subawardee, e.g., the first subawardee of the prime is the first tier. Subawards include but are not limited to subcontracts, subgrants and contract awards under grants.
5. If the organization filing the report in Item 4 checks "Subawardee" then enter the full name, address, city, State and zip code of the prime Federal recipient. Include Congressional District, if known.
6. Enter the name of the Federal agency making the award or loan commitment. Include at least one organization level below agency name, if known. For example, Department of Transportation, United States Coast Guard.
7. Enter the Federal program name or description for the covered Federal action (item 1). If known, enter the full Catalog of Federal Domestic Assistance (CFDA) number for grants, cooperative agreements, loans and loan commitments.
8. Enter the most appropriate Federal identifying number available for the Federal action identification in item 1 (e.g., Request for Proposal (RFP) number, Invitation for Bid (IFB) number, grant announcement number, the contract grant or loan award number, the application/proposal control number assigned by the Federal agency). Include prefixes, e.g., "RFP-DE-90-001."

PARENTS AND FRIENDS INC.

9. For a covered Federal action where there has been an award or loan commitment by the Federal agency, enter the Federal amount of the award/loan commitments for the prime entity identified in item 4 or 5.
10. (a) Enter the full name, address, city, State and zip code of the lobbying entity engaged by the reporting entity identified in item 4 to influenced the covered Federal action.
(b) Enter the full names of the individual(s) performing services and include full address if different from 10 (a). Enter Last Name, First Name and Middle Initial (MI).
11. Enter the amount of compensation paid or reasonably expected to be paid by the reporting entity (item 4) to the lobbying entity (item 10). Indicate whether the payment has been made (actual) or will be made (planned). Check all boxes that apply. If this is a material change report, enter the cumulative amount of payment made or planned to be made.
12. Check the appropriate box(es). Check all boxes that apply. If payment is made through an in-kind contribution, specify the nature and value of the in-kind payment.
13. Check the appropriate box(es). Check all boxes that apply. If other, specify nature.
14. Provide a specific and detailed description of the services that the lobbyist has performed or will be expected to perform and the date(s) of any services rendered. Include all preparatory and related activity not just time spent in actual contact with Federal officials. Identify the Federal officer(s) or employee(s) contacted or the officer(s) employee(s) or Member(s) of Congress that were contacted.
15. Check whether or not a continuation sheet(s) is attached.
16. The certifying official shall sign and date the form, print his/her name title and telephone number.

Public reporting burden for this collection of information is estimated to average 30 minutes per response, including time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0046), Washington, D.C. 20503.

FORM 5

SECTION 3 ASSURANCES

[FORM MUST BE COMPLETED AND SUBMITTED PRIOR TO AWARD]

1. I/We, the undersigned _____(representative), as official representative of _____(contractor) agree to comply with Section 3 requirements for the Parents & Friends inc. Project (Project). It is understood that failure to comply may result in the following sanctions: cancellation, termination, or suspension in whole or in part of this contract. A copy of this executed form and the charts for hires and contractors will be provided to the City of Fort Bragg along with any back up documentation requested prior to execution of contract.

2. Complete for Staffing

- A. How many new full time (permanent, temporary, seasonal) positions will be needed on this project? _____
- B. How many new employment training positions will be created? _____
- C. If New Hires and Employment Training will take place, how many positions are projected to be filled by local low income area residents? _____(see goal below). If new hires or employment training are anticipated then contractor must provide copies of outreach efforts, any preferences given, and any actual Section 3 hires completed. If there were no Section 3 residents hired or the goals were not met, then an explanation of why this happened will be provided.
- D. If new hires or training were made available, did contractor reach 30% Section 3 goal/target? _____
USE FORM 5.4 TO LIST ALL NEW HIRES/TRAINEES FOR THIS PROJECT

3. Complete for construction subcontractors and non-construction contracts

- A. How many construction subcontractors will be utilized for this project? _____
- B. Of these subcontractors, how many are Section 3 subcontractors? _____
1) Was the Section 3 Goal/target of 10% of project dollar amount reached? _____
- C. How many non-construction contracts will be utilized? _____
- D. Of these, how many are Section 3 businesses? _____
1) Was the Section 3 Goal/target of 3% of project dollar amount reached? _____

USE FORM 5.6 and Form 5.7 TO LIST ALL CONTRACTORS/SUBCONTRACTORS HIRED FOR THIS PROJECT

Authorized Signature _____ Date: _____

FORM 5.1
SECTION 3 AFFIRMATIVE ACTION PLAN

[FORM MUST BE COMPLETED AND SUBMITTED ONLY IF NEW HIRES OR TRAINING POSITIONS ARE ANTICIPATED]

In accordance with the Housing and Urban Development Act of 1968, as amended, and the regulations pursuant to that Act.

_____ (Contractor)

Agrees to comply with Section 3 of that Act by assuring that to the greatest extent feasible:

1. Training and employment opportunities will be given to lower income residents of the project; and
2. Contracts in connection with the project will be awarded to business concerns which are located in or owned in substantial part by persons residing in the area of the project.

_____ will initiate the following actions to insure utilization of lower income project residents as employees or trainees and to incorporate project area small businesses as subcontractors and suppliers.

1. The Contractor will establish and maintain a directory of service organization, job referral agencies and manpower training programs operating within, or servicing, project area residents.
2. The Contractor will submit prior to the award of a contract, a signed assurance that it will comply with Section 3 regulations and requirements.
3. The Contractor will provide, prior to the signing of a contract, a statement of work force needs, including trainee positions (see Form 5.4).
4. The Contractor will notify community-based organizations of available employment opportunities, and shall maintain records of response from such organizations.
5. The Contractor will make continuing personal recruitment efforts directed to such service organizations and to schools with lower income resident training programs with which he is familiar.
6. The Contractor will maintain a file of the names and addresses of each low-income resident workers referred to him and that action was taken with respect to each such referred worker and if the worker was not employed, the reasons therefore.

PARENTS AND FRIENDS INC.

7. The Contractor will include the Section 3 clauses in every subcontract for work in connection with HUD-assisted projects.
8. For each subcontract, the Prime Contractor will submit, prior to contract award, the Section 3 Affirmative Action Plans of its subcontractors.
9. The Contractor will not attempt to circumvent Section 3 provisions.
10. The Contractor will, to the greatest extent feasible, attempt to employ or fill training positions with lower income project area residents; it will, as a minimum, provide evidence of the following:
 - a. Attempts to recruit from the project area through local advertising media, community organizations, public and private agencies operating within or serving the project area, such as the State Employment Department, and the Private Industry Council.
 - b. Maintain a list of all lower income area residents who have applied either on their own or on referral from any source, and that he has employed such persons if otherwise qualified and if an opening exists.
11. The Contractor will, to the greatest extent feasible, attempt to incorporate project area businesses as subcontractors and suppliers.
12. The Contractor will provide the Section 3 workforce and business utilization reports required under this contract.

_____ fully realizes failure or refusal to comply and give satisfactory assurances of future compliance with the requirements of this Affirmative Action Plan shall be proper basis for any and all of the following actions: cancellation, termination or suspension in whole or in part of the contract; a determination of ineligibility or debarment from any further contracts under any Federal program with respect to which the failure or future occurred until satisfactory assurances of future compliance have been received.

Authorized Signature _____ Date: _____

Form 5.2
Section 3 Resident Eligibility Certification

The U.S. Department of Housing and Urban Development (HUD) monitors our hiring practices on Section 3-funded projects. It is important, therefore that the information below be provided. Please be aware that your response, though needed, is voluntary and has no effect on your employment status.

Because these questions are personal in nature, your answers will be treated with confidentiality. Thank you for assisting us.

Sincerely,
City of Fort Bragg

1. Name: _____

Address: _____

2. Number of individuals living in your household (include yourself): _____

3. Total annual household income (please check one):

[Complete this using current HUD income limits for your county]

_____ Less than \$_____ Between \$_____ - \$_____

_____ Between \$_____ - \$_____ Between \$_____ - \$_____

_____ Between \$_____ - \$_____ Between \$_____ - \$_____

_____ Between \$_____ - \$_____ Between \$_____ - \$_____

_____ Above \$_____

4. Are you currently employed? _____ Yes _____ No

I certify that the statements made on this sheet are true, complete and correct to be best of my knowledge and belief, and made in good faith.

Date: _____ Signature: _____

Form 5.3
Section 3 Business Eligibility Certification

The U.S. Department of Housing and Urban Development (HUD) monitors our hiring practices on Section 3-covered projects. It is important, therefore that the information below be provided. Please be aware that your response, though needed, is voluntary and has no affect on your contracting.

Your answers will be treated with confidentiality. Thank you for assisting us. Sincerely,
City of Fort Bragg

Business Name: _____

Address: _____

1. Are 51% of business owners qualified Section 3 Residents? _____ If YES stop, if NO proceed.

2. Are at least 30% of your employees Section 3 Residents (or were they when they stated less three years ago)? _____ If YES then stop, if NO then proceed.

3. Does the business subcontract in excess of 25% of the dollar award of all subcontracted to be awarded to business concerns that meet the qualification set forth in number 1 & 2 above? _____ If YES stop, if NO proceed.

We currently do not qualify as a Section 3 business _____

I certify that the statements made on this sheet are true, complete and correct to be best of my knowledge and belief, and made in good faith.

Date: _____ Signature: _____

Form 5.4
SECTION 3 PROJECT WORK FORCE BREAKDOWN

Job Category	Total Positions Needed for Project	No. Positions Occupied by Permanent Employees	Number of Positions not Occupied	Number of Positions filled with Section 3 residents
Supervisor				
Professional				
Technical				
Office/Cleric.				
Others				
TRADE:				
Journeyman				
Apprentices				
Trainees				
Others				
TRADE:				
Journeyman				
Apprentices				
Trainees				
Others				

Section 3 Resident:

Individual residing within the Section 3 Area whose family income does not exceed 80% of the median income in the Metropolitan Statistical Area or the county if not within a MSA in which the Section 3-covered project is located. See Form 5.5 for income schedule.

_____ Company

Parents & Friends Project

NOTE: This document must be submitted with executed contract documents.

Date: _____ Person completing Form _____

Form 5.5
CURRENT CDBG and SECTION 3 INCOME LIMITS
EFFECTIVE JUNE 6, 2016*

Income Category	Number of persons in household							
	1	2	3	4	5	6	7	8
"30%" Limit	\$12,800	\$14,600	\$16,450	\$18,250	\$19,750	\$21,200	\$22,650	\$24,100
"50%" Limit	\$21,350	\$24,400	\$27,450	\$30,450	\$32,900	\$35,350	\$37,800	\$40,200
"60%" Limit	\$25,620	\$29,280	\$32,940	\$36,540	\$39,480	\$42,420	\$45,360	\$48,240
"80%" Limit	\$34,100	\$39,000	\$43,850	\$48,700	\$52,600	\$56,500	\$60,400	\$64,300

PROGRAM PARTICIPANTS' HOUSEHOLD INCOME MUST NOT EXCEED THE "80%" LIMIT FOR THE HOUSEHOLD SIZE

***The above income limits are periodically updated. For the most current income limits, please visit the following link at the California Department of Housing and Community Development website:**

<http://www.hcd.ca.gov/grants-funding/income-limits/state-and-federal-income-limits.shtml>

Form 5.6
SECTION 3 CONTRACTS/SUBCONTRACTS BREAKDOWN

Type of Contract (Business or Profession)	Total Number	Total Approx. Dollar Amount	Estimated No. of Contracts to Section 3 Businesses	Estimated Dollar Amount to Sec. 3 Businesses

NOTE:

This document is to be submitted by the contractor with the executed contract documents.

_____ Company **Parents & Friends Project**

CDBG Grant Number

_____ Date

_____ Person Completing Form

Form 5.7
SECTION 3 BUSINESS UTILIZATION REPORT

Total Dollar Amount of Contract _____ Federal ID No.

Name of Prime Contractor _____
Address

Name of Subcontractor	Sec3 *	Address/Telephone	Trade/Service or Supply	Contract Amount	Award Date	Competitive or Negotiated Bid	Federal ID No.

*Check if Section 3

Total Dollar Amount Awarded to
Section 3 Businesses \$ _____

NOTE: This report must be completed and submitted by the Contractor (monthly) with each payment request.

_____ Date

_____ Company

Parents & Friends Project

_____ Person Completing Form

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INSTRUCTIONS FOR COMPLETION OF SF-LLL, DISCLOSURE OF LOBBYING ACTIVITIES

This disclosure form shall be completed by the reporting entity, whether subawardee or prime Federal recipient, at the initiation or receipt of covered Federal action or a material change to previous filing pursuant to title 31 U.S.C. Section 1352. The filing of a form is required for such payment or agreement to make payment to lobbying entity for influencing or attempting to influence an officer or employee of any agency, a Member of Congress an officer or employee of Congress or an employee of a Member of Congress in connection with a covered Federal action. Attach a continuation sheet for additional information if the space on the form is inadequate. Complete all items that apply for both the initial filing and material change report. Refer to the implementing guidance published by the Office of Management and Budget for additional information.

1. Identify the type of covered Federal action for which lobbying activity is and/or has been secured to influence, the outcome of a covered Federal action.
2. Identify the status of the covered Federal action.
3. Identify the appropriate classification of this report. If this is a follow-up report caused by a material change to the information previously reported, enter the year and quarter in which the change occurred. Enter the date of the last, previously submitted report by this reporting entity for this covered Federal action.
4. Enter the full name, address, city, State and zip code of the reporting entity. Include Congressional District if known. Check the appropriate classification of the reporting entity that designates if it is or expects to be a prime or subaward recipient. Identify the tier of the subawardee, e.g., the first subawardee of the prime is the first tier. Subawards include but are not limited to subcontracts, subgrants and contract awards under grants.
5. If the organization filing the report in Item 4 checks "Subawardee" then enter the full name, address, city, State and zip code of the prime Federal recipient. Include Congressional District, if known.
6. Enter the name of the Federal agency making the award or loan commitment. Include at least one organization level below agency name, if known. For example, Department of Transportation, United States Coast Guard.
7. Enter the Federal program name or description for the covered Federal action (item 1). If known, enter the full Catalog of Federal Domestic Assistance (CFDA) number for grants, cooperative agreements, loans and loan commitments.
8. Enter the most appropriate Federal identifying number available for the Federal action identification in item 1 (e.g., Request for Proposal (RFP) number, Invitation for Bid (IFB) number, grant announcement number, the contract grant. or loan award number, the application/proposal control number assigned by the Federal agency). Include prefixes, e.g., "RFP-DE-90-001."

PARENTS AND FRIENDS INC.

9. For a covered Federal action where there has been an award or loan commitment by the Federal agency, enter the Federal amount of the award/loan commitments for the prime entity identified in item 4 or 5.
10. (a) Enter the full name, address, city, State and zip code of the lobbying entity engaged by the reporting entity identified in item 4 to influenced the covered Federal action.

(b) Enter the full names of the individual(s) performing services and include full address if different from 10 (a). Enter Last Name, First Name and Middle Initial (MI).
11. Enter the amount of compensation paid or reasonably expected to be paid by the reporting entity (item 4) to the lobbying entity (item 10). Indicate whether the payment has been made (actual) or will be made (planned). Check all boxes that apply. If this is a material change report, enter the cumulative amount of payment made or planned to be made.
12. Check the appropriate box(es). Check all boxes that apply. If payment is made through an in-kind contribution, specify the nature and value of the in-kind payment.
13. Check the appropriate box(es). Check all boxes that apply. If other, specify nature.
14. Provide a specific and detailed description of the services that the lobbyist has performed or will be expected to perform and the date(s) of any services rendered. Include all preparatory and related activity not just time spent in actual contact with Federal officials. Identify the Federal officer(s) or employee(s) contacted or the officer(s) employee(s) or Member(s) of Congress that were contacted.
15. Check whether or not a continuation sheet(s) is attached.
16. The certifying official shall sign and date the form, print his/her name title and telephone number.

Public reporting burden for this collection of information is estimated to average 30 minutes per response, including time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0046), Washington, D.C. 20503.

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PERFORMANCE BOND

(Note: The successful bidder must use this form. Use of any other bond form may prevent a contract from forming and/or result in forfeiture of the successful bidder's bid bond.)

KNOW ALL MEN BY THESE PRESENTS:

WHEREAS the Board of the Parents and Friends, Inc. has awarded to _____ (designated as the "PRINCIPAL") a contract for the Parents & Friends, Inc. Project, which contract and all of the contract documents as defined therein (designated as the "Contract") are hereby made a part hereof; and

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

NOW, THEREFORE, WE, the PRINCIPAL and _____ as surety (designated as "SURETY"), an admitted surety insurer authorized to do business in the State of California, are held and firmly bound unto the City (designated as "OBLIGEE"), in the penal sum of _____ Dollars (\$ _____), lawful money of the United States for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, and administrators, and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that, if the above bound PRINCIPAL, his or its heirs, executors, administrators, successors, or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions and agreements in the Contract and any alteration thereof made as therein provided, on his or their part to be kept and performed at the time and in the manner therein specified and in all respects according to their true intent and meaning, and shall defend, indemnify and save harmless the OBLIGEE, it's officials, officers, employees, volunteers and agents, as therein stipulated, then this obligation shall become null and void, otherwise it shall be and remain in full force and virtue.

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 to the specifications or the plans accompanying the same or to any other part of the contract documents, as defined therein, shall in any way affect said SURETY's obligation on this bond, and the SURETY does hereby waive notice of any such change, extension of time, alteration or addition.

And the said SURETY, for value received, hereby stipulates and agrees that upon termination of the Contract for cause, the OBLIGEE reserves the right to refuse tender of the PRINCIPAL by the SURETY to complete the Contract work.

If any action shall be brought by the OBLIGEE upon this bond, a reasonable attorney's fee, to be fixed by the court, shall be and become a part of the OBLIGEE's judgment in any such action.

IN WITNESS WHEREOF, the above-bound parties have executed this instrument under their several seals this _____ day of _____, 2022, the name and corporate seals of each

PARENTS AND FRIENDS INC.

corporate party being hereto affixed and these presents duly signed by their undersigned representatives, pursuant to authority of their governing bodies.

(Corporate Seal)

PRINCIPAL

By: _____

(Acknowledgement)

Title: _____

(Corporate Seal)

SURETY

By: _____

(Attorney-in-fact)

(Acknowledgement)

Title: _____

(NOTE TO SURETY COMPANY: A certified copy of unrevoked resolution of authority for the attorney-in-fact must be submitted with and attached to the executed bid bond.)

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PAYMENT/LABOR AND MATERIALS BOND

(Note: The successful bidder must use this form. Use of any other bond form may prevent a contract from forming and/or result in forfeiture of the successful bidder's bid bond.)

KNOW ALL MEN BY THESE PRESENTS:

WHEREAS the Board of the Parents and Friends, Inc. has awarded to _____ (designated as the "PRINCIPAL"), a contract for the Parents & Friends Inc. Project which contract and all of the contract documents as defined therein (designated as the "Contract") are hereby made a part hereof; and

WHEREAS, pursuant to California Civil Code Section 3247, the PRINCIPAL is required, before entering upon the performance of the Contract, to file a payment bond with and have such bond approved by the officer or public entity by whom the Contract is awarded; and

WHEREAS, pursuant to California Civil Code Section 3248, such payment bond must be in a sum not less than one hundred percent (100%) of the total amount payable by the terms of the Contract, and must satisfy the other requirements specified in that section; and

WHEREAS, the PRINCIPAL is required in accordance with the Contract to furnish a payment bond in connection with the Contract to secure payment of claims of laborers, mechanics and material men employed on work under the Contract in accordance with applicable law;

NOW, THEREFORE, THESE PRESENTS WITNESSETH:

That the PRINCIPAL and the undersigned _____, as surety (designated as "SURETY"), an admitted surety insurer authorized to do business in the State of California are held and firmly bound unto all laborers, material lawful money of the United States, being a sum not less than one hundred percent of the total amount payable by the terms of the Contract, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, or assigns, jointly and severally, by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that if the PRINCIPAL or any of the PRINCIPAL's subcontractors, or the heirs, executors, administrators, successors, or assigns of any, all, or either of them, shall fail to pay any persons named in California Civil Code Section 3181, or fail to pay for any labor, materials, provisions, provender, or other supplies used in, upon, for or about the performance of the work contracted to be done, or for any work or labor thereon of any kind, or fail to pay amounts due under the Unemployment Insurance Code with respect to such work or labor, or fail to pay for any amounts required to be deducted, withheld, and paid over to the Employment Development Department from the wages of employees of the PRINCIPAL or any subcontractors of the PRINCIPAL pursuant to Section 13020 of the Unemployment Insurance Code with respect to such work or labor, that the SURETY will pay for the same in an amount not exceeding the amount herein above set forth, and also, in case suit is brought upon this bond, will pay a reasonable attorney's fee to be awarded and fixed by the Court; otherwise this obligation shall be void.

It is hereby expressly stipulated and agreed by the said Surety, for value received, that this bond shall inure to the benefit of any and all of the persons named in Section 3181 of the California

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Civil Code so as to give a right of action to them or their assigns in any suit brought upon this bond.

It is hereby further expressly stipulated and agreed by the said Surety, for value received, that no change, extension of time, alteration or addition to the terms of the Contract or the specifications or drawings accompanying the same or to any other part of the contract documents, as defined therein, shall in any manner affect the obligations of the SURETY on this bond, and SURETY does hereby waive notice of any such change, extension, alteration, or addition.

IN WITNESS WHEREOF, the above-bound parties have executed this instrument under their several seals this _____ day of _____, 2022, the name and corporate seals of each corporate party being hereto affixed and these presents duly signed by their undersigned representatives, pursuant to authority of their governing bodies.

(Corporate Seal)

PRINCIPAL

By: _____

(Acknowledgement)

Title: _____

(Corporate Seal)

SURETY

By: _____

(Attorney-in-fact)

(Acknowledgement)

Title: _____

(NOTE TO SURETY COMPANY: A certified copy of unrevoked resolution of authority for the attorney-in-fact must be submitted with and attached to the executed bid bond.)

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MAINTENANCE BOND

(Note: The successful bidder must use this form. Use of any other bond form may prevent a contract from forming and/or result in forfeiture of the successful bidder’s bid bond.)

KNOW ALL MEN BY THESE PRESENTS:

WHEREAS the Board of the Parents & Friends, Inc. has awarded to _____(designated as the “PRINCIPAL”), a contract for the Parents & friends inc. Project, which contract and all of the contract documents as defined therein (designated as the “Contract”) are hereby made a part hereof; and

WHEREAS, the PRINCIPAL is required under the terms of the Contract to furnish a bond for the correction of any defects due to defective materials or workmanship in the work performed under the Contract.

NOW, THEREFORE, we the PRINCIPAL and the undersigned _____, as surety (designated as “SURETY”), an admitted surety insurer authorized to do business in the State of California, are held and firmly bound unto the City of Fort Bragg, (designated as the “OBLIGEE”), in the penal sum of _____Dollars (\$ _____) lawful money of the United States, being a sum not less than ten percent (10%) of the final Contract price, 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 CONDITIONS OF THIS OBLIGATION ARE SUCH that if, during a maintenance period of one (1) year from the date of acceptance by the OBLIGEE of the contracted work, the PRINCIPAL upon receiving written notice of a need for repairs which are directly attributable to defective materials or workmanship, shall diligently take the necessary steps to correct said defects within seven (7) days from the date of said notice, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

If any action shall be brought by the OBLIGEE upon this bond, a reasonable attorney’s fee, to be fixed by the Court, shall be and become a part of OBLIGEE’s judgment in any such action.

No right of action shall accrue on this bond to, or for the use of, any person or corporation other than the OBLIGEE named herein or the heirs, executors, administrator or successor of the OBLIGEE.

IN WITNESS WHEREOF, the above bound parties have executed this instrument under their seals this _____day of _____, 2022, the name and corporate seals of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

(Corporate Seal)

PRINCIPAL

PARENTS AND FRIENDS INC.

By: _____

(Acknowledgement)
(Corporate Seal)

Title: _____

SURETY

By: _____

(Attorney-in-fact)

(Acknowledgement)

Title: _____

(NOTE TO SURETY COMPANY: A certified copy of unrevoked resolution of authority for the attorney-in-fact must be submitted with and attached to the executed bid bond.)

ESCROW AGREEMENT FOR SECURITY DEPOSITS IN LIEU OF RETENTION

This Escrow Agreement is made and entered into by and between the City of Fort Bragg, whose address is 416 North Franklin Street, Fort Bragg, California 95437, hereinafter called "City", _____ "Contractor", and _____, whose address is _____, hereinafter called "Escrow Agent"

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

1. Pursuant to Section 22300 of the Public Contract Code of the State of California, Contractor has the option to deposit securities with Escrow Agent as a substitute for retention earnings required to be withheld by City pursuant to the Construction Contract entered into between the City and Contractor for the project entitled Parents and Friends Cypress Street Residential Care Facility for the Elderly in the amount of _____ (\$ _____) dated _____ 20____, (hereinafter referred to as the "Contract"). Alternatively, on written request of the Contractor, the City shall make payments of the retention earnings directly to the Escrow Agent. When Contractor deposits the securities as substitute for Contract earnings, the Escrow Agent shall notify the City within 10 days of the deposit. The market value of the securities at the time of the substitution shall be at least equal to the cash amount then required to be withheld as retention under the terms of the Contract between the City and Contractor. Securities shall be held in the name of _____ and shall designate the Contractor as the beneficial owner.
2. The City shall make progress payments to the Contractor for such funds which otherwise would be withheld from progress payments pursuant to the Contract provisions, provided that the Escrow Agent holds securities in the form and amount specified above.
3. When the City makes payment of retentions earned directly tot he Escrow Agent, the Escrow Agent shall hold them for the benefit of the Contractor until such time as the escrow created under this contract is terminated. The Contractor may direct the investments of the payments into securities. All terms and conditions of this Contract and the rights and responsibilities of the parties shall be equally applicable and binding when the City pays the escrow agent directly.
4. Contractor shall be responsible for paying all fees for the expenses incurred by Escrow Agent in administering the Escrow Account and all expenses of the City. These expenses and payment terms shall be determined by the City, Contractor and Escrow Agent.
5. The interest earned on the securities or the money market accounts held in escrow and all interest earned on that interest shall be for the sole account of the Contractor and shall be subject to withdrawal by contractor at any time and from time to time without notice to the City.

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6. Contractor shall have the right to withdraw all or any part of the principal in the Escrow Account only by written notice to Escrow Agent accompanied by written authorization from City to the Escrow Agent that City consents to the withdrawal of the amount sought to be withdrawn by Contractor.
7. The City shall have a right to draw upon the securities in the event of default by the Contractor. Upon seven day's written notice to the Escrow Agent from the City of the default, the Escrow Agent shall immediately convert the securities to cash and shall distribute the cash as instructed by the City.
8. Upon receipt of written notification from the City certifying that the Contract is final and complete, and that the Contractor has complied with all requirements and procedures applicable to the Contract, Escrow Agent shall release to Contractor all securities and interest on deposit less escrow fees and charges of the Escrow Account. The escrow shall be closed immediately upon disbursement of all monies and securities on deposit and payments of fees and charges.
9. Escrow Agent shall rely on the written notifications from the City and the Contractor pursuant to Sections (5) to (8) inclusive, of this Contract and the City and Contractor shall hold Escrow Agent harmless from Escrow Agent's release and disbursement of the securities and interest as set forth above.

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

On behalf of City:

On Behalf of Contractor

_____ Title

_____ Title

_____ Name

_____ Name

On behalf of Escrow Agent:

_____ Title

_____ Name

_____ Signature

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_____ Address

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

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

City:

Contractor:

_____ Title

_____ Title

_____ Name

_____ Name

_____ Signature

_____ Signature

_____ Address

_____ Address

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SECTION 011000 - SUMMARY

1.GENERAL

1. SUMMARY

A. This Section includes the following:

1. Work covered by the Contract Documents.
2. Work phases.
3. Work under other contracts.
4. Use of premises.
5. Owner's occupancy requirements.
6. Specification formats and conventions.

2. WORK COVERED BY CONTRACT DOCUMENTS

A. Project Identification: Parents and Friends, Residential Care Facility for the Elderly, Fort Bragg APN018-090-12

1. Project Location: 350 Cypress Street
Fort Bragg, CA 95437

B. Owner: Parents and Friends Inc.
306 Redwood Avenue
Fort Bragg, CA 95437
707-964-4940

1. Owner's Representative: Kristy Tanguay
306 Redwood Avenue
Fort Bragg, CA 95437
707-964-4940

C. Architect: K. Boodjeh, Architect
531 3rd Street
Eureka, CA 95501
707-798-6107

D. The Work consists of the following:

1. The Work includes (3) residential structures each containing (4) bedrooms, a residential kitchen, dining, living, and laundry space along w/(3) full bathrooms and an office. the bedrooms are to serve clients, permanently, licensed as a 24-hour care facility. clients may be classified as ambulatory, non-ambulatory, or bedridden. Exterior work includes a reconfiguration of the existing parking lot. New parking and accessible parking spaces will be added between the new building complex and the existing building. Drainage improvements, Site utilities, new propane tanks, and waste & recycling enclosures. There will be sidewalks and decorative stamped concrete connecting the new buildings to each other and the new parking lot. The site will have new landscaping, site lighting, fencing, a built in BBQ, and a birdbath.

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- E. Project will be constructed under a single prime contract.

3. WORK UNDER OTHER CONTRACTS

- A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract. Coordinate the Work of this Contract with work performed under separate contracts.

4. USE OF PREMISES

- A. General: Contractor shall have full use of premises for construction operations, including use of Project site, during construction period. Contractor's use of premises is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

5. OWNER'S OCCUPANCY REQUIREMENTS

- A. Owner Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed areas of building, before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work.
 - 1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied before Owner occupancy.
 - 2. Obtain a Certificate of Occupancy from authorities having jurisdiction before Owner occupancy.
 - 3. Before partial Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of building.
 - 4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of building.

6. SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification Format: The Specifications are organized into Divisions and Sections using the 49-division format and CSI/CSC's "MasterFormat" numbering system.
 - 1. Division 01: Sections in Division 01 govern the execution of the Work of all Sections in the Specifications.
- B. Specification Content:
 - 1. Abbreviated Language: Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. 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. Notify Architect immediately for official interpretation of any unclear language.

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2.PRODUCTS (Not Used)

3.EXECUTION (Not Used)

END OF SECTION 011000

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SECTION 012100 - ALLOWANCES

1. GENERAL

1. SUMMARY

- A. This Section includes administrative and procedural requirements governing the following:
 - 1. Lump-sum allowances.
 - 2. Quantity allowances.
 - 3. Contingency allowances.
 - 4. Testing and inspecting allowances.
- B. See Division 1 Section "Quality Requirements" for procedures governing the use of allowances for testing and inspecting.

2. SELECTION AND PURCHASE

- A. At the earliest practical date after award of the Contract, submit notice with date when final selection of each allowance product or system must be completed to avoid delaying the Work.
- B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- C. Purchase products and systems selected by Architect from the designated supplier.

3. SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.
- B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- C. Coordinate and process submittals for allowance items same as for other portions of the Work.

4. LUMP-SUM AND QUANTITY ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials selected by Architect under allowance and shall include taxes, freight, and delivery to Project site.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials under allowance shall be included as part of the Contract Sum and not part of the allowance.

5. CONTINGENCY ALLOWANCES

- A. Use the contingency allowance only as directed by Architect for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.
- B. Contractor's related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation, taxes, insurance, equipment rental, and similar costs.

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- C. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit margins.
- D. At Project closeout, credit unused amounts in allowance to Owner by Change Order.

6. TESTING AND INSPECTING ALLOWANCES

- A. Testing and inspecting allowances include the cost of engaging testing agencies, actual tests and inspections, and reporting results.
- B. The allowance does not include incidental labor required to assist the testing agency or costs for retesting if previous tests and inspections result in failure. The cost for incidental labor to assist the testing agency shall be included in the Contract Sum.
- C. Costs of services not required by the Contract Documents are not included in the allowance.
- D. At Project closeout, credit unused amounts in allowance to Owner by Change Order.

7. UNUSED MATERIALS

- A. Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.

2.PRODUCTS (Not Used)

3.EXECUTION

1. EXAMINATION

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

2. PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3. SCHEDULE OF ALLOWANCES

- A. Provide proposed Schedule of Allowances for approval prior to commencement of work.
- B. Allowances shall be clearly listed in the Schedule of Values.

END OF SECTION 01210

ALLOWANCES

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SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

1.GENERAL

1. SUMMARY

- A. This Section specifies administrative and procedural requirements for Contract modifications.
- B. See Division 1 Section "Allowances."

2. MINOR CHANGES IN THE WORK - ASI's.

- A. Architect will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time as "**Architect's Supplemental Instructions**," ASI's may reference supplemental drawings, specifications, or other documents.
 - 1. Upon receipt of an ASI, the Contractor shall acknowledge receipt, and if it is deemed that the instructions will affect Contract Sum, or Contract Time, the Contractor shall submit a quotation per the process described in Proposal Requests below.

3. PROPOSAL REQUESTS

- A. **Owner-Initiated Proposal Requests:** Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
 - 2. Within time specified in Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
- B. **Contractor-Initiated Proposals:** If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to Architect.
 - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 - 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits proposed.
 - 3. Indicate applicable taxes, delivery charges, equipment rental, and discounts.
 - 4. Include costs of labor and supervision directly attributable to the change.
 - 5. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish, and relationships. Use available total float before requesting an extension of Contract Time.
 - 6. Comply with requirements in Division 1 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

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- C. Proposal Request Form: May use AIA Document G709 for Proposal Requests, or similar form.

4. ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, base each Change Order proposal on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
 - 1. Include install costs in purchase amount only where indicated as part of the allowance.
 - 2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the Purchase Order amount or Contractor's handling, labor, installation, overhead, and profit. Submit claims within 21 days of receipt of the Change Order or Construction Change Directive authorizing work to proceed. Owner will reject claims submitted later than 21 days after such authorization.
 - 1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
 - 2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

5. CHANGE ORDER PROCEDURES

- A. On Owner's general agreement of a Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701, or similar form.

6. CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 - 1. Construction Change Directive contains a complete description of change in the Work. It also designates method to determine change in Contract Sum or Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
 - 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

2.PRODUCTS (Not Used)

3.EXECUTION (Not Used)

END OF SECTION 01250

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SECTION 012900 - PAYMENT PROCEDURES

1.GENERAL

1. SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

2. SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.

- 1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including Application for Payment forms with Continuation Sheets and Contractor's Construction Schedule.
- 2. Submit the Schedule of Values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
- 3. Subschedules: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of payment if necessary.

- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values.

- 1. Identification: Include the following Project identification on the Schedule of Values:

- a. Project name and location.
- b. Name of Architect.
- c. Contractor's name and address.
- d. Date of submittal.

- 2. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.
- 3. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
- 4. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
- 5. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
- 6. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
- 7. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

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- a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
- 8. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

3. APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
 - 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets as form for Applications for Payment.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
 - 1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
 - 2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- E. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt. One copy shall include waivers of lien and similar attachments if required.
 - 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- F. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from every entity who is lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
 - 1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 - 2. When an application shows completion of an item, submit final or full waivers.
 - 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 - 4. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.
- G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

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1. List of subcontractors.
 2. Schedule of Values.
 3. Contractor's Construction Schedule (preliminary if not final).
 4. Schedule of unit prices.
 5. Submittals Schedule (preliminary if not final).
 6. List of Contractor's staff assignments.
 7. List of Contractor's principal consultants.
 8. Copies of building permits.
 9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 10. Initial progress report.
 11. Report of preconstruction conference.
 12. Certificates of insurance and insurance policies.
 13. Construction Waste Management Plan.
- H. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- I. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 3. Updated final statement, accounting for final changes to the Contract Sum.
 4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
 5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
 6. AIA Document G707, "Consent of Surety to Final Payment."
 7. Evidence that claims have been settled.
 8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
 9. Final Green Building Forms and related submittals.

2.PRODUCTS (Not Used)

3.EXECUTION (Not Used)

END OF SECTION 01290

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SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

1. GENERAL

1. SUMMARY

1. This Section includes administrative provisions for coordinating construction operations.

2. PROJECT DOCUMENT MANAGEMENT:

A. All Project Administration Documents shall be submitted, in digital format.

1. File naming: All files must be appropriately named, and shall include the date of issue, formatted as Type, Sequential Number, *Brief* Description, Date (MMDDYY). Use dashes or underscores to separate name fields. Example: "RFI#1-ConcTexture-080410.pdf."
 - a. Files that have been marked-up by Architect will include "RESPONSE" at the end of the file name. Example: "RFI#1-ConcTexture-080410_RESPONSE.pdf"
2. Related files should be combined into a single PDF, not sent as a set of individual files.
3. *NOTE*: This digital file system is intended to make document filing organized and efficient. Suggestions to make it easier and more effective are encouraged.

3. COORDINATION

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections 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 with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.
4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.

B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such 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. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.
9. Project closeout activities.

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4. COORDINATION SUBMITTALS

- A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.
1. Content: Project-specific information, drawn accurately to scale. Do not base Coordination Drawings on reproductions of the Contract Documents or standard printed data. Include the following information, as applicable:
 - a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - b. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
 2. Number of Copies: Submit one digital copy (PDF).
 3. Refer to individual Sections for their specific Coordination Drawing requirements.

5. PROJECT MEETINGS

- A. General: 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: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes in digital format to everyone concerned, including Owner and Architect, within three days of the meeting.
- B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner and Architect. Hold the conference at the HUD office on closing day. Conduct the meeting to review responsibilities and personnel assignments.
1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference.
 2. Agenda: Discuss items of significance that could affect progress and project success. Prepare and submit draft agenda to Architect not less than 10 days prior to conference.
 3. Minutes: Record and distribute meeting minutes in digital format.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
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 of scheduled meeting dates.
 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration.
 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 4. Reporting: Distribute digital copy of minutes of the meeting to relevant parties.

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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.
- D. Progress Meetings: Conduct progress meetings at regular intervals appropriate to the stage of construction. Coordinate dates of meetings with preparation of payment requests.
 1. Attendees: In addition to representatives of Owner and Architect, Contractor, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. HUD Contract Inspector will attend the Monthly Draw meetings.
 2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 3. Minutes: Record the meeting minutes.
 4. Reporting: Distribute digital copy of minutes of the meeting to relevant parties.
 5. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
6. REQUESTS FOR INTERPRETATION (RFIs)
 - A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, prepare and submit RFI in digital format.
 1. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
 - B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the general project identification information and the following:
 1. RFI number, numbered sequentially.
 2. Related specification section number, as appropriate.
 3. Related drawing sheets and number and detail references.
 4. Field dimensions and conditions, as appropriate.
 5. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 6. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
 7. Identify each page of attachments with the RFI number and sequential page number.
 - C. Architect's Action: Architect will review each RFI, determine action required, and return it in digital format. Allow minimum of seven working days for Architect's response.
 1. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 1 Section "Contract Modifications."
 - a. If Contractor believes the RFI response warrants change in Contract Time or Contract Sum, notify Architect in writing within seven days of receipt of response. See Division 1 Section "Contract Modification Procedures," for process.
 - D. On receipt of Architect's action, update the RFI log and submit a digital copy with the next meeting minutes. Review response and notify Architect within seven days if Contractor disagrees with response.
 - E. RFI Log: Prepare, and maintain a digital log of RFIs organized by the RFI number. Include the following:

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1. RFI number.
2. Date the RFI was submitted.
3. RFI description.
4. Date Architect's response was received.
5. Notes.

2.PRODUCTS (Not Used)

3.EXECUTION (Not Used)

END OF SECTION 013100

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SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

1. GENERAL

1. SUMMARY

- A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Contractor's Construction Schedule.
 - 2. Submittals Schedule.
 - 3. Daily construction reports.
 - 4. Field condition reports.
- B. See Division 1 for submitting the Schedule of Values.
- C. See Division 1 Section "Photographic Documentation" for submitting construction photographs.

2. DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 1. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- D. Float: The measure of leeway in starting and completing an activity.
 - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
- E. Fagnet: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.
- F. Major Area: A story of construction, a separate building, or a similar significant construction element.

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3. SUBMITTALS

- A. Submittals Schedule: Submit one digital copy of submittal schedule. Arrange the following information in a tabular format:
 - 1. Scheduled date for first submittal.
 - 2. Specification Section number and title.
 - 3. Submittal category (action or informational).
 - 4. Name of subcontractor.
 - 5. Description of the Work covered.
 - 6. Scheduled date for purchasing products included.
 - 7. Scheduled date for this portion of work/installation to begin.
 - 8. Scheduled date for Architect's final release or approval.
- B. Contractor's Critical Path Construction Schedule: Submit one digital copy of initial schedule, large enough to show entire schedule for entire construction period.
- C. Daily Construction Reports: Submit one digital copy at each Progress Meeting.
- D. Field Condition Reports: Submit one digital copy within five days of discovery of differing conditions.

4. COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
- B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.
 - 1. Secure time commitments for performing critical elements of the Work from parties involved.
 - 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

2.PRODUCTS

1. SUBMITTALS SCHEDULE

- A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.
 - 1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
 - 2. Submit concurrently with the first complete submittal of Contractor's Construction Schedule.
 - 3. Submit updated Submittals Schedule with each major change to the Construction Schedule.

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2. CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for commencement of the Work to date of Final Completion.
 - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Include the following:
 - 1. Activity Duration: Define activities so no activity is longer than 20 days.
 - 2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - 3. Submittal Review Time: Include review and resubmittal times indicated in Division 1 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
 - 4. Startup and Testing Time: Include not less than seven days for startup and testing.
 - 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
 - 1. Phasing: Arrange list of activities on schedule by phase.
 - 2. Work by Owner: Include activity for each portion of Work performed by Owner.
 - 3. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Uninterruptible services.
 - c. Partial occupancy before Substantial Completion.
 - d. Use of premises restrictions.
 - e. Provisions for future construction.
 - f. Seasonal variations.
 - g. Environmental control.
 - 4. Work Stages: Indicate important stages for each major portion of the Work.
- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.
- E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis to demonstrate the effect of the proposed change on the overall project schedule.

3. REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
 - 1. List of subcontractors at Project site.

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2. Equipment at Project site.
3. Material deliveries.
4. High and low temperatures and general weather conditions.
5. Stoppages, delays, shortages, and losses.
6. Meter readings and similar recordings.
7. Orders and requests of authorities having jurisdiction.
8. Services connected and disconnected.
9. Equipment or system tests and startups.

- B. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit as an RFI. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

3.EXECUTION

1. CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule 5 days before each regularly scheduled progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 3. As the Work progresses, indicate Actual Completion percentage for each activity.
 4. Coordinate with Construction Progress Schedule Requirements.
- B. Distribution: Distribute copies of approved schedule to Architect Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 013200

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SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION

1.GENERAL

1. SUMMARY

- A. This Section includes administrative and procedural requirements for the following:
 - 1. Preconstruction photographs.
 - 2. Periodic construction photographs.
- B. See Division 1 Section "Closeout Procedures" for submitting digital media as Project Record Documents at Project closeout.
- C. See Division 1 Section "Demonstration and Training" for submitting videotapes of demonstration of equipment and training of Owner's personnel.
- D. See Division 1 Section "Green Building Requirements" for required photograph submittals. Those submittals will comply with the requirements in this section.

2. SUBMITTALS

- A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same label information as corresponding set of photographs.
- B. Construction Photographs: Submit digital copy of each photographic view within seven days of taking photographs.
 - 1. Identification:
 - a. Photographs must have date and time stamp either visibly on image or embedded digitally in the electronic file.
 - 2. Submit electronic files by email, burned to CD, or on USB Flash Drive.

3. USAGE RIGHTS

- A. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.

2.PRODUCTS- NOT USED.

3.EXECUTION

1. CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs that are in focus, to clearly show the Work.

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1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- B. Preconstruction Photographs: Before commencement of excavation, take, digital photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.
1. Flag construction limits before taking construction photographs.
 2. Take a minimum of eight (8) photographs to show existing conditions adjacent to property before starting the Work.
 3. Take a minimum of (8) eight photographs of adjacent properties to accurately record physical conditions at start of construction.
- C. Periodic Construction Photographs: Take a minimum of (12) digital photographs weekly, with timing each month adjusted to coincide with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

END OF SECTION 013233

SECTION 013300 - SUBMITTAL PROCEDURES

1. GENERAL

1. SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals. Other Sections include requirements for submittals such as Photographs, Quality Requirements, Project Record Documents, Operations and Maintenance Data, and Demonstration and Training, etc.

2. DEFINITIONS

- A. **Action Submittals:** Written and graphic information that requires Architect's responsive action. These may include Product Data, Shop Drawings, Samples for Selection or Verification, or others. Architect will review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents. Print, mark-up, and file one final approved copy as a Project Record Document.
- B. **Informational Submittals:** Written information that does not require Architect's responsive action. Submittals may be rejected for not complying with requirements. These may include Design Data, Certificates, Test Reports, Inspection Reports, Manufacturer's Instructions, GREEN BUILDING Submittal Forms, or others. Submit for Architect's general knowledge. Architect will only respond to acknowledge receipt, or to require re-submittal of incomplete or otherwise insufficient documents. Print, mark-up, and file one final approved copy as a Project Record Document.

3. SUBMITTAL PROCEDURES

- A. **Coordination:** Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- B. **Submittals Schedule:** Comply with requirements in Division 1 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.
- C. **Processing Time:** Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. **Initial Review:** Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required.

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2. Resubmittal Review: Allow 15 days for review of each resubmittal.

2.PRODUCTS

1. ACTION SUBMITTALS

- A. General: Prepare and submit Action Submittals required by individual Specification Sections.

B. **Product Data Submittals:**

1. **Product data submittals shall be composed as multi-page PDF documents. The first page of the PDF document shall be the cover sheet for that particular submittal, followed by the individual pages of that submittal.**
2. Include the following information on a cover sheet for each submittal:
 - a. Submittal number (sequential format) including revision identifier, e.g. "Rev-1"
 - b. Number and title of appropriate Specification Section.
 - c. Location(s) where product is to be installed, as appropriate.
 - d. Other necessary identification.
3. On individual Product Data sheets, include the following information, as applicable:
 - a. Clearly identify which options, accessories, etc. are applicable to the Project.
 - b. Performance characteristics.
 - c. Wiring diagrams showing factory-installed wiring, controls, piping, etc.
 - d. Compliance with specified referenced standards.
 - e. Show dimensions, field dimensions, and required clearances.
4. Deviations: Make marks to identify deviations from the Contract Documents.
5. Resubmit submittals until they are approved.
6. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, owner, and others as necessary for performance of construction activities.
7. Use for Construction: Use only final approved submittals. Do not continue with affected portions of the Work until all related submittals have been approved.

C. **Shop Drawings:** Prepare Project-specific information, drawn accurately to scale.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Dimensions.
 - b. Identification of products.
 - c. Fabrication and installation drawings.
 - d. Roughing-in and setting diagrams.
 - e. Wiring diagrams: shop & field-installed wiring, power, signal, and control wiring.
 - f. Shopwork manufacturing instructions.
 - g. Templates and patterns.
 - h. Schedules.
 - i. Notation of coordination requirements.
 - j. Notation of dimensions established by field measurement.
 - k. Relationship to adjoining construction clearly indicated.
 - l. Seal and signature of professional engineer if required.

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

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1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Attach label that includes identification info.
2. INFORMATIONAL SUBMITTALS
- A. General: Prepare and submit Informational Submittals required by other Specification Sections.
 - B. Material Safety Data Sheets (MSDSs): Submit information directly to Owner; do not submit to Architect. Architect will not review submittals that include MSDS's.
3. DELEGATED DESIGN
- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
 - B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit three copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

3.EXECUTION

1. CONTRACTOR'S REVIEW

- A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions.
 1. Mark submittal cover sheet with the following:
 - a. Date of Contractors Approval
 - b. Name of Reviewer
 - c. Statement of Approval, such as "This submittal has been reviewed, checked, and approved for compliance with the Contract Documents."

2. ARCHITECT'S ACTION

- A. General: Architect may choose to not review submittals missing Contractor's statement of approval.
 1. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will mark each submittal with action taken.
- B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements.
- C. Partial submittals will be considered nonresponsive, and will not be reviewed.

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D. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

1. GENERAL

1. SUMMARY

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 2. Requirements for Contractor to provide quality-assurance and control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- C. See Divisions 2 through 16 Sections for specific test and inspection requirements.

2. DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Laboratory Mockups: Full-size, physical assemblies that are constructed at testing facility to verify performance characteristics.
- D. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
- E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.
- F. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
- G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

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- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.
- J. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

3. 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 Architect 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 Architect for a decision before proceeding.

4. SUBMITTALS

- A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- B. Reports: Prepare and submit certified written reports that include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.
 - 7. Identification of product and Specification Section.
 - 8. Complete test or inspection data.
 - 9. Test and inspection results and an interpretation of test results.
 - 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.

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12. Name and signature of laboratory inspector.
 13. Recommendations on retesting and reinspecting.
- C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.
5. QUALITY ASSURANCE
- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
 - B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
 - C. 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.
 - D. 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.
 - E. 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.
 - F. 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. Requirement for specialists shall not supersede building codes and regulations governing the Work.
 - G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
 - H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

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- I. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Sections in Divisions 2 through 16.

6. QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 - 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 - 2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.
- B. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 - 1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 - 2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 - 3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 - 4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 - 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 1 Section "Submittal Procedures."
- D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- E. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
 - 1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 - 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.

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4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

7. SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:

B. Special Tests and Inspections: Conducted by a qualified special inspector as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

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2.PRODUCTS (Not Used)

3.EXECUTION

1. REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
 - 2. Comply with the Contract Document requirements for Division 1 Section "Cutting and Patching."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

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SECTION 014200 - REFERENCES

1.GENERAL

1. DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "approved," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

2. INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents, unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

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1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

D. Abbreviations and Acronyms for Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list.

PRIVATE tbl1

ADAAG Americans with Disabilities Act (ADA)
Architectural Barriers Act (ABA)

CFR Code of Federal Regulations

CRD Handbook for Concrete and Cement

DOD Department of Defense Military Specifications and Standards

DSCC Defense Supply Center Columbus (See FS)

FED-STD Federal Standard (See FS)

FS Federal Specification

FTMS Federal Test Method Standard (See FS)

ICC-ES ICC Evaluation Service, Inc.

MIL (See MILSPEC)

MIL-STD (See MILSPEC)

MILSPEC Military Specification and Standards

NES National Evaluation Service (See ICC-ES)

UFAS Uniform Federal Accessibility Standards

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3. ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale Research's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."

B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

PRIVATE tbl2

AA	Aluminum Association, Inc. (The)
AAADM	American Association of Automatic Door Manufacturers
AABC	Associated Air Balance Council
AAMA	American Architectural Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists (The)
ABMA	American Bearing Manufacturers Association
ACI	ACI International (American Concrete Institute)
ACPA	American Concrete Pipe Association
AEIC	Association of Edison Illuminating Companies, Inc. (The)
AF&PA	American Forest & Paper Association
AGA	American Gas Association
AGC	Associated General Contractors of America (The)

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AHA	American Hardboard Association (Now part of CPA)
AHAM	Association of Home Appliance Manufacturers
AI	Asphalt Institute
AIA	American Institute of Architects (The)
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
ALCA	Associated Landscape Contractors of America
ALSC	American Lumber Standard Committee, Incorporated
AMCA	Air Movement and Control Association International, Inc.
ANSI	American National Standards Institute
AOSA	Association of Official Seed Analysts
APA	APA - The Engineered Wood Association
APA	Architectural Precast Association
API	American Petroleum Institute
ARI	Air-Conditioning & Refrigeration Institute

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ARMA	Asphalt Roofing Manufacturers Association
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASME	ASME International (The American Society of Mechanical Engineers International)
ASSE	American Society of Sanitary Engineering
ASTM	ASTM International (American Society for Testing and Materials International)
AWCI	AWCI International (Association of the Wall and Ceiling Industries International)
AWCMA	American Window Covering Manufacturers Association (Now WCSC)
AWI	Architectural Woodwork Institute
AWPA	American Wood-Preservers' Association
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Industry Association (The)

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BICSI	BICSI
BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association International)
BISSC	Baking Industry Sanitation Standards Committee
CCC	Carpet Cushion Council
CDA	Copper Development Association Inc.
CEA	Canadian Electricity Association
CFFA	Chemical Fabrics & Film Association, Inc.
CGA	Compressed Gas Association
CGSB	Canadian General Standards Board
CIMA	Cellulose Insulation Manufacturers Association
CISCA	Ceilings & Interior Systems Construction Association
CISPI	Cast Iron Soil Pipe Institute
CLFMI	Chain Link Fence Manufacturers Institute
CPA	Composite Panel Association
CPPA	Corrugated Polyethylene Pipe Association
CRI	Carpet & Rug Institute (The)

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CRSI	Concrete Reinforcing Steel Institute
CSA	CSA International (Formerly: IAS - International Approval Services)
CSI	Construction Specifications Institute (The)
CSSB	Cedar Shake & Shingle Bureau
CTI	Cooling Technology Institute (Formerly: Cooling Tower Institute)
DHI	Door and Hardware Institute
EIA	Electronic Industries Alliance
EIMA	EIFS Industry Members Association
EJCDC	Engineers Joint Contract Documents Committee
EJMA	Expansion Joint Manufacturers Association, Inc.
ESD	ESD Association
FCI	Fluid Controls Institute
FIBA	Federation Internationale de Basketball Amateur (The International Basketball Federation)
FIVB	Federation Internationale de Volleyball (The International Volleyball Federation)

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FM	Factory Mutual System (Now FMG)
FMG	FM Global (Formerly: FM - Factory Mutual System)
FRSA	Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.
FSA	Fluid Sealing Association
FSC	Forest Stewardship Council
GA	Gypsum Association
GANA	Glass Association of North America
GRI	(Now GSI)
GS	Green Seal
GSI	Geosynthetic Institute
HI	Hydraulic Institute
HI	Hydronics Institute
HMMA	Hollow Metal Manufacturers Association (Part of NAAMM)
HPVA	Hardwood Plywood & Veneer Association
HPW	H. P. White Laboratory, Inc.
IAS	International Approval Services (Now CSA International)

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IBF	International Badminton Federation
ICEA	Insulated Cable Engineers Association, Inc.
ICRI	International Concrete Repair Institute, Inc.
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The)
IESNA	Illuminating Engineering Society of North America
IGCC	Insulating Glass Certification Council
IGMA	Insulating Glass Manufacturers Alliance (The)
ILI	Indiana Limestone Institute of America, Inc.
ISO	International Organization for Standardization
ISSFA	International Solid Surface Fabricators Association
ITS	Intertek
ITU	International Telecommunication Union
KCMA	Kitchen Cabinet Manufacturers Association
LMA	Laminating Materials Association (Now part of CPA)
LPI	Lightning Protection Institute

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MBMA	Metal Building Manufacturers Association
MFMA	Maple Flooring Manufacturers Association
MFMA	Metal Framing Manufacturers Association
MH	Material Handling (Now MHIA)
MHIA	Material Handling Industry of America
MIA	Marble Institute of America
MPI	Master Painters Institute
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc.
NAAMM	National Association of Architectural Metal Manufacturers
NACE	NACE International (National Association of Corrosion Engineers International)
NADCA	National Air Duct Cleaners Association
NAGWS	National Association for Girls and Women in Sport
NAIMA	North American Insulation Manufacturers Association (The)
NBGQA	National Building Granite Quarries Association, Inc.
NCAA	National Collegiate Athletic Association (The)
NCMA	National Concrete Masonry Association

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NCPI	National Clay Pipe Institute
NCTA	National Cable & Telecommunications Association
NEBB	National Environmental Balancing Bureau
NECA	National Electrical Contractors Association
NeLMA	Northeastern Lumber Manufacturers' Association
NEMA	National Electrical Manufacturers Association
NETA	InterNational Electrical Testing Association
NFHS	National Federation of State High School Associations
NFPA	NFPA (National Fire Protection Association)
NFRC	National Fenestration Rating Council
NGA	National Glass Association
NHLA	National Hardwood Lumber Association
NLGA	National Lumber Grades Authority
NOFMA	National Oak Flooring Manufacturers Association
NRCA	National Roofing Contractors Association
NRMCA	National Ready Mixed Concrete Association

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NSF	NSF International (National Sanitation Foundation International)
NSSGA	National Stone, Sand & Gravel Association
NTMA	National Terrazzo & Mosaic Association, Inc.
NTRMA	National Tile Roofing Manufacturers Association (Now RTI)
NWWDA	National Wood Window and Door Association (Now WDMA)
OPL	Omega Point Laboratories, Inc.
PCI	Precast/Prestressed Concrete Institute
PDCA	Painting & Decorating Contractors of America
PDI	Plumbing & Drainage Institute
PGI	PVC Geomembrane Institute
PTI	Post-Tensioning Institute
RCSC	Research Council on Structural Connections
RFCI	Resilient Floor Covering Institute
RIS	Redwood Inspection Service
RTI	(Formerly: NTRMA - National Tile Roofing Manufacturers Association) (Now TRI)

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SAE	SAE International
SDI	Steel Deck Institute
SDI	Steel Door Institute
SEFA	Scientific Equipment and Furniture Association
SEI	Structural Engineering Institute
SGCC	Safety Glazing Certification Council
SIA	Security Industry Association
SIGMA	Sealed Insulating Glass Manufacturers Association (Now IGMA)
SJI	Steel Joist Institute
SMA	Screen Manufacturers Association
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SMPTE	Society of Motion Picture and Television Engineers
SPFA	Spray Polyurethane Foam Alliance (Formerly: SPI/SPFD - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division)
SPIB	Southern Pine Inspection Bureau (The)
SPI/SPFD	Society of the Plastics Industry, Inc. (The)

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Spray Polyurethane Foam Division (Now SPFA)

SPRI	SPRI (Single Ply Roofing Institute)
SSINA	Specialty Steel Industry of North America
SSPC	SSPC: The Society for Protective Coatings
STI	Steel Tank Institute
SWI	Steel Window Institute
SWRI	Sealant, Waterproofing, & Restoration Institute
TCA	Tile Council of America, Inc.
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance
TMS	The Masonry Society
TPI	Truss Plate Institute, Inc.
TPI	Turfgrass Producers International
TRI	Tile Roofing Institute (Formerly: RTI - Roof Tile Institute)
UL	Underwriters Laboratories Inc.
UNI	Uni-Bell PVC Pipe Association

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USAV	USA Volleyball
USGBC	U.S. Green Building Council
USITT	United States Institute for Theatre Technology, Inc.
WASTEC	Waste Equipment Technology Association
WCLIB	West Coast Lumber Inspection Bureau
WCMA	Window Covering Manufacturers Association (Now WCSC)
WCSC	Window Covering Safety Council (Formerly: WCMA - Window Covering Manufacturers Association)
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association)
WI	Woodwork Institute (Formerly WIC - Woodwork Institute of California)
WIC	Woodwork Institute of California (Now WI)
WMMPA	Wood Moulding & Millwork Producers Association
WSRCA	Western States Roofing Contractors Association
WWPA	Western Wood Products Association

- C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

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PRIVATE tbl3

BOCA	BOCA International, Inc. (Now ICC)
CABO	Council of American Building Officials (Now ICC)
IAPMO	International Association of Plumbing and Mechanical Officials
ICBO	International Conference of Building Officials (Now ICC)
ICBO ES	ICBO Evaluation Service, Inc. (Now ICC-ES)
ICC	International Code Council (Formerly: CABO - Council of American Building Officials)
ICC-ES	ICC Evaluation Service, Inc.
NES	National Evaluation Service (Now ICC-ES)
SBCCI	Southern Building Code Congress International, Inc. (Now ICC)

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

PRIVATE tbl4

CE	Army Corps of Engineers
CPSC	Consumer Product Safety Commission
DOC	Department of Commerce
DOD	Department of Defense
DOE	Department of Energy

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EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FDA	Food and Drug Administration
GSA	General Services Administration
HUD	Department of Housing and Urban Development
LBL	Lawrence Berkeley National Laboratory
NCHRP	National Cooperative Highway Research Program (See TRB)
NIST	National Institute of Standards and Technology
OSHA	Occupational Safety & Health Administration
PBS	Public Building Service (See GSA)
PHS	Office of Public Health and Science
RUS	Rural Utilities Service (See USDA)
SD	State Department
TRB	Transportation Research Board
USDA	Department of Agriculture

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USPS Postal Service

E. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

PRIVATE tbl5

CBHF State of California, Department of Consumer Affairs
 Bureau of Home Furnishings and Thermal Insulation

CPUC California Public Utilities Commission

TFS Texas Forest Service
 Forest Products Laboratory

2.PRODUCTS (Not Used)

3.EXECUTION (Not Used)

END OF SECTION 014200

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SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

1. GENERAL

1. SUMMARY

- A. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. See Division 1 Section "Execution Requirements" for progress cleaning requirements.
- C. See Divisions 2 through 16 Sections for temporary heat, ventilation, and humidity requirements for products in those Sections.

2. DEFINITIONS

- A. **Permanent Enclosure:** As determined by Architect, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures.

3. USE CHARGES

- A. **General:** Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Architect, testing agencies, and authorities having jurisdiction.
- B. **Water Service:** Provide connections and extensions of services as required for construction operations and include cost of service and use in contract.
- C. **Electric Power Service:** Provide temporary site power as required for construction operations and include cost of service and use in contract.

4. SUBMITTALS

- A. **Temporary Facilities Site Plan:** Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel and public.

5. QUALITY ASSURANCE

- A. **Tests and Inspections:** Arrange for utility providers and authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

6. PROJECT CONDITIONS

- A. **Temporary Use of Permanent Facilities:** Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its

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use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

2.PRODUCTS

1. EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas heaters with individual space thermostatic control.
 - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 - 2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

3.EXECUTION

1. TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 - 1. 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. Water Service: Use of Owner's existing water service facilities, if available, will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
 - 1. Where installations below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize water damage. Drain accumulated water promptly from pans.
- E. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- F. Backflow Prevention: If the Contractor wishes to use water from the municipal water distribution system during the course of this project, they shall obtain and attach a double check valve at the point where they connect to the water, or, as otherwise required and approved by

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municipal water provider. The Contractor shall be responsible for the maintenance and protection of the point of connection including backflow prevention.

- G. Heating: Provide temporary heating 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.
- H. 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.
- I. Electric Power Service: Use of Owner's existing electric power service will be permitted, if available, as long as equipment is maintained in a condition acceptable to Owner.
 - 1. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations. If necessary, connect temporary service to Owner's existing power source, as directed by Owner.
- J. 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. SUPPORT FACILITIES INSTALLATION

- A. Temporary Paved Areas: Construct and maintain temporary paved areas adequate for construction operations if required.
- B. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- C. Parking: The project has limited on-site parking. Coordination of lawful temporary parking areas for construction personnel is the responsibility of the Contractor.
- D. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
 - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
- E. Project Identification and Temporary Signs: Provide Project identification. Install signs where indicated to inform public and individuals seeking entrance to Project. Unauthorized signs are not permitted. Architect may order unnecessary promotional signs to be removed.
 - 1. Provide temporary, directional signs for construction personnel and visitors.
 - 2. Maintain signs so they are legible and neat-looking at all times.

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- F. Waste Disposal Facilities: Provide clearly labeled waste-collection containers in sizes adequate to handle waste and recycling from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 1 Section "Execution Requirements" for progress cleaning requirements.
 - 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 Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.
 - I. Temporary Use of Permanent Stairs: Cover finished, permanent stairs with protective covering of plywood or similar material so finishes will be undamaged at time of acceptance.
 - J. Other construction aids and miscellaneous facilities: Provide scaffolds, platforms, ramps, incidental sheeting and shoring, and demolition waste chutes to suit Project construction requirements.
3. SECURITY AND PROTECTION FACILITIES INSTALLATION
- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 - B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
 - C. Stormwater Control: Comply with authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
 - D. Tree and Plant Protection: If existing trees are to be retained, install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations.
 - E. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Obtain extended warranty for Owner. Perform control operations lawfully, using environmentally safe materials.
 - F. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence, in a manner that will 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. Coordinate fence location and extent with Architect and include on Temporary Facilities Site Plan submittal for this Section.

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Fencing may be relocated to suit stage of construction and specific construction activities. Coordinate relocation with Architect.

2. Fence maintenance: Maintain fence daily to ensure it is sturdy, appropriately fixed in place, and neat-looking.
 - G. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
 - H. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
 - 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 is needed and permanent enclosure is not complete, insulate temporary enclosures.
4. 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: Maintain facilities in good operating condition until removal.
 1. 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.
 - 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. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 1 Section "Closeout Procedures."

END OF SECTION 015000

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SECTION 016000 - PRODUCT REQUIREMENTS

1. GENERAL

1. SUMMARY

- A. This Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.
- B. See Division 1 Section "Closeout Procedures" for submitting warranties for Contract closeout.
- C. See Divisions 2 through 16 Sections for specific requirements for warranties on products and installations specified to be warranted.
- D. See Division 1 for submitting change orders.

2. DEFINITIONS

- A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," 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, that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, 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. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
- C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," 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 other named manufacturers.

3. SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

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1. Substitution Request Form: Use form approved by Architect that includes all of the required information in an organized and consistent format.
 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified material or product cannot be provided.
 - b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
 - i. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
 - j. Cost information, including a proposal of change, if any, in the Contract Sum.
 - k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, including LEED requirements, and is appropriate for applications indicated.
 - l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
 3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.
 - a. Form of Acceptance: Change Order.
 - b. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.
- B. Comparable Product Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
1. 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

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product request within 15 days of receipt of request, or 7 Insert time days of receipt of additional information or documentation, whichever is later.

- a. Form of Approval: As specified in Division 1 Section "Submittal Procedures."
- b. Use product specified if Architect cannot make a decision on use of a comparable product request within time allocated.

- C. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 1 Section "Submittal Procedures." Show compliance with requirements.

4. QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

5. PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

- B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project 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 ensure compliance with the Contract Documents and to ensure 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. Store cementitious products and materials on elevated platforms.
5. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.

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

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product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 2. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 2. Specified Form: When specified forms are included with the Specifications, prepare a written document using appropriate form properly executed.
 3. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Division 1 Section "Closeout Procedures."

2.PRODUCTS

1. PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a 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. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
 6. 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 product and manufacturer, provide the named product that complies with requirements.
 2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
 3. Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
 4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.

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5. Available Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
6. Available Manufacturers: Where Specifications include a list of manufacturers, provide a product by one of the manufacturers listed, or an unnamed manufacturer, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
7. Product Options: Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product or system. Comply with provisions in Part 2 "Product Substitutions" Article for consideration of an unnamed product or system.
8. *Basis-of-Design Product*: Where Specifications name a product, provide the specified product or submit a Request for Substitution for comparable product, as described in Part 2 "Product Substitutions" Article for consideration of an unnamed product or system.
9. Visual Matching Specification: Where Specifications require matching an established Sample, select a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
 - a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.
10. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.
 - a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
 - b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2. PRODUCT SUBSTITUTIONS

- A. Timing: Architect will consider requests for substitution if received within 60 days after commencement of the Work. Requests received after that time may be considered or rejected at discretion of Architect.
- B. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 2. Requested substitution does not require extensive revisions to the Contract Documents.

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3. Requested substitution is consistent with the Contract Documents, including LEED requirements and will produce indicated results.
4. Substitution request is fully documented and properly submitted.
5. Requested substitution will not adversely affect Contractor's Construction Schedule.
6. Requested substitution has received necessary approvals of authorities having jurisdiction.
7. Requested substitution is compatible with other portions of the Work.
8. Requested substitution has been coordinated with other portions of the Work.
9. Requested substitution provides specified warranty.

3. COMPARABLE PRODUCTS

A. Conditions: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require extensive revisions to the Contract Documents, that it is consistent with the Contract Documents and 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.

3.EXECUTION (Not Used)

END OF SECTION 016000

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SECTION 017300 - EXECUTION

1.GENERAL

1. SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. General installation of products.
 - 4. Progress cleaning.
 - 5. Starting and adjusting.
 - 6. Protection of installed construction.
 - 7. Correction of the Work.
- B. See Division 1 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
- C. See Division 1 Section "HUD Special Conditions" for submitting topographic land survey.

2. SUBMITTALS

- A. Qualification Data: For land surveyor.
- B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal. See Green Building Form 1 for Non-hazardous waste disposal receipt requirements.

2.PRODUCTS (Not Used)

3.EXECUTION

1. EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
 - 1. Before construction, verify the location and points of connection of utility services.
- B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.

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1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 3. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 4. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.
2. PREPARATION
- A. Existing Utility Information: Furnish information to local utility and Architect that is 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, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.
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. General: Engage a land surveyor 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 needed to locate each element of Project.
 2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.

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3. Inform installers of lines and levels to which they must comply.
 4. Check the location, level and plumb, of every major element as the Work progresses.
 5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
 6. 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 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.
4. FIELD ENGINEERING
- A. 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.
- B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project 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.
5. INSTALLATION
- A. General: 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.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure 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.

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- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
 - F. 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.
 - G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
 - 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.
 - H. 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.
 - I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.
6. PROGRESS CLEANING
- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F.
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - B. Site: Maintain Project 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.

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- 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: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- 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.

7. STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 1 Section "Quality Requirements."

8. 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.

9. CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 1 Section "Cutting and Patching."
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.

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- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300

SECTION 017329 - CUTTING AND PATCHING

1. GENERAL

1. SUMMARY

- A. This Section includes procedural requirements for cutting and patching.
- B. See Divisions 2 through 16 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

2. SUBMITTALS

- A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
 - 1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
 - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
 - 3. Products: List products to be used and firms or entities that will perform the Work.
 - 4. Dates: Indicate when cutting and patching will be performed.
 - 5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
 - 6. Architect's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

3. QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements not identified for removal, or otherwise in a manner that could change their load-carrying capacity or load-deflection ratio.
- B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
- C. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

2.PRODUCTS

1. MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials 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 match the visual and functional performance of in-place materials.

3.EXECUTION

1. EXAMINATION

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

2. PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

3. PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size

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- required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Excavating and Backfilling: Comply with requirements in applicable Division 2 Sections where required by cutting and patching operations.
 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 6. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.
- D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 017329

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SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

1.GENERAL

1. SUMMARY

- A. This section includes general procedure requirements for development a Waste Management Plan.
- B. See Appendix A “CALGreen Building Standards and Forms”

2. REQUIREMENTS

- A. Develop and implement Waste Management Plan that results in end-of-Project rates for salvage/recycling of 65 percent, or more, by weight of total demolition and construction waste generated by the Work. Hazardous materials are not included as part of “waste” in this section. Refer to AIA A201 §10.3 for contract requirements concerning hazardous materials.

3. SUBMITTALS

- A. Green Building Form 1, including additional supplemental documents listed on Form, submitted per Section 018113 Sustainable Design Requirements.
- B. Waste Management Plan: Submit 3 copies of plan on, or before, date established for commencement of the Work. Include, at a minimum, the following information:
 - 1. Identify Waste Management Coordinator.
 - 2. List of the types and approximate quantities (by weight) of waste materials projected to be generated during the Work. Note if such material will be landfilled, recycled, or salvaged.
 - 3. Landfill disposal options: Name, address, and phone number of landfill or transfer station where trash waste will be disposed of.
 - 4. Recycling options: Name, address, and phone number of recycling facility, type(s) of material accepted.
 - 5. Salvage options: Methods for salvaging materials for reuse in this Project, or for donation or sale to individual or organization. Provide Name, address, and phone number of all applicable individuals and/or organizations.
 - 6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes, labels, and location of containers.
 - 7. Employee and Subcontractor waste diversion education plan.

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2.PRODUCTS (Not Used)

3.EXECUTION

1. PLAN IMPLEMENTATION

- A. 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 entities in a timely manner as it may affect their bidding or on-site work. 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.
- E. 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.
- F. 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 designated by Owner.
 - 5. Protect items from damage during transport and storage.
- G. Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall be shared equally by Owner and Contractor.
- H. Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.

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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.

- I. 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 acceptable to authorities having jurisdiction. Do not allow waste to accumulate on-site.

END OF SECTION 017419

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SECTION 017700 - CLOSEOUT PROCEDURES

1. GENERAL

1. SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Inspection procedures.
 - 2. Warranties.
 - 3. Final cleaning.
- B. See Division 1 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
- C. See Division 1 Section "Photographic Documentation" for submitting Final Completion construction photographs and negatives.
- D. See Division 1 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
- E. See Division 1 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
- F. See Division 1 Section "Demonstration and Training" for requirements for instructing Owner's personnel.
- G. See Divisions 2 through 16 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

2. SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
 - 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 - 2. Advise Owner of pending insurance changeover requirements.
 - 3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 5. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs, damage or settlement surveys, property surveys, and similar final record information.
 - 6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
 - 7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.

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8. Complete startup testing of systems.
9. Submit test/adjust/balance records.
10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
11. Advise Owner of changeover in heat and other utilities.
12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
13. Complete final cleaning requirements, including touchup painting.
14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. See Section 1 for requirements. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

3. FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Division 1
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report and warranty.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
6. Submit, concurrently, all final and completed Green Building Forms per Section 01350 Green Building Requirements.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

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4. LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
 - 1. Organize list of spaces in sequential order.
 - 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.

5. WARRANTIES

- A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 - 1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
- C. Provide additional copies of each warranty to include in operation and maintenance manuals.

2.PRODUCTS

1. MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

3.EXECUTION

1. FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

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- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - f. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - g. Sweep concrete floors broom clean in unoccupied spaces.
 - h. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - i. Remove labels that are not permanent.
 - j. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
 - k. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - l. Replace parts subject to unusual operating conditions.
 - m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - o. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
 - p. Leave Project clean and ready for occupancy.
- C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

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END OF SECTION 017700

CLOSEOUT PROCEDURES 017700 - 5

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SECTION 017823 - OPERATION AND MAINTENANCE DATA

1.GENERAL

1. SUMMARY

- A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and Maintenance Manual
 - 2. Occupant Manual

2. SUBMITTALS

- A. Operation and Maintenance Manual: Submit one (1) digital copy and one (1) hard copy of manual in final form at least 15 days before final inspection.
 - 1. If Architect provides comments within 15 days after final inspection, correct or modify each manual to comply with Architect's comments and resubmit.
- B. Resident Manual: Submit one (1) digital copy and twenty-nine (29) hard copies of manual in final form at least 15 days before final inspection.
 - 1. If Architect provides comments within 15 days after final inspection, correct or modify each manual to comply with Architect's comments and resubmit.

2.PRODUCTS

1. MANUALS, GENERAL

- A. Organization, Digital: Digital copy should be organized with documents sorted appropriately in folders corresponding to the table of contents. Each individual file should be appropriately named. The organization shall correspond to the organization of the printed copy as outlined below.
- B. Organization, Hard Copy: Organize each manual into a separate section for each system and subsystem or topic, and a separate section for each piece of equipment not part of a system. Each manual shall contain a title page, table of contents, and manual contents.
 - 1. Title Page: Include the relevant identification information.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Section number in Project Manual.
- D. Manual Contents: Organize into sets of manageable size.
 - 1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold cover sheets and pockets inside covers to hold folded oversize sheets.
 - a. Identify binders on front and spine, with title of the Manual and Project name.
 - 2. Dividers: Mark each tab to indicate contents.
 - 3. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in

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manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2. OPERATION AND MAINTENANCE MANUAL

- A. Description: This manual is intended for use by the building manager and operations staff, including maintenance personnel and building owner(s). It includes all equipment, fixtures, and finishes for the entire building including common areas, elevator, mechanical rooms, roof-mounted equipment, and fixtures and appliances within residential units.
- B. Required Content (not necessarily in the following order, in addition to items listed in Manual Contents above):
1. Equipment data sheets
 2. Wiring and control diagrams
 3. Piped systems diagrams
 4. License requirements
 5. Special installation conditions
 6. Parts lists and sources for replacements
 7. Operations and Maintenance instructions and procedures manuals
 8. Operations and Maintenance schedules and log forms
 9. Contact information for installer and qualified repair technicians
 10. Warranties
 11. Appliance operations instructions
 12. Appliance maintenance and care instructions
 13. Adaptable features instructions. These instructions shall conform to the requirements of CBC and UFAS accessibility requirements including instructions for how to adapt, adjust, or remove under sink cabinetry, lower sinks and/or cabinets, operate auxiliary emergency features, and any other related feature as applicable. The instructions should be brief, easy to follow, and include illustrations. NOTE: One additional copy of this section shall be laminated and posted inside a closet or cabinet door in each residential unit.
 14. Green Building information: Coordinate with Architect on the final content, including but not limited to the following:
 - a. Completed LEED Homes checklist (provided by architect),
 - b. a copy of each signed Accountability Form (provided by architect),
 - c. A copy of the Durability inspection checklist (provided by architect),
 - d. The product manufacturers' manuals for all installed equipment, fixtures, and appliances.
 - e. General information on efficient use of energy, water, and natural resources.
 - f. Operations and maintenance guidance for any LEED for Homes–related equipment installed in the home, including
 - 1) space heating and cooling equipment;
 - 2) mechanical ventilation equipment;
 - 3) humidity control equipment;
 - 4) renewable energy system; and
 - 5) irrigation, rain water harvesting, and or graywater system.
 - g. Guidance on occupant activities and choices, including the following:
 - 1) cleaning materials, methods, and supplies;
 - 2) water-efficient landscaping;
 - 3) impacts of chemical fertilizers and pesticides;
 - 4) irrigation;
 - 5) lighting selection; and

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- 6) appliance selection.
- h. Educational information on “green power”
- 15. Emergency information: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties. Include instructions on stopping, shutdown instructions for each type of emergency, operating instructions for conditions outside normal operating limits, and required sequences for electric or electronic systems.

3. OCCUPANT MANUAL

- A. Description: This manual is intended for use by building resident occupants. One manual will be issued to each residential unit. It includes all equipment, fixtures, appliances within residential units as well as accessibility-related features of the entire building including the residential unit.
- B. Required Content (not necessarily in the following order, in addition to items listed in Manual Contents above):
 - 1. Appliance operations instructions
 - 2. Appliance maintenance and care instructions
 - 3. Adaptable features instructions. These instructions shall conform to the requirements of CBC and UFAS accessibility requirements including instructions for how to adapt, adjust, or remove under sink cabinetry, lower sinks and/or cabinets, operate auxiliary emergency features, and any other related feature as applicable. The instructions should be brief, easy to follow, and include illustrations. NOTE: One additional copy of this section shall be laminated posted inside a closet or cabinet door in each residential unit.
 - 4. Contact information for building manager
 - 5. Green Building information: Coordinate with Architect on the final content, including but not limited to the following:
 - a. Completed LEED Homes checklist (provided by architect),
 - b. a copy of each signed Accountability Form (provided by architect),
 - c. A copy of the Durability inspection checklist (provided by architect),
 - d. The product manufacturers’ manuals for all installed equipment, fixtures, and appliances.
 - e. General information on efficient use of energy, water, and natural resources.
 - f. Operations and maintenance guidance for any LEED for Homes–related equipment installed in the home, including
 - 1) space heating and cooling equipment;
 - 2) mechanical ventilation equipment;
 - 3) humidity control equipment;
 - 4) renewable energy system; and
 - 5) irrigation, rain water harvesting, and or graywater system.
 - g. Guidance on occupant activities and choices, including the following:
 - 1) cleaning materials, methods, and supplies;
 - 2) water-efficient landscaping;
 - 3) impacts of chemical fertilizers and pesticides;
 - 4) irrigation;
 - 5) lighting selection; and
 - 6) appliance selection.
 - h. Educational information on “green power”
 - 6. Emergency information: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

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Include instructions on stopping, shutdown instructions for each type of emergency, operating instructions for conditions outside normal operating limits, and required sequences for electric or electronic systems.

3.EXECUTION

1. MANUALS

- A. Prepare, assemble, and submit a complete set of required manuals.
- B. Comply with Division 1 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01782

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SECTION 017839 - PROJECT RECORD DOCUMENTS

1.GENERAL

1. SUMMARY

- A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
 - 3. Record Product Data.
- B. See Division 1 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
- C. See Divisions 2 through 16 Sections for specific requirements for Project Record Documents of the Work in those Sections.

2. SUBMITTALS

- A. Submit one complete set of each: Record Drawings, Record Specifications, and Record Product Data, to Architect and one complete set to Owner at time of Substantial Completion. Submittal shall be in digital file format on compact disc (CD). Record Drawings shall be scanned in color, to show red pencil markings. Record Specifications and Record Product Data may be black and white scan.

2.PRODUCTS

1. RECORD DRAWINGS

- A. Throughout construction maintain one set of prints, in addition to the "As-Built Set," of the Contract Drawings and Shop Drawings as follows:
 - 1. Mark Record Prints in, erasable, red-colored pencil, 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 prepare the marked-up Record Prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
 - 2. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.

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3. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, Architect's Supplemental Instruction numbers, and similar identification, where applicable.
4. Label each sheet of Record Prints in clearly visible and legible writing near the lower right corner of the title block with the words "PROJECT RECORD DRAWINGS," and the date, name of the individual responsible for maintaining the drawings, and the name of Contractor.

2. RECORD SPECIFICATIONS

- A. Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
 1. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 2. Note related Change Orders, Record Product Data, and Record Drawings where applicable.

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. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 2. Note related Change Orders, Record Specifications, and Record Drawings where applicable.

3.EXECUTION

1. RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; DO NOT wait until the 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 purposes. 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 017839

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SECTION 018150 - COMMISSIONING OF HVAC

1.GENERAL

1. SUMMARY

- A. Section includes commissioning process requirements for HVAC&R systems, assemblies, and equipment.
- B. Related Sections:
 - 1. Division 1 Section "General Commissioning Requirements" for general commissioning process requirements.
 - 2. Commissioning Plan.

2. ALLOWANCES

- A. Labor, instrumentation, tools, and equipment costs for technicians for the performance of commissioning testing shall be provided by allowance per section 01210 Allowances.

3. CONTRACTOR'S RESPONSIBILITIES

- A. Prepare and implement commissioning testing plans.
- B. Lead construction phase controls coordination meeting.
- C. Lead testing, adjusting, and balancing review and coordination meeting.
- D. Provide information requested by the CxA for final commissioning documentation.
- E. Provide measuring instruments and logging devices to record test data, and provide data acquisition equipment to record data for the complete range of testing for the required test period.

4. CxA'S RESPONSIBILITIES

- A. Provide Commissioning Plan.
- B. Observe commissioning testing.
- C. Verify testing, adjusting, and balancing of Work are complete.
- D. Provide test data, inspection reports, and certificates in Systems Manual.

5. COMMISSIONING DOCUMENTATION

- A. Provide the following information to the CxA for inclusion in the commissioning plan:
 - 1. Plan for delivery and review of submittals, systems manuals, and other documents.
 - 2. Identification of installed systems, assemblies, equipment, and components including design changes that occurred during the construction phase.
 - 3. Process and schedule for completing construction checklists and manufacturer's prestart and startup checklists for HVAC&R systems, assemblies, equipment, and components to be verified and tested.

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4. Certificate of readiness, signed by the Contractor, certifying that HVAC&R systems, assemblies, equipment, components, and associated controls are ready for testing.
5. Certificate of completion certifying that installation, prestart checks, and startup procedures have been completed.
6. Certificate of readiness certifying that HVAC&R systems, subsystems, equipment, and associated controls are ready for testing.
7. Test and inspection reports and certificates.
8. Corrective action documents.
9. Verification of testing, adjusting, and balancing reports.

6. SUBMITTALS

- A. Certificates of readiness.
- B. Certificates of completion of installation, prestart, and startup activities.

2.PRODUCTS (Not Used)

3.EXECUTION

1. TESTING PREPARATION

- A. Certify that HVAC&R systems, subsystems, and equipment have been installed, calibrated, and started and are operating according to the Contract Documents.
- B. Certify that HVAC&R instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest set points have been recorded.
- C. Certify that testing, adjusting, and balancing procedures have been completed and that testing, adjusting, and balancing reports have been submitted, discrepancies corrected, and corrective work approved.
- D. Set systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).
- E. Inspect and verify the position of each device and interlock identified on checklists.
- F. Check safety cutouts, alarms, and interlocks with smoke control and life-safety systems during each mode of operation.
- G. Testing Instrumentation: Install measuring instruments and logging devices to record test data.

2. TESTING AND BALANCING VERIFICATION

- A. Prior to performance of testing and balancing Work, provide copies of reports, sample forms, checklists, and certificates to the CxA.

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- B. Notify the CxA at least 10 days in advance of testing and balancing Work, and provide access for the CxA to witness testing and balancing Work.
- C. Provide technicians, instrumentation, and tools to verify testing and balancing of HVAC&R systems.
 - 1. Failure of an item includes, other than sound, a deviation of more than 10 percent. Failure of more than 10 percent of selected items shall result in rejection of final testing, adjusting, and balancing report. For sound pressure readings, a deviation of 3 dB shall result in rejection of final testing. Variations in background noise must be considered.
 - 2. Remedy the deficiency and notify the CxA so verification of failed portions can be performed.

3. GENERAL TESTING REQUIREMENTS

- A. Provide technicians, instrumentation, and tools to perform commissioning test.
- B. Scope of HVAC&R testing shall include entire HVAC&R installation, from central equipment for heat generation and refrigeration through distribution systems to each conditioned space. Testing shall include measuring capacities and effectiveness of operational and control functions.
- C. Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and verify proper response of building automation system controllers and sensors.
- D. The General Contractor and/or their appropriate subcontractor shall prepare detailed testing plans, procedures, and checklists for HVAC&R systems, subsystems, and equipment.
- E. Tests will be performed using design conditions whenever possible.
- F. Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.
- G. If tests cannot be completed because of a deficiency outside the scope of the HVAC&R system, document the deficiency and report it to the Owner. After deficiencies are resolved, reschedule tests.
- H. If the testing plan indicates specific seasonal testing, complete appropriate initial performance tests and documentation and schedule seasonal tests.

4. HVAC&R SYSTEMS, SUBSYSTEMS, AND EQUIPMENT TESTING PROCEDURES

- A. Energy Supply System: Prepare and implement testing plan in accordance with manufacturer's instructions and industry standards.
- B. Boiler Testing and Acceptance Procedures: Prepare and implement testing plan in accordance with manufacturer's instructions and industry standards.
- C. Instrumentation and Control System: Prepare and implement testing plan in accordance with manufacturer's instructions and industry standards.

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- D. HVAC&R Distribution System: Prepare and implement testing plan in accordance with manufacturer's instructions and industry standards. Include test performance of air, steam, and hydronic distribution systems; exhaust; and other distribution systems, including HVAC&R terminal equipment and unitary equipment.
- E. Pipe system cleaning, flushing, and hydrostatic pressure: Prepare and implement testing plan in accordance with manufacturer's instructions and industry standards.

END OF SECTION 018150

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SECTION 018200 - DEMONSTRATION AND TRAINING

1.GENERAL

1. SUMMARY

- A. This Section includes administrative and procedural requirements for instructing Owner's personnel and Residents for training in operation and maintenance of systems, subsystems, appliances, equipment, and other building features.
- B. There shall be three separate training/education/awareness programs developed, focusing the following groups:
 - 1. Building Owner, manager, & maintenance personnel
 - 2. Residents.
 - 3. Public awareness activities.
- C. See Divisions 2 through 16 Sections for specific requirements for demonstration and training for products in those Sections.

2. SUBMITTALS

- A. Building Owner, manager, & maintenance personnel Program: Submit a summary outline of instructional program for demonstration and training, length of instruction time, and instructors' names for each training module. Include learning objective and brief outline for each training module.
- B. Resident Program: Submit a summary outline of instructional program for demonstration and training, length of instruction time, and instructors' names for each training module. Include learning objective and brief outline for each training module.
- C. Public awareness activities: Submit a summary of the activities planned.
- D. Schedules: Provide proposed dates & times for the programs and activities. Coordinate final dates with Architect and Owner.

2.PRODUCTS

1. CONTENT

- A. Building Owner, manager, & maintenance training: Develop an instruction program that includes individual or grouped training that covers all of the information included in the Operation and Maintenance Manual as described in Section 01782.
 - 1. This program will be at a minimum of 1 hour, but not less than is required to cover all applicable training topics. The training may occur in a series of multiple sessions.
- B. Resident Training: Develop an instruction program that includes individual or grouped training that covers all of the information included in the Resident Manual as described in Section 01782. In addition to the training described above, provide "Enhanced Training," in the form of two hours of training for the occupants in the form of additional walkthroughs, more detailed

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training on efficient use of resources, and/or a DVD with operations and maintenance information on the home's LEED for Homes measures and features.

EXECUTION

2. PROGRAMS

- A. Prepare instruction programs, training modules, and activities. Coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Scheduling: Complete all obligations at mutually agreed upon dates and times.

END OF SECTION 018200

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SECTION 019113 - GENERAL COMMISSIONING REQUIREMENTS

1.GENERAL

1. SUMMARY

- A. Section includes general requirements that apply to implementation of commissioning without regard to specific systems, assemblies, or components.
- B. Commissioning process activities shall be completed for the following systems, at a minimum:
 - 1. Heating, ventilating, air conditioning, and refrigeration (HVAC&R) systems (mechanical and passive) and associated controls
 - 2. Lighting and daylighting controls
 - 3. Domestic hot water systems
 - 4. Renewable energy systems (solar etc.)

2. DEFINITIONS

- A. BoD: Basis of Design. A document that records concepts, calculations, decisions, and product selections used to meet the OPR and to satisfy applicable regulatory requirements, standards, and guidelines. Not part of contract documents.
- B. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.
- C. CxA: Commissioning Authority.
- D. OPR: Owner's Project Requirements. A document that details the functional requirements of a project and the expectations of how it will be used and operated. These include Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information. Not part of contract documents.
- E. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

3. COMMISSIONING TEAM

- A. Members Appointed by Contractor(s): Individuals, each having the authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated action. The commissioning team shall consist of, but not be limited to, representatives of Contractor, including Project superintendent and subcontractors, installers, suppliers, and specialists deemed appropriate by the CxA.
- B. Members Appointed by Owner:
 - 1. CxA: The designated person, company, or entity that plans, schedules, and coordinates the commissioning team to implement the commissioning process. Owner will engage the CxA under a separate contract.
 - 2. Representatives of the facility user and operation and maintenance personnel.
 - 3. Architect and engineering design professionals.

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4. OWNER'S RESPONSIBILITIES

- A. Provide the OPR documentation to the CxA for information and use.
- B. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities.
- C. Coordinate activities specified in paragraph below with Owner-Architect and Architect-Consultant agreements.
- D. Provide the BoD documentation, prepared by Architect and approved by Owner, to the CxA and for use in developing the commissioning plan, systems manual, and operation and maintenance training plan.

5. CONTRACTOR'S RESPONSIBILITIES

- A. Contractor shall assign representative with expertise and authority to act on its behalf and shall schedule them to participate in and perform commissioning process activities including, but not limited to, the following:
 - 1. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.
 - 2. Cooperate with the CxA for resolution of issues recorded in the Issues Log.
 - 3. Attend commissioning team meetings held on a variable basis.
 - 4. Integrate and coordinate commissioning process activities with construction schedule.
 - 5. Review and accept construction checklists provided by the CxA.
 - 6. Complete paper construction checklists as Work is completed and provide to the Commissioning Authority at each commissioning team meeting.
 - 7. Review and accept commissioning process test procedures provided by the Commissioning Authority.
 - 8. Complete commissioning process test procedures.

6. CxA'S RESPONSIBILITIES

- A. Organize and lead the commissioning team.
- B. Provide commissioning plan. Convene commissioning team meetings.
- C. Provide Project-specific construction checklists and commissioning process test procedures.
- D. Verify the execution of commissioning process activities using random sampling. Verification will include, but is not limited to, equipment submittals, construction checklists, training, operating and maintenance data, tests, and test reports to verify compliance with the OPR. When a random sample does not meet the requirement, the CxA will report the failure in the Issues Log.
- E. Prepare and maintain the Issues Log.
- F. Prepare and maintain completed construction checklist log.
- G. Witness systems, assemblies, equipment, and component startup.
- H. Compile test data, inspection reports, and certificates; include them in the systems manual and commissioning process report.

2.PRODUCTS (Not Used)

3.EXECUTION (Not Used)

END OF SECTION 019113

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SECTION 022300 - SITE CLEARING

1.GENERAL

1. SUMMARY

A. This Section includes the following:

1. Protecting existing trees to remain.
2. Removing existing trees shrubs groundcovers plants and grass.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.
6. Disconnecting and capping or sealing site utilities.
7. Temporary erosion and sedimentation control measures.

2. MATERIAL OWNERSHIP

A. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

3. PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and permit from authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

B. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

C. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.

D. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.

2.PRODUCTS

1. SOIL MATERIALS

A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 2 Section "Earthwork."

1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

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3.EXECUTION

1. PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Locate and clearly flag trees and vegetation to remain or to be relocated.
- C. Protect existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

2. TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to Sediment and Erosion Control Plan, or requirements of authorities having jurisdiction, whichever is more stringent.
- B. Inspect and maintain erosion and sedimentation control measures throughout construction.
- C. Remove erosion and sedimentation controls and restore and areas disturbed during removal.

3. TREE PROTECTION

- A. Erect and maintain temporary fencing around tree protection zones before starting site clearing. Remove fence when construction is complete.
- B. Do not excavate within tree protection zones, unless otherwise indicated.
- C. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Architect.

4. UTILITIES

- A. Locate, identify, disconnect, and seal or cap off utilities to be removed.
 - 1. Arrange with utility companies to shut off indicated utilities.
- B. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Architect's written permission.

5. CLEARING AND GRUBBING

- A. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

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1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.
-
6. TOPSOIL STRIPPING
 - A. Remove sod and grass before stripping topsoil.
 - B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
 - C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
-
7. SITE IMPROVEMENTS
 - A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.
-
8. DISPOSAL
 - A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.
 1. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

END OF SECTION 022300

SECTION 023000 - EARTHWORK

1. GENERAL

1. SUMMARY

- A. This Section includes the following:
1. Preparing subgrades for slabs-on-grade, walks, pavements, and landscaped areas.
 2. Excavating and backfilling for buildings and structures.
 3. Drainage course for slabs-on-grade.
 4. Subbase course for concrete walks and pavements.
 5. Excavating and backfilling for utility trenches.

2. DEFINITIONS

- A. Backfill: Soil material used to fill an excavation.
1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Base Course: Course placed between the subbase course and hot-mix asphalt paving.
- C. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.
- D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- E. Drainage Course: Course supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions changes in the Work.
 2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
- G. Fill: Soil materials used to raise existing grades.
- H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- I. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- J. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
- K. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

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3. PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.

2.PRODUCTS

1. SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations. Submit proposed soil ASTM D 2487 Soil Classification Group to Geotechnical Engineer for approval. Any imported soils shall be free of rock or gravel larger than 3 inches in any dimension, and shall be free of debris, garbage, vegetation, or other matter.
- B. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve. Or as approved by Structural Engineer.
- C. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve. Or as approved by Structural Engineer.
- D. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve. Or as approved by Structural Engineer.
- E. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve. Or as approved by Structural Engineer.
- F. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve. Or as approved by Structural Engineer.

2. ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility. Or as otherwise approved by PG&E and authority having jurisdiction.

3.EXECUTION

1. PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Division 2 Section "Site Clearing."

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- C. Protect and maintain erosion and sedimentation controls, which are specified in Division 2 Section "Site Clearing," during earthwork operations.

2. EXCAVATION

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3. EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch, or per Structural Engineering, which ever is more stringent for the specific application. If applicable, extend excavations a sufficient distance from structures for constructability, for installing services and other construction, and for inspections.
 - 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

4. EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

5. EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated. Coverage of utilities per PG&E or authority having jurisdiction.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
 - 1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material, 4 inches deeper elsewhere, to allow for bedding course.

6. SUBGRADE INSPECTION

- A. Proof-roll subgrade below the building slabs and pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades. Do not alter subgrade elevations from those required.
- B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, without additional compensation.

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7. UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Concrete mix design per approval of Structural Engineer.

8. STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

9. UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of standing water or mud.
- B. Place and compact bedding course on trench bottoms and where required. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Backfill trenches excavated under footings and within critical zone of edge of matt slab as identified in Structural Drawings with concrete or compacted fill to elevation of bottom of footings per Structural Engineer approval.
- D. Verify with jurisdiction having authority requirements for base support and backfill requirements for piping or conduit below public roadways and sidewalks.
- E. Place and compact initial backfill of subbase material, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the utility pipe or conduit.
 - 1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- F. Place and compact final backfill of satisfactory soil to final subgrade elevation.
- G. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs. Or as otherwise approved by PG&E and authority having jurisdiction.

10. SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
 - 1. Under grass and planted areas, use satisfactory soil material.
 - 2. Under walks and pavements, use satisfactory soil material, followed by final layer of gravel base per drawings.
 - 3. Under steps and ramps, use engineered fill.
 - 4. Under building slabs, use engineered fill.
 - 5. Under footings and foundations, use engineered fill, and/or concrete as recommended by Geotechnical Engineer, and approved by Structural Engineer.

11. SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

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1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

12. COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698, or per project-specific recommendations of Geotechnical Engineer:
 1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
 2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 92 percent.
 3. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.
 4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

13. GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
- B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
 1. Lawn or Unpaved Areas: Plus or minus 1 inch.
 2. Walks: Plus or minus 1/2 inch. Notify architect immediately upon discovery of potential conflict in grades.
 3. Pavements: Plus or minus 1/2 inch. Notify architect immediately upon discovery of potential conflict in grades.
- C. Grading inside Building Lines: Finish subgrade to a tolerance of minus 1/2 inch when tested with a 10-foot straightedge.

14. SUBBASE AND BASE COURSES

- A. Place subbase and base course on subgrades free of standing water or mud.
- B. On prepared subgrade, place subbase and base course under pavements and walks as follows:
 1. Shape subbase and base course to required crown elevations and/or cross-slope grades.
 2. Compact subbase and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

15. DRAINAGE COURSE

- A. Place drainage course on subgrades free of standing water or mud.

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- B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
 - 1. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
 - 2. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

- 16. FIELD QUALITY CONTROL
 - A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing, if required per project engineer.
 - B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
 - C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.

- 17. PROTECTION
 - A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
 - B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
 - C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

END OF SECTION 023000

SECTION 024119 - SELECTIVE DEMOLITION

1. GENERAL

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.

2. SUMMARY

- A. Section Includes:
 - 1. Demolition and removal of selected portions of building or structure.
 - 2. Demolition and removal of selected site elements.
 - 3. Salvage of existing items to be reused or recycled.

3. DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

4. MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.

5. PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at project site.
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review structural load limitations of existing structure.
 - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.

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5. Review areas where existing construction is to remain and requires protection.

6. INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and for noise control. Indicate proposed locations and construction of barriers.
- C. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
 - 4. Use of stairs.
- D. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.
- E. Predemolition Photographs or Video: Submit before Work begins.
- F. 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.
- G. Warranties: Documentation indicated that existing warranties are still in effect after completion of selective demolition.

7. CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.
- B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

8. QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

9. FIELD CONDITIONS

- A. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

SELECTIVE STRUCTURAL DEMOLITION

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- B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- C. Hazardous Materials: Hazardous materials are potentially present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is included in Appendix A for review and use. Examine report to become aware of any locations where hazardous materials are present.
 - 1. Hazardous material remediation is specified elsewhere in the Contract Documents.
 - 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
 - 3. Owner will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.
- D. Storage or sale of removed items or materials to be determined by owner.
- E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

2.PRODUCTS

1. PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

3.EXECUTION

1. EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.
- C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

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- E. Review provided engineering drawings and documents to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
 - 1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

- F. Survey of Existing Conditions: Record existing conditions by use of measured drawings, preconstruction photographs and templates.
 - 1. Comply with requirements specified in Division 01 Section "Photographic Documentation."
 - 2. Inventory and record the condition of items to be removed and salvaged. Provide photographs conditions that might be misconstrued as damage caused by salvage operations.
 - 3. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

2. UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
 - 1. Comply with requirements for existing services/systems interruptions specified in Division 01 Section "Summary."

- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Arrange to shut off indicated utilities with utility companies.
 - 2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
 - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.

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3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly. Comply with requirements in Division 01 Section "Construction Waste Management."

B. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

C. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

- D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition, and cleaned and reinstalled in their original locations after selective demolition operations are complete.

5. SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch (19 mm) at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
- B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, then remove concrete between saw cuts.
- C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

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- D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.
- E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings."
- F. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight.
 - 1. Remove existing roof membrane, flashings, copings, and roof accessories.
 - 2. Remove existing roofing system down to substrate.

6. DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 - 4. Comply with requirements specified in Division 01 Section "Construction Waste Management."
- B. Burning: Do not burn demolished materials.

7. CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

SECTION 026300 - STORM DRAINAGE

1.GENERAL

1. SUMMARY

1. This Section includes gravity-flow, nonpressure storm drainage outside the building.

2. SUBMITTALS

- A. Product Data: For each type of product to be installed.
- B. Shop Drawings: For catch basins. Include plans, elevations, sections, details, and catch basin frames and grates.
- C. Coordination Drawings: Show pipe sizes, locations, and elevations, where planned installation differs from the layout shown in the Construction Drawings.

2.PRODUCTS

1. PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe, fitting, and joining materials.

2. HDPE PIPE AND FITTINGS

- A. Corrugated HDPE Drainage Pipe and Fittings NPS 10 and Smaller: AASHTO M 252M, Type S, with smooth waterway for coupling joints.
 1. Soiltight Couplings: AASHTO M 252M, corrugated, matching tube and fittings.
 2. Corrugated HDPE Pipe and Fittings NPS 12 and Larger: AASHTO M 294M, Type S, with smooth waterway for coupling joints.
 3. Soiltight Couplings: AASHTO M 294M, corrugated, matching pipe and fittings.

3. PVC PIPE AND FITTINGS

- A. PVC Sewer Pipe and Fittings, NPS 15 and Smaller: ASTM D 3034, SDR 35, with bell-and-spigot ends for gasketed joints with ASTM F 477, elastomeric seals.
- B. PVC Sewer Pipe and Fittings, NPS 18 and Larger: ASTM F 679, T- 1 wall thickness, with bell-and-spigot ends for gasketed joints with ASTM F 477, elastomeric seals.

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4. NONPRESSURE-TYPE PIPE COUPLINGS

- A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined and corrosion-resistant-metal tension band and tightening mechanism on each end.
- B. Sleeve Materials:
 - 1. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
 - 2. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
- C. Unshielded Flexible Couplings: Elastomeric sleeve with corrosion-resistant-metal tension band and tightening mechanism on each end.
- D. Shielded Flexible Couplings: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.
- E. Ring-Type Flexible Couplings: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

5. CLEANOUTS

- A. Gray-Iron Cleanouts: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
 - 1. Top-Loading Classification(s): Medium duty.
 - 2. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.
- B. PVC Cleanouts: ASTM D 3034, PVC cleanout threaded plug and threaded pipe hub. Acceptable where Cleanout is located in landscaped area.

6. CATCH BASINS / DROP INLETS

- A. Standard Precast Concrete Catch Basins: ASTM C 478, precast, reinforced concrete, of depth required, with provision for sealant joints.
 - 1. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.
 - 2. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
- B. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading. Include 24-inch ID by 7- to 9-inch riser with 4-inch minimum width flange, and 26-inch- diameter flat grate with small square or short-slotted drainage openings.
 - 1. Grate Free Area: Approximately 50 percent, unless otherwise indicated.

3.EXECUTION

1. PIPING APPLICATIONS

- A. Pipe couplings and fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.
 - 1. Use nonpressure-type flexible couplings where required to join gravity-flow, nonpressure sewer piping, unless otherwise indicated.
 - a. Flexible couplings for same or minor difference OD pipes.
 - b. Increaser/reducer-pattern, flexible couplings for pipes with different OD.
 - c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.
- B. Gravity-Flow, Nonpressure Sewer Piping: Use any of the following pipe materials for each size range:
 - 1. NPS 3 to NPS 6: Corrugated HDPE drainage pipe and fittings, soiltight couplings, and coupled joints.
 - 2. NPS 3 to NPS 6: PVC sewer pipe and fittings, gaskets, and gasketed joints.
 - 3. NPS 8 to NPS 15: Corrugated HDPE drainage pipe and fittings, soiltight couplings, and coupled joints.
 - 4. NPS 8 to NPS 15: PVC sewer pipe and fittings, gaskets, and gasketed joints.
 - 5. NPS 18 to NPS 30: Corrugated HDPE pipe and fittings, soiltight couplings, and coupled joints.
 - 6. NPS 18 to NPS 30: PVC sewer pipe and fittings, gaskets, and gasketed joints.

2. PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical, unless conflict is anticipated. In which case, prepare a Coordination Drawing showing proposed modifications to layout and submit to architect for approval. Follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.
- C. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- D. Install gravity-flow, nonpressure drainage piping according to the following:
 - 1. Install piping pitched down in direction of flow, at minimum slope of 1 percent, unless otherwise indicated.
 - 2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.
 - 3. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.

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E. Clear interior of piping of dirt and superfluous material as work progresses.

3. PIPE JOINT CONSTRUCTION

A. Basic pipe joint construction is specified in Division 2 Section "Piped Utilities - Basic Materials and Methods." Where specific joint construction is not indicated, follow piping manufacturer's written instructions.

B. Join gravity-flow, nonpressure drainage piping according to the following:

1. Join PVC sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-gasket joints.
2. Join dissimilar pipe materials with nonpressure-type flexible couplings.

4. CLEANOUT INSTALLATION

A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.

1. Use light-duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
2. Use medium-duty, top-loading classification cleanouts in paved foot-traffic areas.
3. Use heavy-duty, top-loading classification cleanouts in vehicle-traffic service areas.
4. Use extra-heavy-duty, top-loading classification cleanouts in roads.

B. Set cleanout frames and covers in earth in cast-in-place-concrete block. Set with tops 1 inch above surrounding grade.

C. Set cleanout frames and covers in concrete pavement with tops flush with pavement surface.

5. CATCH BASIN INSTALLATION

A. Set frames and grates to elevations indicated. Install per manufacturer's instructions.

6. CONNECTIONS

A. Connect nonpressure, gravity-flow drainage piping to building's storm building drains specified in Division 15 Section "Storm Drainage Piping."

B. Make connections to existing piping and underground manholes.

1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.

7. FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

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1. Submit separate report for each system inspection.
 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 4. Reinspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
1. Do not enclose, cover, or put into service before inspection and approval.
 2. Test completed piping systems according to requirements of authorities having jurisdiction.
 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
 4. Submit separate report for each test.
 5. Air Tests: Test storm drainage according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
 - a. Option: Test plastic gravity sewer piping according to ASTM F 1417.
- C. Leaks and loss in test pressure constitute defects that must be repaired.
- D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

END OF SECTION 026300

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SECTION 027410 - ASPHALT PAVING

1. GENERAL

1. SUMMARY

- A. Section Includes:
 - 1. Open graded permeable asphalt paving.
 - 2. Pavement-marking paint.

2. SUBMITTALS

- A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.
 - 1. Job-Mix Designs: For each job mix proposed for the Work.
- B. Construction sequencing schedule: to show plan for avoiding compaction of existing subgrades and how finished pavement will be properly placed and protected as concerning seasonal weather and site access issues.
- C. Geotechnical observation reports: if and where required.

3. QUALITY ASSURANCE

- A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by authorities having jurisdiction or the DOT of state in which Project is located.
- B. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of the local AHJ for asphalt paving work.
 - 1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.
- C. Preinstallation Conference: Conduct conference at Project site.
- D. LOW IMPACT DEVELOPMENT: The pavement used in this project is an integral part of the “Low Impact Development” design strategies. This will require special attention before, during, and after construction to ensure a properly functioning permeable surface. The system is designed to allow infiltration of stormwater into the pavement structure, then down into groundwater through the drain rock course that underlies the pavement. Existing subgrades must not be overcompacted, and only static compaction shall be used, where required at all.

4. PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively cold, damp, or if rain is imminent or expected before time required for adequate cure.
- B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature as required by paint manufacturer instructions.

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2.PRODUCTS

1. AUXILIARY MATERIALS

- A. Pavement-Marking Paint: MPI #97 Latex Traffic Marking Paint.
- B. Glass Beads: AASHTO M 247, Type 1.

2. MIXES

- A. Hot-Mix Asphalt: Open graded permeable mix, with >18% void content.
 - 1. Provide mixes with a history of satisfactory performance in geographical area where Project is located, if such local knowledge is available for open graded permeable asphalt.
 - 2. Referenced standard: Comply with Caltrans Standard Spec Section 39, and use Caltrans mix design procedure CT-368-OBC, for OGFC with conventional PG 70-10 binder.

3.EXECUTION

1. PREPARATION

- A. Existing subgrades shall not be compacted or subject to excessive construction equipment prior to placement of geotextile and gravel bed.
- B. Bring subgrade of stone infiltration basin to line, grade, and elevations indicated. The bottom of the cut shall be flat level, even if the finished surface is sloped. Fill and lightly regrade areas that are damaged by compaction prior to placing of stone.
- C. Place geotextile in accordance with manufacturer's standards and recommendations. Adjacent strips of geotextile shall overlap a minimum of 16-inches. Secure geotextile at least four (4) feet outside of bed and take any steps necessary to prevent any runoff or sediment from entering the storage bed.
- D. Install coarse aggregate in 8-inch maximum lifts. Lightly static roll compact each layer, keeping equipment movement over storage bed subgrades to a minimum.
- E. Install choker base course aggregate evenly over surface of stone bed, sufficient to allow placement of pavement. Call for inspection by all related parties.
- F. Following placement of bed aggregate, the excess geotextile shall be folded over along all bed edges to protect from sediment washout along bed edges. At least a four (4) foot edge strip shall be used to protect beds from adjacent bare soil. This edge strip shall remain in place until all bare soils contiguous to beds are stabilized and vegetated. In addition, take any other necessary steps to prevent sediment from washing into beds during site development. When the site is fully stabilized, temporary sediment control devices shall be removed. All aggregates (coarse and choker base aggregate materials) within infiltration beds shall meet the following:
 - 1. Maximum Wash Loss (ASTM C117) of 1.5 %

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2. The Los Angeles Abrasion (ASTM C535) loss on the coarse aggregate fraction (material retained on the 4.75 mm [No. 4] sieve) shall not exceed 40% for any individual source used within the mix. The composite maximum LAA loss shall not exceed 35.
3. Material shall be 80% crushed (one fractured face)
4. The use of recycled materials will not be permitted in the coarse and choker base aggregate materials. Coarse aggregate for the groundwater infiltration beds shall be uniformly graded with a minimum void space of 40% according to AASHTO T19. Gradations may be modified AASHTO #2, #3, #5 or comparable.

2. PATCHING

- A. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade. Where patching is required in the public right of way, comply with Public Works standard plans and specifications.

3. OPEN GRADED ASPHALT PLACING & COMPACTION

- A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
- B. All compaction shall be by the Ordinary Compaction Method. Compaction of the hot-mix asphalt shall take place when the surface is cool enough to resist a 10-ton steel-wheeled roller. Typically, two to four passes of a static steel wheel roller is all that is required for proper compaction. Excessive rolling will cause a reduction in the surface porosity which is unacceptable. Pneumatic-tired rollers are not allowed.
- C. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of asphalt course.
- D. Edge Shaping: While surface is being compacted and finished, trim and bevel edges of pavement to proper alignment.
- E. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened. Do not track mud, dirt, or other sediment onto the finished surface. Lay over areas with sheets of 3/4" thick plywood where vehicles will require passage after hardening, but before the project reaches substantial completion. Any areas damaged will be required to be removed and replaced at the contractor's expense. Where areas become inadvertently soiled, provide a vacuum machine to remove the sediment from the pores. Use erosion and sediment control measures such as straw wattles to prevent movement of material from adjacent grasspave parking area or other landscapes.
- F. Erect barricades to protect paving from all traffic until cooled enough not to become marked.

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4. INSTALLATION TOLERANCES

- A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
 - 1. Base Course: Plus or minus 1/2 inch.
 - 2. Surface Course: Plus, no minus.

- B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
 - 1. Base Course: 1/4 inch
 - 2. Surface Course: 1/8 inch
 - 3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch

5. PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.

- B. Allow paving to age for 30 days before starting pavement marking, unless construction schedule requires earlier marking to meet the scheduled date of substantial completion.

- C. Sweep and clean surface to eliminate loose material and dust.

- D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates.

6. FIELD QUALITY CONTROL

- A. Protect. Protect. Protect. Remove and replace or install additional asphalt where it does not comply with specified requirements.

END OF SECTION 027410

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SECTION 027510 – CONCRETE, EXTERIOR PAVEMENT

1.GENERAL

1. SUMMARY

- A. Includes exterior cement concrete pavement as indicated for the following (as applicable):
 - 1. Driveways and roadways.
 - 2. Parking areas.
 - 3. Curbs and gutters.
 - 4. Walkways.
- B. See Section 03331 Cast-in-Place Architectural Concrete which includes interior concrete floors.
- C. This Section does not include structural requirements. See structural drawings and calculations.

2. SUBMITTALS

- A. See Section 01350 GREEN BUILDING REQUIREMENTS and GREEN BUILDING Forms for related product submittal requirements.
 - 1. GREEN BUILDING Form 3 requires documentation of recycled content.
 - 2. GREEN BUILDING Form 4 requires indication of regional materials.
 - 3. Other GREEN BUILDING Form submittals and requirements may apply.
- B. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

2.PRODUCTS

1. CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout the Project:
 - 1. Portland Cement: ASTM C 150, Type I/II, gray.
- B. Normal-Weight Aggregates: ASTM C 33,
 - 1. Provide aggregates from a source from within 500 miles of project location.
 - 2. Provide aggregates with a recycled content minimum 20% by weight.
- C. Water: ASTM C 94/C 94M.

2. RELATED MATERIALS

- A. Sub-Base: Recycled Class-2 Aggregate at depth required.
- B. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- C. Latex bonding agent: Non-dispersible acrylic latex, ASTM C1059 Type II.
- D. Reinforcement as required by Public Works or Engineer.

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3. CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301, with the following properties:
 - 1. Compressive Strength (28 Days): 3000 psi. minimum, or as indicated on civil and structural drawings and calculations.
 - 2. Proportioning: Comply with ACI 211.1 recommendations or those indicated on civil and structural drawings and calculations.
 - 3. Cement content: 517 lb cement per cubic yard.
 - 4. Slump Limit: 2.5 to 4 inches.
 - 5. Maximum aggregate size: 3/4 inch.

4. CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M.

3.EXECUTION

1. EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

2. STEEL REINFORCEMENT

- A. General: If steel reinforcement is required, comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

3. JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
- D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness.
- E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 3/8-inch radius unless indicated otherwise. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

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4. CONCRETE PLACEMENT

- A. Moisten subbase to provide a uniform dampened condition at time concrete is placed.
- B. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- C. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- D. Screed pavement surfaces with a straightedge and strike off.
- E. Commence initial floating using bull floats to impart an open textured and uniform surface plane before excess moisture or b GREEN BUILDING water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

5. FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when b GREEN BUILDING-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
 - 1. Medium Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

6. CONCRETE PROTECTION AND CURING

- A. General: Notify Architect not less than 48 hours prior to commencement of placement.
- B. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- C. Begin curing after finishing concrete but not before free water has disappeared from surface.
- D. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, or a combination of these methods.

7. PAVEMENT TOLERANCES

- A. Comply with tolerances of ACI 117 and as follows:
 - 1. Elevation: 1/4 inch (or less when required to meet ADA precision).
 - 2. Thickness: Plus 1/2 inch, minus 1/4 inch.
 - 3. Surface: Gap below 10-foot- long, unlevelled straightedge not to exceed 1/4 inch.
 - 4. Joint Spacing: 3 inches.
 - 5. Contraction Joint Depth: Plus 1/4 inch, no minus.
 - 6. Joint Width: Plus 1/8 inch, no minus.

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8. REPAIRS AND PROTECTION

- A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section.
- B. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement.
- C. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 027510

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SECTION 030500 - BASIC CONCRETE MATERIALS AND METHODS

1. GENERAL

1. SUMMARY

- A. Section includes formwork, reinforcement, accessories, cast-in place concrete, finishing and curing.

2. SUBMITTALS

- A. Shop Drawings: Indicate pertinent dimensioning, arrangement of construction joints and ties. Indicate reinforcement sizes, spacings, locations, and quantities, bending and cutting schedules, supporting and spacing devices.
- B. Product Data: Indicate admixtures and anchors.
- C. Design Data: Submit mix design.

3. QUALITY ASSURANCE

- A. Construct and erect concrete formwork in accordance with ACI 301-10.
- B. Perform concrete reinforcing work in accordance with ACI 301-10.
- C. Perform cast-in-place concrete work in accordance with ACI 301-10.
- D. Maintain one copy of ACI SP-15(10), Field Reference Manual: Specifications for Structural Concrete, on site.

2. PRODUCTS

1. FORM MATERIALS AND ACCESSORIES

- A. Form Materials: At the discretion of the Contractor.
- B. Form Release Agent: Colorless mineral oil which will not stain concrete or impair natural bonding characteristics of coating intended for use on concrete.
- C. Formed Construction Joints for mat slab: Form material is at the discretion of the Contractor: Tongue and groove type profile with holes to receive doweling.
- D. Moisture/Vapor Barrier: Minimum 10 mil thick, manufactured for the purpose of minimizing the transmission of soil moisture up through the slab, type recommended for below grade application.

2. REINFORCEMENT MATERIALS

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- A. Reinforcing Steel: ASTM A615, 60 ksi yield grade; deformed billet steel bars, plain finish.
- B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for support of reinforcing.
- C. Fabricate concrete reinforcing in accordance with ACI 301-10 and CRSI.

3. CONCRETE MATERIALS

- A. Cement: ASTM C150, Type II.
- B. Fine and Coarse Aggregates: ASTM [C33.] [C330, lightweight.]
- C. Water: Clean and not detrimental to concrete.
- D. Air Entrainment Admixture: ASTM C260.
- E. Non-shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.

4. COMPOUNDS, HARDENERS AND SEALERS

- A. Curing Compound: ASTM C309-11; Acrylic type.

5. CONCRETE MIX

- A. Mix and deliver concrete in accordance with ASTM C94, Alternative 3.
- B. Provide concrete of the following strength:
 - 1. Compressive Strength 3000 psi (28 day).
 - 2. Slump: 4 inches maximum.
 - 3. Maximum water/cement ratio: 0.45.
- C. Select admixture proportions for normal weight concrete in accordance with ACI 301-10.
- D. Add air entraining agent to concrete mix for concrete work exposed to exterior.

3. EXECUTION

1. FORMWORK ERECTION

- A. Erect formwork, shoring and bracing to achieve design requirements.
- B. Provide bracing to ensure stability of formwork.
- C. Provide chamfer strips on external corners of pedestals.

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- D. Apply form release agent to formwork prior to placing form accessories and reinforcement.
 - E. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings which are affected by agent.
 - F. Clean forms as erection proceeds, to remove foreign matter.
2. INSERTS, EMBEDDED COMPONENTS, AND OPENINGS
- A. Provide formed openings where required for work to be embedded in and passing through concrete members.
 - B. Coordinate work of other sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.
 - C. Install concrete accessories straight, level, and plumb.
 - D. Place formed construction joint device in mat slab.
3. REINFORCEMENT PLACEMENT
- A. Place reinforcement, supported and secured against displacement.
 - B. Ensure reinforcing is clean, free of loose scale, dirt, or other foreign coatings.
4. PLACING CONCRETE
- A. Prepare previously placed concrete by cleaning with steel brush.
 - B. Install vapor retarder under interior mat slabs. Lap joints minimum 24 inches and seal watertight. Repair damaged vapor retarder with vapor retarder material, lap over damaged areas minimum 6 inches and seal watertight.
 - C. Place concrete continuously between predetermined construction joints.
 - D. Place mat slab sections in pattern indicated.
 - E. Screed mat slab level.
5. FORM REMOVAL
- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
 - B. Remove formwork progressively and in accordance with code requirements.
6. FLOOR FINISHING

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- A. Finish concrete floor surfaces in accordance with [ACI 301-10 ACI 302.1R-15.
- B. Uniformly spread, screed, and float concrete.
- C. Wood float surfaces which will receive quarry tile or ceramic tile with full bed setting system.
- D. Steel trowel surfaces which will receive carpeting, resilient flooring, thin set quarry tile, thin set ceramic tile or which will be left exposed.
- E. Maintain surface flatness, with maximum variation of 1/4 inch in 10 ft.
- F. In areas with floor drains, maintain floor level at walls and slope surfaces uniformly to drains.

7. CURING

- A. Apply sealer on floor surfaces.
- B. Immediately after placement, protect concrete from premature drying.
- C. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete for not less than 7 days.

8. FORMED SURFACES

- A. Provide concrete surfaces to be left exposed with sack rubbed finish.

9. FIELD QUALITY CONTROL

- A. Three (3) Concrete Test Cylinders: Taken for every 150 or less cu yds of each class of concrete placed.
- B. One (1) Additional Test Cylinder: Taken during cold weather concreting, and be cured on job site under same conditions as concrete it represents.
- C. One (1) Slump Test: Taken for each 50 cu yds or fraction thereof for each type of concrete. Additional tests required when concrete consistency appears to have changed.

10. DEFECTIVE CONCRETE

- A. Modify or replace concrete not conforming to required lines, details and elevations, as directed by Architect/Engineer.

END OF SECTION

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SECTION 031510 – BENTONITE WATERSTOP

1.GENERAL

1. SUMMARY

- A. Furnish and install expanding bentonite-based waterstop as specified herein, illustrated on project drawings, and at all water infiltration prone cold joints in concrete and at pipe penetrations. Confirm with Architect if it is unclear whether waterstop may be required at a particular location.

2. SUBMITTALS

- A. Product Data: Submit manufacturer's product data.

3. PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Protect from direct sunlight and moisture, store in dry area.

2.PRODUCTS

- 1. Tremco, Superstop Waterstop, and manufacturer's paraprimmer adhesive. Approved equal product from another manufacturer may be accepted.

3.EXECUTION

- A. Comply with contract documents and manufacturer's product data and installation instructions.

END OF SECTION 03250

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SECTION 032100 - REINFORCING STEEL

1. GENERAL

1. DESCRIPTION:

- A. Work Included: Provide labor, material, tools, equipment, appliances, transportation and services required to completely furnish and install reinforcing steel for cast-in-place concrete, all as shown on the Drawings and herein specified, including but not limited to the following:
 - 1. Furnishing and installation of reinforcing steel.
- B. Related Work Specified Elsewhere:
 - 1. Reinforcement for concrete work beyond building lines: See Sidewalks and Driveways.

2. REFERENCES, CODES AND STANDARDS: The following references, codes and standards are hereby made a part of this Section and reinforcement shall conform to the applicable requirements therein except as otherwise specified herein or shown on the Drawings. Nothing contained herein shall be construed as permitting work that is contrary to code requirements.

- A. "Manual of Standard Practice for Detailing Reinforced Concrete Structures", ACI 315, latest edition.
- B. "Building Code Requirement for Reinforced Concrete", ACI 318-11.
- C. "Manual of Standard Practice" published by CRSI, latest edition.
- D. California Building Code, 2019 Edition.
- E. USGBC

3. SOURCE QUALITY CONTROL: Refer to Quality Control Section for general requirement governing testing and inspection. Where certified mill test reports (required hereinafter under "Submittals") are not furnished, conform to the following.

- A. Reinforcing bars shall be tested in tension and bending as per ASTM A-615. Testing shall be done by the Owner's testing agency. Furnish one copy of test reports to Architect, Structural Engineer, Owner and Contractor.
- B. Samples will be taken by the testing agency from bundles as delivered from the mill. Where bundles are identified by heat number and a mill analysis accompanies the report, one tensile and one bending test specimen will be taken from each 10 tons or fraction thereof, of each size and kind of bar. Where positive identification of heat numbers cannot be made or where random samples are taken, one series of tests shall be made from each 2-1/2 tons or fraction thereof, of each size and kind of bar.
- C. The costs of tests, sampling and handling of reinforcing steel shall be paid by the County by deducting from moneys due the Contractor.

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- D. Include material required to provide samples for testing.
 - E. The following is subject to Special Inspection as per California Building Code, Sec. 1705. Costs therefore will be paid by the County. No inspection is required for slabs-on-grade 5" thick or thinner.
 - 1. Placement of reinforcing steel as required by Sec. 1705.4.
4. SUBMITTALS: Comply with requirements of Shop Drawings, Product Data, and Sample Sections.
- A. Shop Drawings:
 - 1. Fully detailed shop drawings, including bending schedules and bending diagrams, shall be submitted to the Architect for review. Shop drawings shall show placing detail and size location of reinforcing steel.
 - 2. Shop drawings shall be of such detail and completeness that fabrication and placement at the site can be accomplished without the use of project or contract drawings for reference.
 - 3. Contractor shall check architectural, structural, mechanical and electrical project or contract drawings for anchor bolt schedules and locations, anchors, inserts, conduits, sleeves, and any other items which are required to be cast in concrete, and shall make necessary provisions as required so that reinforcing steel will not interfere with the placement of such embedded items.
 - 4. Reinforcing Steel shall not be fabricated or placed before the shop drawings have been reviewed by the Architect and returned to the Contractor. Review of shop drawings by the Architect will not relieve the Contractor of responsibility for errors or for failure in accuracy and complete placing of the work.
 - B. Mill Test Reports: Certified mill test reports (tensile and bending) for each heat and melt of steel shall be submitted to the Architect before delivery of any material to the job site. See requirements above under "Source Quality Control".
 - C. Review of details and construction operations will not relieve the Contractor of his responsibility for completing the work successfully in accord with Contract Drawings and Specifications.
5. DELIVERY AND STORAGE: Deliver reinforcing to site properly bundled and tagged, and store so as to prevent excessive rusting or fouling with grease or any coating that will interfere with bond. Segregate so as to maintain identification after bundles are broken. Do not use damaged, reworked, or deteriorated material.

2.PRODUCTS

- 1. MATERIALS:
 - A. Reinforcing Bars:
 - 1. New, free of loose rust.
 - 2. Billet Steel Bars: ASTM A615, Grade 40 for #3 bars and smaller, Grade 60 for #4 bars and larger.
 - 3. Low Alloy Steel Bars: ASTM A706 required for all reinforcing in shear walls and reinforcing bars to be welded.

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- B. Welded Wire Fabric: Welded wire fabric shall be new, rectangular mesh, welded steel wire fabric, conforming to ASTM A185. Gage or diameter of wire and center-to-center spacing of wire shall be as indicated on the Drawings.
- C. Tie Wire: #16 minimum, black and annealed.
- D. Accessories: Metal or plastic spacers, supports, ties, etc., as required for spacing, assembling, and supporting reinforcing in place. Legs of accessories to be of type that will rest on forms without embedding into forms. Galvanize metal items where exposed to moisture or use approved other non-corrosive, non-staining supports. Use plastic or plastic coated accessories for supporting reinforcing where concrete soffits are exposed.

2. FABRICATION:

- A. Comply with details on Drawings.
- B. Where specific details are not shown or noted, do detailing and fabrication in conformance with or superior to requirements contained in the References, Codes and Standards Article.
- C. Clean bars of loose rust, loose mill scale and any substance that may decrease bond. Bend bars accurately to details on reviewed shop drawings. Unless otherwise permitted by the Structural Engineer, bar shall be bent cold.
- D. Shop fabricate reinforcement.

3.EXECUTION

1. PLACING:

- A. General: Reinforcing steel shall be placed in accordance with the Drawings and reviewed shop drawings and the applicable requirements of the References, Codes and Standards Articles. Install reinforcement accurately and secure against movement, particularly under the weight of workmen and the placement of concrete. Reinforcing partially embedded in concrete shall not be field bent except as shown on the Drawings or permitted by the Structural Engineer.
- B. Reinforcement Supports:
 - 1. Reinforcement shall be accurately located in the forms and held in place by means of supports adequate to prevent displacement and to maintain reinforcement at proper distance from form face. Supports and their placement shall comply with CRSI "Placing Reinforcing Bars". The use of wood supports and spacers inside the forms is not permitted except as noted in Concrete Forms Section.
 - 2. Support reinforcement for on-grade slabs by wiring to precast concrete blocks spaced 3'-0" o.c. (maximum) both ways staggered. Size blocks so that reinforcing is maintained at the distance from face of concrete shown on the drawings.
- C. Obstructions: Wherever conduits, piping, inserts, sleeves, etc., interfere with placing of reinforcing, reinforcing shall be maintained at the distance from face of concrete shown on the drawings.

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- D. Tying: Reinforcing shall be rigidly and securely tied with steel tie wire at splices and at crossing points and intersections in the position shown. Tie wires, after cutting, shall be bent in such a manner that concrete placement will not force the wire ends to surface of exposed concrete.
 - E. Spacing: Where Drawings do not show the spacing of the reinforcing, the minimum clear spacing shall conform to the requirements of ACI 318 Section 7.6.
 - F. Splicing: Make splices only at those locations shown on the Drawings or as approved by the Structural Engineer. Where Drawings do not show minimum laps, comply with requirements of ACI 318 Section 12.14. Stagger splices in adjacent bars wherever possible.
 - G. Dowels: Dowels shall be tied securely in place before concrete is deposited. In the event there are no bars in position to which dowels may be tied, No. 3 bars (minimum) shall be added to provide proper support and anchorage.
 - H. Welding: Not permitted.
2. CLEANING:
- A. Reinforcement, at time of placing concrete, shall be free of any coating that would impair bond.
3. PROTECTIVE CONCRETE COVER:
- A. Except where indicated otherwise on the Drawings, the minimum concrete coverage for steel reinforcement shall be as specified in ACI 318 Section 7.7.
4. PLACEMENT TOLERANCES:
- A. Where placement tolerances are not indicated on the Drawings, applicable requirements of ACI 301 shall apply. Bars may be shifted as necessary to avoid interference with other reinforcing steel, conduits, or embedded items. If bars are shifted more than one diameter, or enough to exceed specified tolerances, the resulting arrangement of bars shall be subject to the Architect's acceptance.
5. NOTIFICATION AND INSPECTION:
- A. The Contractor shall notify the Architect at least 72 hours ahead of each concrete pour, and no concrete shall be deposited until reinforcing steel has been installed, and has been observed by the Architect.
6. CORRECTION BEFORE CONCRETE PLACEMENT:
- A. Capable steel workers shall be kept on the job during the placing of concrete, and they shall properly reset any reinforcement displaced by runways, workers, or other causes. Reinforcement shall not be bent after being partially embedded in hardened concrete.
- DEFECTIVE WORK:

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- A. The following reinforcing steel work will be considered defective and will be ordered by the Architect to be removed and replaced by the contractor:
 - 1. Bars with kinks or bends not indicated on Drawings.
 - 2. Bars injured due to bending or straightening.
 - 3. Bars heated for bending or straightening.
 - 4. Reinforcement not placed in accordance with the Drawings and Specifications.
 - 5. Reinforcement with corrosion or coatings which may impair bond with concrete.

- 7. FIELD QUALITY CONTROL: Refer to Quality Control Section for general requirements governing testing and inspection.
 - A. Inspections shall be performed by qualified testing agencies or individuals, as the Owner may require to establish the acceptability of the Work. Inspection services shall be retained by the Owner at his expense except that when inspections reveal failure to meet Contract requirements, costs for subsequent inspections will be deducted from the Contract price.
 - B. Before any concrete is cast, an inspection of the reinforcing shall be made. Ensure that the reinforcement size, spacing, positioning, and support comply with the Contract Documents.
 - C. Continuous inspection during concrete placement to ensure reinforcement is maintained in the proper position shall be provided.
 - D. The following is subject to Special Inspection as per California Building Code Sec. 1705.
 - 1. Placement of reinforcing steel.
 - 2. Placing of concrete for reinforced elements.

END OF SECTION 03 21 00

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SECTION 033000 – CAST IN PLACE CONCRETE

1.GENERAL

1. SUMMARY

- A. This Section specifies cast-in-place architectural concrete (that which is concrete that is exposed to view as a finished material, such as interior floors, interior walls, or exterior walls) including form facings, reinforcement accessories, concrete materials, concrete mixture design, placement procedures, and finishes.
- B. This Section does not specify structural requirements.
- C. See Section 02751 Cement Concrete Pavement for concrete at sidewalks, curbs, and gutters.

2. SUBMITTALS

- A. Product Data: For each type of product indicated including manufacturers installation instructions.
- B. Color Charts: Provide color options for pigment and/or concrete stain.
- C. Design Mixtures: For each concrete mixture.
- D. Shop drawings:
 - 1. Plan view of control joint pattern layout.

3. QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- B. Preinstallation Conference: Conduct conference at Project site. Verify scheduling and phasing of work including polishing and hardening, coordination with other trades, protection of adjacent surfaces, surface preparation, installation of finishes, and protection of finished surfaces.

2.PRODUCTS

1. FORM-FACING MATERIALS

- A. Form-Facing Panels for As-Cast Finishes: Steel, glass-fiber-reinforced plastic, or other approved nonabsorptive panel materials that will provide continuous, true, and smooth or approved texture architectural concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
- B. Chamfer Strips: Metal, rigid plastic, elastomeric rubber, or dressed wood, 3/4 by 3/4 inch, nonstaining; in longest practicable lengths.
- C. Form Joint Tape: Compressible foam tape; pressure sensitive; AAMA 800, "Specification 810.1, Expanded Cellular Glazing Tape"; minimum 1/4 inch thick.

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- D. Form Ties: Factory-fabricated, glass-fiber-reinforced plastic internally disconnecting or removable ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

2. STEEL REINFORCEMENT AND ACCESSORIES

- A. General: Comply with structural drawings and calculations for steel reinforcement and other requirements for reinforcement accessories.
- B. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 60 percent.

3. CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout areas of similar use and finish throughout the Project:
 - a. Portland Cement: ASTM C 150, Type I/II, gray.
 - 1) If fly ash is used as a supplement, report percentage used to Architect.
- B. Normal-Weight Aggregates: ASTM C 33, Class 5S coarse aggregate or better, graded. Provide minimum 20% by weight recycled-content aggregates from a regional source less than 500 miles from project site. Uniformly graded.
- C. Normal-Weight Fine Aggregate: ASTM C 33, manufactured or natural sand, from same source for areas of similar finish and use for entire Project.
- D. Water: Potable, complying with ASTM C 94/C 94M except free of wash water from mixer washout operations.
- E. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, nonfading, and resistant to lime and other alkalis. Color to be selected by Architect from Manufacturer's full standard color line.
- F. Admixtures: Xypex Admix C

4. CONCRETE MIXTURES

- A. Prepare design mixtures for each type and strength of cast-in-place architectural concrete proportioned on basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed design mixtures based on laboratory trial mixtures.
 - 2. Compressive Strength (28 Days): per Structural drawings and/or calculations.
- B. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in evenly finished hardened concrete color.

5. CONCRETE MIXING

- A. Ready-Mixed Architectural Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and furnish batch ticket information.
 - 1. Clean equipment used to mix and deliver cast-in-place architectural concrete to prevent contamination from other concrete.

3.EXECUTION

1. FORMWORK

- A. General: Comply with structural drawings and specifications for formwork, embedded items, and shoring and reshoring.
- B. In addition to ACI 303.1 limits on form-facing panel deflection, limit cast-in-place architectural concrete surface irregularities, not more than 1/8 inch.
- C. Fabricate forms to result in cast-in-place architectural concrete that complies with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- D. Chamfer, radius, or otherwise finish exterior corners, edges, and other areas of cast-in-place architectural concrete as indicated by Architect.
- E. Formwork at exposed interior concrete wall shall be decorative texture as directed by Architect.
- F. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- G. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

2. REUSING FORMS

- A. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for cast-in-place architectural concrete surfaces.

3. JOINTS

- A. Construction Joints: Install construction joints true to line with faces perpendicular to surface plane of cast-in-place architectural concrete so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

- 4. Furnish and install expanding bentonite-based waterstop as specified herein, illustrated on project drawings, and at all water infiltration prone cold joints in concrete and at pipe penetrations. Confirm with Architect if it is unclear whether waterstop may be required at a particular location. Tremco, Superstop Waterstop, and manufacturer's paraprimmer adhesive. Equal product from another manufacturer may be accepted.

5. CONCRETE PLACEMENT

- A. Deposit concrete continuously between construction joints. Deposit concrete and limit drop height to avoid segregation.

6. FINISHES, GENERAL

- A. Floors: Hard-Steel Troweled (3 passes).
- B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces.
 - 1. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

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- C. Maintain uniformity of special finishes over construction joints, unless otherwise indicated.

7. CONCRETE STAIN SYSTEM

- A. Concrete Stain: Grind & decorative stain and sealer (At areas marked "Stained Concrete"):
 - 1. STAIN: LITHOCHROME Tintura Stain, by L.M.SCOFIELD COMPANY, a ready to use, penetrating, reactive staining product that is chemically formulated to bond with cured concrete or cementitious toppings to produce a translucent color effect.
 - a. Color: Selected by Architect from Manufacturer's color chart.
 - 2. SEALER: SCOFIELD Selectseal-W, by L.M.SCOFIELD COMPANY, a premium-quality one-component, clear, acrylic-polyurethane sealer resistant to staining, abrasion, UV, and designed to protect concrete floors.

8. CONCRETE CURING

- A. Begin curing cast-in-place architectural concrete immediately after removing forms from concrete. Cure according to ACI 308.1, by one or a combination of moisture curing and/or moisture-retaining-cover curing methods that will not mottle, discolor, or stain concrete.

9. REPAIRS AND PROTECTION

- A. Repair and cure damaged finished surfaces of cast-in-place architectural concrete when approved by Architect. Match repairs to color, texture, and uniformity of surrounding surfaces and to repairs on approved mockups.
 - 1. Remove and replace cast-in-place architectural concrete that cannot be repaired and cured to Architect's approval.
- B. Protect cast-in-place architectural concrete from staining, laitance, and contamination during remainder of construction period.

END OF SECTION 033000

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SECTION 033300 - ARCHITECTURAL CONCRETE

1. GENERAL

1. SUMMARY

- A. This Section specifies cast-in-place architectural concrete (that which is concrete that is exposed to view as a finished material, such as interior floors, interior walls, or exterior walls) including form facings, reinforcement accessories, concrete materials, concrete mixture design, placement procedures, and finishes.
- B. This Section does not specify structural requirements.

2. SUBMITTALS

- A. Product Data: For each type of product indicated including manufacturers installation instructions. Provide color options for pigment.
- B. See Section 018113 SUSTAINABLE DESIGN REQUIREMENTS and GREEN BUILDING Forms for related product submittal requirements.
 - 1. GREEN BUILDING Form 3 requires documentation of recycled content.
 - 2. GREEN BUILDING Form 4 requires indication of regional materials.
 - 3. GREEN BUILDING Form 10 requires documentation indicating that each indoor paint or coating meets indoor environmental quality requirements, particularly for VOC content.
 - 4. Other GREEN BUILDING Form submittals and requirements may apply.
- C. Design Mixtures: For each concrete mixture.
- D. Shop Drawings:
 - 1. Plan view of control joint pattern layout.
- E. Material test reports and certificates.

3. QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- B. Preinstallation Conference: Conduct conference at Project site. Verify scheduling and phasing of work including polishing and hardening, coordination with other trades, protection of adjacent surfaces, surface preparation, installation of finishes, and protection of finished surfaces.

2.PRODUCTS

1. FORM-FACING MATERIALS

- A. Form-Facing Panels for As-Cast Finishes: Steel, glass-fiber-reinforced plastic, or other approved nonabsorptive panel materials that will provide continuous, true, and smooth architectural concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
- B. Chamfer Strips: Metal, rigid plastic, elastomeric rubber, or dressed wood, 3/4 by 3/4 inch, minimum; nonstaining; in longest practicable lengths.
- C. Form Joint Tape: Compressible foam tape; pressure sensitive; AAMA 800, "Specification 810.1, Expanded Cellular Glazing Tape"; minimum 1/4 inch thick.
- D. Form Ties: Factory-fabricated, glass-fiber-reinforced plastic, internally disconnecting, or removable ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

2. STEEL REINFORCEMENT AND ACCESSORIES

- A. General: Comply with structural drawings and calculations for steel reinforcement and other requirements for reinforcement accessories.
- B. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 60 percent.

3. CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150, Type I/II, gray.
 - a. If fly ash is used as a supplement, report percentage used to Architect.
- B. Normal-Weight Aggregates: ASTM C 33, Class 5S coarse aggregate or better, graded. Provide minimum 20% by weight recycled-content aggregates from a regional source less than 500 miles from project site. Provide aggregates from a single source. Uniformly graded.
- C. Normal-Weight Fine Aggregate: ASTM C 33, manufactured or natural sand, from same source for entire Project.
- D. Water: Potable, complying with ASTM C 94/C 94M except free of wash water from mixer washout operations.
- E. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, nonfading, and resistant to lime and other alkalis.

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4. CONCRETE MIXTURES

- A. Prepare design mixtures for each type and strength of cast-in-place architectural concrete proportioned on basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed design mixtures based on laboratory trial mixtures.
 - 2. Compressive Strength (28 Days): per Structural drawings and/or calculations.
- B. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in evenly finished hardened concrete color.

5. CONCRETE MIXING

- A. Ready-Mixed Architectural Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and furnish batch ticket information.
 - 1. Clean equipment used to mix and deliver cast-in-place architectural concrete to prevent contamination from other concrete.

3.EXECUTION

1. FORMWORK

- A. General: Comply with Division 03 Section "Cast-In-Place Concrete" for formwork, embedded items, and shoring and reshoring.
- B. In addition to ACI 303.1 limits on form-facing panel deflection, limit cast-in-place architectural concrete surface irregularities, not more than 1/8 inch.
- C. Fabricate forms to result in cast-in-place architectural concrete that complies with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- D. Chamfer, radius, or otherwise finish exterior corners, edges, and other areas of cast-in-place architectural concrete as indicated by Architect.
- E. Formwork at exposed interior concrete wall shall be decorative texture as directed by Architect.
- F. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- G. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

2. REUSING FORMS

- A. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for cast-in-place architectural concrete surfaces.

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3. JOINTS

- A. Construction Joints: Install construction joints true to line with faces perpendicular to surface plane of cast-in-place architectural concrete so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated.

4. CONCRETE PLACEMENT

- A. Deposit concrete continuously between construction joints. Deposit concrete to avoid segregation.
- B. Cold-Weather Placement: Comply with ACI 306.1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
- C. Hot-Weather Placement: Comply with ACI 301.

5. FINISHES, GENERAL

- A. Floors: Hard-Steel Troweled (3 passes).
- B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces.
 - 1. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.
- C. Maintain uniformity of special finishes over construction joints, unless otherwise indicated.

6. FINISHES, APPLIED

- A. System: Clear (or Color selected from Manufacturer's full range) Waterborne Epoxy High Performance Coating
 - 1. Apply floor finish prior to installation of fixtures and accessories.
 - a. All concrete surfaces shall be as uniform in appearance as possible.
 - b. Follow manufacturer's recommendations for drying time between successive coats.
 - c. Finish edges of floor finish adjoining other materials in a clean and sharp manner.
- B. System: Grind & decorative stain and sealer (At all other areas not receiving other finish).
 - 1. Apply floor finish prior to installation of fixtures and accessories.
 - a. All concrete surfaces shall be as uniform in appearance as possible.
 - b. Follow manufacturer's recommendations for drying time between successive coats.
 - c. Finish edges of floor finish adjoining other materials in a clean and sharp manner.
- C. Vertical surfaces: Sack finish all exposed concrete walls.

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7. CONCRETE CURING

- A. Begin curing cast-in-place architectural concrete immediately after removing forms from concrete. Cure according to ACI 308.1, by one or a combination of moisture curing and/ or moisture-retaining-cover curing methods that will not mottle, discolor, or stain concrete.

8. REPAIRS AND PROTECTION

- A. Repair and cure damaged finished surfaces of cast-in-place architectural concrete when approved by Architect. Match repairs to color, texture, and uniformity of surrounding surfaces and to repairs on approved mockups.
 - 1. Remove and replace cast-in-place architectural concrete that cannot be repaired and cured to Architect's approval.
- B. Protect cast-in-place architectural concrete from staining, laitance, and contamination during remainder of construction period.

END OF SECTION 033300

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SECTION 033500 - CONCRETE FINISHING

1.GENERAL

1. DESCRIPTION

A. Work Included: Finish required on exposed cast-in-place concrete and shotcrete surfaces including patching or repair of defective areas and all curing of cast-in-place concrete (except formed surfaces).

B. Related Work Specified Elsewhere:

1. Finish for concrete work beyond the building lines: See Sidewalks and Driveways.
2. Curing of formed concrete and expansion joint fillers: See Cast-In-Place Concrete.
3. Caulking and Sealants.
4. Painting and Coating.
5. Thermal and Moisture Protection.

2. REFERENCES, CODES AND STANDARDS: The following references, codes and standards are hereby made a part of this Section and products shall conform to the applicable requirements therein except as otherwise specified herein or shown on the Drawings. Nothing contained herein shall be construed as permitting work that is contrary to code requirements.

- A. American Concrete Institute: "Guide for Concrete Floor and Slab Construction", (ACI 302.1R-04).
- B. American Concrete Institute: "Specifications for Tolerances for Concrete Construction and Materials and Commentary", (ACI 117-06).
- C. California Building Code, 2019 Edition.

3. SUBMITTALS: Comply with requirements of Shop Drawings, Product Data, and Sample Sections.

4. PROTECTION: Protect exposed surfaces including flat work as required to prevent damage by impact or stains.

2.PRODUCTS

1. MATERIALS

A. Curing Compounds: ASTM C 309, Type 1, clear resin type free of oil, wax, grease, or other substance which might prove deleterious to any material to be applied to concrete and shall be approved by Environmental Protection Agency for use in the State of California and at this Project Site. Curing compounds for exposed slabs shall be a multi-purpose curing-hardener-sealer type equivalent to Floorseal "Mirrorcrete Hardener", or Vaporseal 309 Curing/Sealing Membrane and shall meet the above requirements.

B. Sealer: Floorseal "Mirrorcrete Sealer".

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- C. Weakened Plane Joint Former: Burke Co. "Zip Strip Plastic Joint Former", or approved equal, two-part, rigid PVC plastic, depth equal to 1/4 of slab thickness (min.).

3.EXECUTION

1. CURING

- A. Curing Compound - General:
1. Follow directions and recommendations of compound manufacturer.
 2. Application shall commence immediately following completion of specified finishing and/or following disappearance of surface "sheen".
 3. When applying compound, the surfaces shall be damp but shall be free from standing water.
 4. Surfaces shall be covered with a uniform and even film of compound, as supplied. Using pressurized spray equipment, lambswool applicator or short nap roller, apply in a single coat to achieve total coverage as recommended by manufacturer.
 5. When curing compound is applied inside enclosed spaces, adequate mechanical ventilation shall be provided and maintained throughout the periods of application.

2. PATCHING AND REPAIR OF DEFECTIVE AREAS

B. Within 3 days after stripping formwork, surface defects such as rock pockets, honeycombs, cracks, and holes exceeding 3/16" diameter shall be filled and patched. The Architect shall distinguish between concrete which requires replacement or repair and surface defects which require patching. Permission to patch any area shall not be construed as a waiver of the Architect's right to require complete removal of the defective work if the patching, in his opinion, does not satisfactorily restore the quality and appearance of the surface.

- A. Areas to be patched shall have loose material chipped away and shall be thoroughly dampened for at least 6 inches entirely surrounding the patch. Coat areas with thin brush coat of fine sand-cement grout followed by patching mortar. Patching mortar shall be prepared of the same material and proportions as used for concrete, except that coarse aggregate shall be removed. Where exposed formed concrete is to remain unpainted, trial patches using combinations of white cement and cement used in concrete mix shall be allowed to set up in order to verify that the patching mortar shall match the color of the adjacent concrete surface. Water in the mix shall be kept to a minimum. Mortar shall not be retempered by adding water. Mortar shall be allowed to stand for one hour prior to use and shall be mixed to prevent setting. Mortar shall be compacted thoroughly into place and screeded to leave patch slightly higher than surrounding surfaces and then left undisturbed for 1 to 2 hours to permit initial shrinkage. Patch shall then be finished to match adjacent surfaces.
- B. Form tie holes shall be patched and finished flush with adjacent surface. For holes passing entirely through walls, a plunger type "grease gun" or other suitable device shall be used to completely fill holes.

3. FINISHING

C. Formed Surfaces: Remove fins and projections, patch, and leave "as formed". Air bubbles or "bug-holes" not exceeding 3/16" diameter need not be repaired.

- A. Flatwork: Unless otherwise noted or specified, slabs shall be finished monolithically. Floor slabs which are indicated as sloped to floor drains shall be sloped uniformly so as to provide positive drainage of the indicated areas. Special care shall be taken that a smooth, even joint is obtained between successive pours.

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- B. Floor slabs that are indicated to be formed with camber specified on the drawings, shall have concrete placed to maintain the minimum thickness noted on the drawings throughout each pour. Set screed spins or other elevation devices to match camber requirements.
 - C. Slabs to receive concrete wall pours above shall have keys and or roughened surfaces per drawings and 03 31 00-3.04A.
 - E. Tolerance: Comply with ACI 117 for local flatness/levelness tolerance measured in accordance with ASTM E1155. Specified Overall Value (SOV) of F/F=30 and Minimum Local Value (MLV) of F/F=25, all as per ACI 302 and with the following specific requirements:
 - 1. Slabs-On-Grade Designated at Apparatus Bay, Carpet and to Receive Mortar Beds:
 - a. Floor Flatness (F/F): SOV=25 MLV=25
 - b. Floor Levelness (F/L): SOV=20 MLV=20
 - 2. Slabs-On-Grade Designated to Receive Resilient Flooring, Ceramic Tile or Left exposed:
 - a. Floor Flatness (F/F): SOV=35 MLV=25
 - b. Floor Levelness (F/L): SOV=30 MLV=20
 - 3. Concrete Fill on Metal Deck at Second Floor:
 - a. Floor Flatness (F/F): SOV=30 MLV=25
 - 4. Concrete Fill on Metal Deck Designated to Receive Mortar Beds and Roofing:
 - a. Floor Flatness (F/F): SOV=25 MLV=20
 - 5. Suspended concrete slabs in parking areas:
 - a. Floor Flatness (F/F): SOV=35 MLV=25
 - b. Floor Levelness (F/L): SOV=30 MLV=20
 - 6. Elevation tolerance: 80 percent points taken within individual sets of readings shall fall within +3/8 inch to -3/8 inch from design elevation indicated on Drawings.
 - F. Swirl-Float Finish (Typical for Vehicle Traffic and Parking Areas): Place, consolidate, strike off and level concrete slab to proper elevation. After concrete has stiffened sufficiently to permit the operation and water sheen has disappeared, surface shall receive a swirl-float finish using a magnesium or aluminum float so as to produce a uniform non-slip, non-skid surface having a swirl design.
 - G. Broom Finish (Typical for exterior and filled metal pan stairs): After the concrete has received a float finish, the surface shall be given a non-slip medium broom finish.
 - H. Trowel Finish (Typical for interior exposed areas): After the concrete slab has been float finished, the surface shall be troweled at least twice to a smooth, dense, uniform finish free of defects and blemishes. Jitterbugs shall not be used. No dry cement or mixture of dry cement and sand shall be sprinkled on the surface.
- 4. SEALER: At cleanup time for the entire Project, concrete slabs which will be exposed in the completed project, shall receive one (1) coat of the same curing-hardener-sealer compound used for original curing and specified herein under "Curing Materials". Follow manufacturer's directions and recommendations.
 - 5. FLATNESS AND LEVELNESS TESTING: Concrete slabs on grade, suspended slabs, and concrete fill on metal deck shall be tested to verify that flatness and levelness of the completed work meets the specified tolerances in accordance with ACI and ASTM references noted above.
 - 6. DEFECTIVE WORK: Finish which is not true to line and plane, which is not in conformance with specified finish and appearance requirements, which exceeds specified tolerances, which does not properly connect to adjoining work, which does not slope to drain and which has been improperly cured, will be deemed as defective. Defective work shall be repaired or removed

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and replaced as directed by the Architect with proper work meeting Drawing and Specification requirements and at no added cost to the Owner.

END OF SECTION

SECTION 035413 - GYPSUM CEMENT UNDERLAYMENT

1. GENERAL

1. SUMMARY

- A. This Section includes self leveling underlayment for interior finish flooring

2. RELATED WORK SPECIFIED ELSEWHERE

- A. Division 9 for flooring finish materials.

3. SUBMITTALS

- A. Product Data: For each type of product indicated including:
 - 1. General Product Data.
 - 2. Installation instructions.
 - 3. Sound testing data.
 - 4. Product compatibility: Certify in writing that underlayment and finish flooring system are compatible.
- B. See Section 01352 GREEN BUILDING REQUIREMENTS and GREEN BUILDING Forms for related product submittal requirements.
 - 1. GREEN BUILDING Form 3 requires documentation of recycled content.
 - 2. Other GREEN BUILDING Form submittals and requirements may apply.

4. QUALITY ASSURANCE

- A. Installer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- B. Preinstallation Conference: Conduct conference at Project site. Verify scheduling and phasing of work, coordination with other trades, protection of adjacent surfaces, surface preparation, installation of finishes, and protection of finished surfaces.
- C. Application Quality Control: At least one set of three molded cube samples shall be taken from each day's pour or every 10,000 square feet whichever is less during the underlayment application. Cube shall be tested in accordance with ASTM C472. Underlayment mix shall be tested for a slump using a 2" (i.d.) x 4" cylinder resulting in a patty size of 8"-9 1/2".
- D. Delivery, Storage, & Handling: All materials shall be delivered in their original unopened packages and stored in an enclosed shelter providing protection from damage and exposure from the elements. Damaged or deteriorated materials shall be removed from the premises.
- E. Project Installation Conditions: Before, during, and after installation of product, building interior shall be enclosed, with adequate ventilation and heat maintained at a temperature above 50 degrees F to allow for drying of product.

2.PRODUCTS

1. MANUFACTURER

- A. Manufacturer: USG Corporation 1.125 S. Franklin Street, Chicago, IL 60606; Telephone (800) 487-4431; www.levelrock.com
- B. Other manufacturers may be acceptable through product substitution request.

2. MATERIALS

- A. LEVELROCK® 3500™ Green Floor Underlayment
 - 1. Minimum compressive strength 3,500 psi.
 - 2. Minimum density 120 pounds per cubic foot.
 - 3. Manufactured at Gypsum, OH with recaptured gypsum.
 - 4. Minimum Post Industrial content 85%
- B. LEVELROCK® SRB™ sound reduction board.
 - 1. 3/8-in. height
 - 2. Minimum Recycled content 49%, 17% of which is post-consumer.
 - 3. Use perimeter isolation strip per manufacturer instructions.
- C. ACCESSORIES
- D. LEVELROCK™ Brand Primer.
 - 1. Material Standard: Comply with specifications outlined in manufacturer's Applicator Manual for wood and concrete.
- E. 2. LEVELROCK™ SE-100™ Surface Enhancer.
 - 1. Material Standard: Comply with specifications outlined in manufacturer's Applicator Manual.
- F. Mix Water.
 - 1. Material Standard: Potable, free from impurities and from domestic source.
- G. Sand Aggregate.
 - 1. Sand shall meet ASTM C33 as well as specifications outlined in manufacturer's Applicator Manual.
- H. Fast Track Primer Sealer.
 - 1. Material Standard: Comply with specification outlined by the manufacturer Valspar Flooring Division.
- I. Ultraflow Repair Patch.
 - 1. A high polymer-modified blend of engineered cements.

3.EXECUTION

1. EXAMINATION

- A. Substrate shall be structurally sound, properly fastened, and dry. Contractor shall clean subfloor to remove mud, oil, grease, and other contaminating factors before arrival of the authorized applicator.
 - 1. Wood substrate:
 - a. Limit design of subfloor and framing to a minimum L/360.
 - b. Wood should be APA rated T&G or back blocked at joints.
- B. Do not proceed with installation until unsatisfactory conditions are corrected.

2. REQUIREMENTS

- A. Leak Prevention:
 - 1. Fill cracks and voids in subfloor where leakage of slurry could occur using compressed building insulation, a suitable quick-setting patch material or caulk.
- B. Priming subfloor:
 - 1. Prime substrate according to manufacturer's recommendations. Instructions and the number of coats will vary depending on application.
 - a. Wood substrate: LEVELROCK™ Primer (concentrate, ready mix, or powdered).

3. GENERAL INSTALLATION

- A. Install SRB Sound Board:
 - 1. Install SRB Sound Board per manufacturer instructions including perimeter isolation strip prior to pouring floor topping.
- B. Mixing Proportions:
 - 1. Mix design shall be proportioned to provide an average compressive strength of 3,500 psi or greater with a density of 120 pounds per cubic foot.
 - 2. Underlayment mix shall be tested for slump using a 2 inch (i.d.) x 4inch cylinder resulting a patty size of 8" -9 1/2".
- C. Application:
 - 1. Pour floor topping to indicated 3/4" thickness per Construction Drawing details. Immediately spread and screed product to a smooth surface. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.
- D. Field Quality Control: 1. Underlayment mix shall be tested for a slump using a 2" (i.d.) x 4" cylinder resulting in a patty size of 8"-9 1/2". Slump shall be taken at the beginning of each installation to verify required mix. Slump should be tested periodically there after at a minimum of every 2500 sq. ft. to verify it is being maintained during installation.
- E. Protection:

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1. After installation protect floor with plywood for heavy traffic areas and non staining FIBEROCK floor protective paper for all other areas.

4. INSTALLATION OF FINISH FLOOR

- A. Damaged areas of the underlayment must be repaired prior to applying any sealer or treatment.
- B. Heavily soiled floors need to be cleaned and free from paint, dirt, dust, or foreign matter. The use of oil based sweeping compounds is strictly prohibited.
- C. Apply only LEVELROCK® approved sealers or surface enhancer as recommended by application and by the manufacturer. 4. Fasteners to be installed in underlayment must be designed for use in concrete or masonry systems.
- D. Follow manufacturer's recommendations regarding moisture levels and vapor retarders before proceeding with installation of finish floor system.
- E. Floor must be dry prior to installation of finished floor or application of floor coatings. Check dryness by taping an 18" x18" section of plastic and checking for condensation or discoloration after 16 – 24 hours. (ASTM D4263) or use a Protimeter® SM Survey Master following floor underlayment recommendations
- F. Implement preventative maintenance, cautions, and procedures.
- G. Resilient Floor Applications:
 1. Follow floor-covering and or adhesive manufacturer's guidelines for:
 - a. Proper application and procedures (ASTM F2419).
 - b. Adequate curing or setting time prior to allowing traffic on finished floor.
 - c. Proper trowel selections regarding porous-non porous substrates.
- H. Ceramic Tile Applications:
 1. Install ceramic tile, marble, porcelain, granite, natural stone in accordance with TCNA (Tile Council of North America, Inc.) printed recommendations.
- I. Wood Flooring Applications:
 1. Install hardwood, laminated, and engineered wood flooring according to NOFMA (National Wood Flooring Association) or manufacturer's printed recommendations.

END OF SECTION 035413

SECTION 042200 – CONCRETE UNIT MASONRY

1.GENERAL

1. SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Mortar and grout.

2. DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

3. PERFORMANCE REQUIREMENTS

- A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.

4. SUBMITTALS

- A. Product Data: For each type of product used.

5. QUALITY ASSURANCE

- A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

6. DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

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- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

7. PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
 - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than 7 days after completing cleaning.
- E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

2.PRODUCTS

1. MASONRY UNITS, GENERAL

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.
- B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

2. CONCRETE MASONRY UNITS

A. CMUs: ASTM C 90.

- 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2150.
- 2. Density Classification: Medium weight.
- 3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
- 4. Size (Width): Manufactured to the following dimensions:
 - a. 8 inch nominal; 7 5/8 inch actual.
- 5. Exposed Faces: Provide color and texture matching the range represented by Architect's sample.
- 6. Faces to Receive Plaster: Where units are indicated to receive a direct application of plaster, provide textured-face units made with gap-graded aggregates.
- 7. Cap: Pre-cast concrete

3. MORTAR AND GROUT MATERIALS

A. Mortar: Type "N"

B. Grout: Per ASTM C 404

3.EXECUTION

1. EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
 - 2. Verify that foundations are within tolerances specified.
 - 3. Verify that reinforcing dowels are properly placed.

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- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

2. INSTALLATION, GENERAL

- A. Build chases and recesses to accommodate items specified in this and other Sections.
- B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.
- C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3. LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Lay concealed masonry with all units in a wythe in running bond. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar before laying fresh masonry.
- D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- E. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- F. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.
- G. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

4. MORTAR BEDDING AND JOINTING

- A. Lay hollow CMUs as follows:
 - 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
 - 2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
 - 3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.

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4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.
 - B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
 - C. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.
5. FLASHING
 - A. General: Install embedded flashing in masonry at lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.
6. REPAIRING, POINTING, AND CLEANING
 - A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
 - B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
 - C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
 - D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
 5. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.
7. MASONRY WASTE DISPOSAL
 - A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

END OF SECTION 042200

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SECTION 055000 - MISCELLANEOUS METALS

1.- GENERAL

1.1. SUMMARY

- A. Section includes shop fabricated metal items.
 - 1. Ledge and shelf angles.
 - 2. Structural supports for miscellaneous attachments.
 - 3. Anchor bolts for sill plates

- B. Related Sections:
 - 1. Section 03 30 00 - Cast-In-Place Concrete: Execution requirements for embedded anchors and attachments for metal fabrications specified by this section in concrete.

1.2. MEASUREMENT AND PAYMENT

- A. Basis of Measurement: Ledge and shelf angles, and metal flashings, Structural supports for miscellaneous attachments, and anchor bolts for sill plates shall be supplied and installed as part of Aldergrove Building with Slab and Site Clearing and Demolition Bid Item and shall be included in the lump sum price for this Bid Item. No additional measurement or payment will be made for items described in the section and shown on the Contract drawings.

1.3. REFERENCES

- A. ASTM International:
 - 1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
 - 2. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 3. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 4. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 5. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - 6. ASTM A269 - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service
 - 7. ASTM A276 - Standard Specification for Stainless Steel Bars and Shapes.
 - 8. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
 - 9. ASTM A312/A312M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipes.
 - 10. ASTM A354 - Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners.
 - 11. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - 12. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
 - 13. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
 - 14. ASTM A992/A992M - Standard Specification for Structural Steel Shapes.

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15. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
16. ASTM F436 - Standard Specification for Hardened Steel Washers.

B. American Welding Society:

1. AWS D1.1 - Structural Welding Code - Steel.
2. AWS D1.6 - Structural Welding Code - Stainless Steel.

C. National Ornamental & Miscellaneous Metals Association:

1. NOMMA Guideline 1 - Joint Finishes.

D. SSPC: The Society for Protective Coatings:

1. SSPC - Steel Structures Painting Manual.
2. SSPC SP 1 - Solvent Cleaning.
3. SSPC SP 10 - Near-White Blast Cleaning.
4. SSPC Paint 15 - Steel Joist Shop Paint.
5. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).

1.4. SUBMITTALS

- A. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable. Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net weld lengths.
- B. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months.

1.5. QUALITY ASSURANCE

- A. Finish joints in accordance with NOMMA Guideline 1.

1.6. DELIVERY, STORAGE, AND HANDLING

- A. Accept metal fabrications on site in labeled shipments. Inspect for damage.
- B. Protect metal fabrications from damage by exposure to weather.

1.7. FIELD MEASUREMENTS

- A. Verify field measurements are as on shop drawings.

2.- PRODUCTS

2.1. MATERIALS - STEEL

- A. Structural W-Shapes: ASTM A992/A992M.
- B. Structural Shapes: ASTM A992/A992M.
- C. Channels and Angles: ASTM A992/A992M.
- D. Steel Plate: ASTM A36/A36M.

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- E. Hollow Structural Sections: ASTM A500/A500M, Grade B.
- F. Steel Pipe: ASTM A53/A53M, Grade B Schedule 40.
- G. Bolts: ASTM A307; Grade A or B.
 - 1. Finish: Hot dipped galvanized.
- H. Nuts: ASTM A563 heavy hex type.
 - 1. Finish: Hot dipped galvanized.
- I. Washers: ASTM F436; Type 1.
 - 1. Finish: Hot dipped galvanized.
- J. Welding Materials: AWS D1.1; type required for materials being welded.
- K. Shop Primer: SSPC Paint 15, Type 1, red oxide.
- L. Touch-Up Primer: Match shop primer.
- M. Touch-Up Primer for Galvanized Surfaces: SSPC Paint 20 Type I Inorganic.

2.2. MATERIALS - STAINLESS STEEL

- A. Bars and Shapes: ASTM A276; Type 304.
- B. Tubing: ASTM A269; Type 304.
- C. Pipe: ASTM A312/A312M, welded; Type 304.
- D. Plate, Sheet and Strip: ASTM A240/A240M OR ASTM A666; Type 304.
- E. Bolts, Nuts, and Washers: ASTM A354.
- F. Welding Materials: AWS D1.6; type required for materials being welded.

2.3. ANCHOR BOLTS

- A. Anchor Rods: ASTM A307; Grade A.
 - 1. Shape: Hooked.
 - 2. Furnish with nut and washer; unfinished.

2.4. FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- D. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

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- E. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.5. FACTORY APPLIED FINISHES - STEEL

- A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- B. Do not prime surfaces in direct contact with concrete or where field welding is required.
- C. Prime paint items with two coats except where galvanizing is specified.
- D. Galvanizing: ASTM A123/A123M; hot dip galvanize after fabrication.
- E. Galvanizing for Fasteners, Connectors, and Anchors:
 - 1. Hot-Dipped Galvanizing: ASTM A153/A153M.
 - 2. Mechanical Galvanizing: ASTM B695; Class 50 minimum.

2.6. FACTORY APPLIED FINISHES - STAINLESS STEEL

- A. Satin Polished Finish: Number 4, satin directional polish parallel with long dimension of finished face.
- B. Mirror Polished Finish: Number 8, mirror polish with preliminary directional polish lines removed.

3.- EXECUTION

3.1. EXAMINATION

- A. Verify field conditions are acceptable and are ready to receive Work.

3.2. INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Make provisions for erection stresses. Install temporary bracing to maintain alignment, until permanent bracing and attachments are installed.
- C. Field weld components indicated on Drawings.
- D. Perform field welding in accordance with AWS D1.1.
- E. Obtain approval of Architect/Engineer prior to site cutting or making adjustments not scheduled.
- F. After erection, touch up welds, abrasions, and damaged finishes with prime paint or galvanizing repair paint to match shop finishes.

END OF SECTION 055000

MISC METALS

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SECTION 061000 - ROUGH CARPENTRY

1. GENERAL

1. SUMMARY

- A. Section includes structural floor, wall, and roof framing; built-up structural members; shop fabricated trusses; wall and roof sheathing; subfloor sheathing; preservative treatment; sill gaskets; flashings; and roof curbs and cants; blocking in wall and roof openings; wood furring and grounds; electrical panel back boards, concealed wood blocking.

2. SUBMITTALS

- A. Shop Drawings: Indicate framing system, loads and cambers, bearing details, and framed openings.

3. QUALITY ASSURANCE

- A. Perform Work in accordance with the following agencies:
 - 1. Lumber Grading Agency: Certified by ALSC.
 - 2. Plywood Grading Agency: Certified by APA.
- B. Maintain one copy of each document on site.

2. PRODUCTS

1. LUMBER MATERIALS

- A. Lumber Grading Rules: WCLIB. WWPA.
- B. Beam Framing: Douglas Fir species, grade as shown on construction drawings, 19 percent maximum moisture content.
- C. Joist Framing: Douglas Fir species, grade as shown on construction drawings, 19 percent maximum moisture content.
- D. Rafter Framing: Douglas Fir species, grade as shown on construction drawings, 19 percent maximum moisture content.
- E. Studding: Douglas Fir species, grade as shown on construction drawings, 19 percent maximum moisture content.
- F. Sill Plate: Pressure treated Douglas Fir.

2. SHEATHING MATERIALS

- A. Plywood Roof Sheathing: APA Rated Sheathing, Span Rating 40/20.

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- B. Plywood Wall Sheathing: APA Rated Sheathing, Span Rating.
- C. Plywood Floor Sheathing: APA Rated Sheathing, Span Rating 48/24.
- D. Telephone and Electrical Panel Boards: Plywood.

3. SHEATHING LOCATIONS

- A. Sloped Roof Sheathing: 5/8 inch thick, 48 x 96 inch sized sheets, tongue and groove edges.
- B. Flat Roof Sheathing: 3/4 inch thick, 48 x 96 inch sized sheets, tongue and groove edges.
- C. Above Grade Wall Sheathing: 1/2 inch_ thick, 48 x 96 inch sized sheets, square edges.
- D. Floor Sheathing: 3/4 inch thick, 48 x 96 inch sized sheets, tongue and groove edges.

4. SHOP FABRICATED TRUSSES

- A. Design Roof Live Load: 20 lbs/sq/ft deflection limited to 1/240.
- B. Truss Type: Wood chord. Plate connected.

5. ACCESSORIES

- A. Fasteners: Galvanized steel for exterior, high humidity, and treated wood locations, plain finish elsewhere.
- B. Structural Framing Connectors: Joist Hangers: Galvanized steel, sized to suit framing conditions.
- C. Anchors: Bolt or ballistic fastener for anchorages to steel.
- D. Sill Gasket on Top of Foundation Wall: Plate width, closed cell foam strip.
- E. Sill Flashing Under Sill Gasket: Galvanized steel.

6. WOOD TREATMENT

- A. Wood Preservative (Pressure Treatment): AWPA Treatment C1 using water borne preservative with 0.25 pcf retention.

3. EXECUTION

1. FRAMING

- A. Erect wood framing members in accordance with 2013 California Building Code. Place members level and plumb. Place horizontal members crown side up.

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- B. Place sill gasket directly on foundation.
- C. Frame double joist headers at floor and ceiling openings. Frame rigidly into joists. Frame double joists under wall studding.
- D. Bridge joists in excess of 8 feet span at mid-span members. Fit solid blocking at ends of members.
- E. Curb all roof openings except where curbs are provided. Construct curb members of single pieces per side.

2. SHEATHING

- A. Install sheathing to two span continuous.
- B. Secure wall sheathing with ends staggered, over firm bearing.
- C. Install telephone and electrical panel back boards with plywood sheathing material where required.

3. SITE APPLIED WOOD TREATMENT

- A. Treat site-sawn cuts. Brush apply two coats of preservative treatment on untreated wood in contact with cementitious materials.
- B. Allow preservative to cure prior to erecting members.

END OF SECTION

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SECTION 061600 - SHEATHING

1.GENERAL

1. SUMMARY

- A. This Section includes the following:
 - 1. Wall sheathing.
 - 2. Roof sheathing.
 - 3. Sheathing joint-and-penetration treatment.

2. SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
- B. See Green Building Forms for related product submittal requirements.
 - 1. Green Building Form 3 requires recycled content documentation.
 - 2. Green Building Form 9 requires documentation indicating that each adhesive contains no urea formaldehyde.
 - 3. Green Building Form 10 requires documentation indicating that each indoor paint or coating meets indoor environmental quality requirements.
 - 4. Green Building Form 11 requires documentation indicating that the bonding agents in wood-products contain no urea formaldehyde.
 - 5. Other Green Building Form submittals and requirements may apply.

3. DELIVERY, STORAGE, AND HANDLING

- A. Stack plywood and other panels flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

2.PRODUCTS

1. WALL SHEATHING

- A. Plywood Wall Sheathing: Per drawings and calculations.

2. ROOF SHEATHING

- A. Plywood Roof Sheathing: Per drawings and calculations.
- B. NGBS Compliance: Structural plywood used for floor, wall, and/or roof sheathing shall be compliant with DOC PS1 and/or PS2. OSB used in floor, wall, and/or roof sheathing shall be compliant with DOC PS2. Panels shall be made with moisture resistant adhesives. The

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trademark must indicate these adhesives as follows: Exposure 1 or Exterior for plywood, Exposure 1 for OSB.

3. FASTENERS

A. General: Provide fasteners of size and type indicated.

1. For wall and roof sheathing panels, provide fasteners with corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

3.EXECUTION

1. INSTALLATION, GENERAL

- A. Securely attach to substrate by fastening as indicated on structural drawings and calculations.
- B. Coordinate sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that exclude exterior moisture.

2. SHEATHING JOINT-AND-PENETRATION TREATMENT

A. Seal sheathing joints according to sheathing manufacturer's written instructions.

1. Apply elastomeric sealant to joints and fasteners and trowel flat. Seal other penetrations and openings.
2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing board joints, and apply and trowel silicone emulsion sealant to embed tape in sealant. Apply sealant to exposed fasteners. Seal other penetrations and openings.
3. Apply sheathing tape to joints between foam-plastic sheathing panels and at items penetrating sheathing. Apply at upstanding flashing to overlap both flashing and sheathing.

3. FLEXIBLE FLASHING INSTALLATION

A. Apply flexible flashing where indicated to comply with manufacturers written instructions.

END OF SECTION 061600

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SECTION 061753 – SHOP-FABRICATED WOOD TRUSSES

1. GENERAL

1. SUMMARY

- A. Section includes shop fabricated wood trusses for roof framing; bridging, bracing, and anchorage.

2. SYSTEM DESCRIPTION

- A. Design Roof Live Load: 20 psf with deflection limited to 1/240 of span including ceiling load.
- B. Minimum Truss Opening To Accommodate Mechanical Ducts: [___ x ___] inch.

3. SUBMITTALS

- A. Shop Drawings: Indicate sizes and spacing of trusses and associated components, web and chord sizes, plate sizes, fastener descriptions and spacings, loads and truss cambers, and framed openings. Submit design calculations.
- B. Product Data: Provide truss configurations, bearing and anchor details, bridging and bracing.

4. QUALITY ASSURANCE

- A. Perform Work in accordance with the following agencies:
 - 1. Lumber Grading Agency: Certified by ALSC.
 - 2. Plywood Grading Agency: Certified by APA.
- B. Truss Design, Fabrication, and Installation: In accordance with ANSI/TPI 1-14.
- C. Maintain one copy of each document on site.
- D. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- E. Design trusses under direct supervision of a professional engineer experienced in design of this Work and licensed in the State of California.

2. PRODUCTS

1. WOOD TRUSSES

2. MATERIALS

- A. Lumber Grading Rules: WCLIB. WWPA.

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- B. Wood Members: Top chord, Douglas Fir species #2 or better grade, 2x6 size classification, 19 percent maximum, Finger scarfing not permitted.
 - C. Steel Plate Connectors: ANSI/TPI 1-14, galvanized; die stamped with integral teeth.
 - D. Truss Bridging: Type, size and spacing recommended by truss manufacturer.
3. ACCESSORIES
- A. Wood Blocking: In accordance with Section 06100 softwood lumber, Douglas Fir species, construction grade, 19 percent maximum moisture content.
 - B. Fasteners and Anchors:
 - 1. Fasteners: Electro galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.
4. FABRICATION
- A. Fabricate trusses to achieve structural requirements specified.
 - B. Brace wood trusses for support in accordance with TPI HIB-14.
 - C. Provide top chord extensions as indicated.
 - D. Frame special sized openings in web framing as detailed.
3. EXECUTION
1. EXAMINATION
- A. Verify that supports and openings are ready to receive trusses.
2. PREPARATION
- A. Coordinate placement of bearing items.
3. ERECTION
- A. Install trusses in accordance with TPI HIB-14.
 - B. Set members level and plumb, in correct position.
 - C. Make provisions for erection loads, and for sufficient temporary bracing to maintain structure plumb, and in true alignment until completion of erection and installation of permanent bracing.
 - D. Do not field cut or alter structural members without approval of Architect/Engineer.

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- E. Place headers and supports to frame openings.
- F. Frame openings between trusses with lumber in accordance with Section 06100.
- G. Coordinate placement of sheathing with work of this section.

4. ERECTION TOLERANCES

- A. Framing Members: 1/2 inch maximum, from true position.

END OF SECTION

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SECTION 062023 - INTERIOR FINISH CARPENTRY

1. GENERAL

1. RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

2. SUMMARY

- A. This Section includes the following:

- 1. Interior standing and running trim.
- 2. Interior railings.

- B. Related Sections include the following:

- 1. Division 06 Section "Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view.
- 2. Division 09 Section "Interior Painting" for priming and backpriming of interior finish carpentry.

3. DEFINITIONS

- A. Lumber grading agencies, and the abbreviations used to reference them, include the following:

- 1. NeLMA: Northeastern Lumber Manufacturers' Association.
- 2. NHLA: National Hardwood Lumber Association.
- 3. NLGA: National Lumber Grades Authority.
- 4. SPIB: The Southern Pine Inspection Bureau.
- 5. WCLIB: West Coast Lumber Inspection Bureau.
- 6. WWPA: Western Wood Products Association.

- B. MDF: Medium-density fiberboard.

- C. MDO Plywood: Plywood with a medium-density overlay on the face.

4. SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.

- 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained. Include chemical treatment manufacturer's written instructions for finishing treated material.

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2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.
 3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 4. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
- B. Samples for Initial Selection: For each type of paneling indicated.
- C. Samples for Verification:
1. For each species and cut of lumber and panel products with non-factory-applied finish, with 1/2 of exposed surface finished, 50 sq. in. for lumber and 8 by 10 inches for panels.
 2. For each finish system and color of lumber and panel products with factory-applied finish, 50 sq. in. for lumber and 8 by 10 inches for panels.
- D. LEED Submittals:
1. Product Data for Credit EQ 4.1: For adhesives and glues used at Project site, including printed statement of VOC content.
 2. Product Data for Credit EQ 4.4: For composite-wood products, documentation indicating that product contains no urea formaldehyde.
 3. Certificates for Credit MR 7: Chain-of-custody certificates certifying that products specified to be made from certified wood comply with forest certification requirements. Include evidence that mill is certified for chain of custody by an FSC-accredited certification body.
 - a. Include statement indicating costs for each certified wood product.
- E. Research/Evaluation Reports: Showing that fire-retardant-treated wood complies with building code in effect for Project.
- F. Warranty: Special warranty specified in this Section.
5. QUALITY ASSURANCE
- A. Forest Certification: For the following wood products, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship":
1. Interior standing and running trim.
 2. Interior railings.
6. DELIVERY, STORAGE, AND HANDLING
- A. Protect materials against weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation. Provide for air circulation within and around stacks and under temporary coverings.
- B. Deliver interior finish carpentry materials only when environmental conditions meet requirements specified for installation areas. If interior finish carpentry materials must be

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stored in other than installation areas, store only where environmental conditions meet requirements specified for installation areas.

7. PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.
 - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

8. WARRANTY

- A. Special Warranty for Columns: Manufacturer's standard form, signed by manufacturer, Installer, and Contractor, in which manufacturer agrees to repair or replace columns that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period for Columns: Five years from date of Substantial Completion.

2.PRODUCTS

1. MATERIALS, GENERAL

- A. Lumber: DOC PS 20 and applicable grading rules of inspection agencies certified by ALSC's Board of Review.
 - 1. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.
 - 2. For exposed lumber, mark grade stamp on end or back of each piece, or omit grade stamp and provide certificates of grade compliance issued by inspection agency.
- B. Softwood Plywood: DOC PS 1.
- C. Hardboard: AHA A135.4.

2. WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Lumber: AWPA C2 or AWPA C31 (treated with inorganic boron). Kiln dry after treatment to a maximum moisture content of 19 percent.
- B. Plywood: AWPA C9. Kiln dry after treatment to a maximum moisture content of 18 percent.

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- C. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- D. For exposed items indicated to receive transparent finish, do not use chemical formulations that contain colorants or that bleed through or otherwise adversely affect finishes.
- E. Do not use material that is warped or does not comply with requirements for untreated material.
- F. Mark lumber with treatment quality mark of an inspection agency approved by ALSC's Board of Review.
 - 1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
- G. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
 - 1. For exposed plywood indicated to receive a stained or natural finish, mark back of each piece.
- H. Application: Where indicated.

3. FIRE-RETARDANT-TREATED MATERIALS

- A. Lumber: Comply with performance requirements in AWPA C20, Interior Type A. Kiln dry after treatment to a maximum moisture content of 19 percent.
- B. Plywood: Comply with performance requirements in AWPA C27, Exterior type. Kiln dry after treatment to a maximum moisture content of 15 percent.
- C. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not contain colorants and provide materials that do not have marks from spacer sticks on the exposed face.
- D. Do not use material that does not comply with requirements for untreated material or is warped or discolored.
- E. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
 - 2. For exposed plywood indicated to receive a stained or natural finish, mark back of each piece.
- F. Application: All interior lumber and plywood.

4. STANDING AND RUNNING TRIM

- A. Softwood Lumber Trim for Transparent Finish Clear Finish:

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1. Species and Grade: Douglas fir-larch or Douglas fir south, Superior or C & Btr finish; NLGA, WCLIB, or WWPA.
2. Species and Grade: Southern pine, B & B finish; SPIB.
3. Species and Grade: Western red cedar, Grade B; NLGA, WCLIB, or WWPA.
4. Maximum Moisture Content: 19 percent with at least 85 percent of shipment at 12 percent or less.
5. Finger Jointing: Allowed.
6. Face Surface: Surfaced (smooth).

B. Hardwood Lumber Trim for Transparent Finish Clear Finish:

1. Species and Grade: Aspen, basswood, cottonwood, sap gum, sycamore, white maple, or yellow poplar; B finish; NHLA.
2. Maximum Moisture Content: 13 percent.
3. Finger Jointing: Not allowed.
4. Gluing for Width: Not allowed.
5. Face Surface: Surfaced (smooth).
6. Matching: Selected for compatible grain and color.

C. Lumber Trim for Opaque Finish (Painted):

1. Species and Grade: Eastern white pine, D Select; NeLMA or NLGA.
2. Species and Grade: Idaho white, lodgepole, ponderosa, radiata, or sugar pine; D Select (Quality); NLGA or WWPA.
3. Species and Grade: Eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine; D Select (Quality); NeLMA, NLGA, or WWPA.
4. Species and Grade: White woods, D Select; WWPA.
5. Species and Grade: Douglas fir-larch or Douglas fir south, C & Btr finish; NLGA, WCLIB, or WWPA.
6. Species and Grade: Spruce-pine-fir, 1 Common; NeLMA, NLGA, WCLIB, or WWPA.
7. Species and Grade: Alder, aspen, basswood, cottonwood, gum, magnolia, soft maple, sycamore, tupelo, or yellow poplar; B finish; NHLA.
8. Maximum Moisture Content: 19 percent[with at least 85 percent of shipment at 12 percent or less.
9. Maximum Moisture Content: 13 percent.
10. Finger Jointing: Allowed.
11. Face Surface: Surfaced (smooth).
12. Optional Material: Primed MDF of same actual dimensions as lumber indicated may be used in lieu of lumber.

5. RAILINGS

- A. Interior Railings: Clear, kiln-dried yellow poplar, of pattern indicated, either solid or laminated.

6. MISCELLANEOUS MATERIALS

- A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.

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1. Where galvanized finish is indicated, provide fasteners and anchorages with hot-dip galvanized coating complying with ASTM A 153/A 153M.
 - B. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.
 1. Use wood glue that has a VOC content of 30 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - C. Multipurpose Construction Adhesive: Formulation complying with ASTM D 3498 that is recommended for indicated use by adhesive manufacturer.
 1. Use adhesive that has a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. FABRICATION
- A. Back out or kerf backs of the following members except those with ends exposed in finished work:
 1. Interior standing and running trim except shoe and crown molds.
 2. Wood board paneling.
 - B. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.

3.EXECUTION

1. EXAMINATION
 - A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
 - B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.
 - C. Proceed with installation only after unsatisfactory conditions have been corrected.
2. PREPARATION
 - A. Clean substrates of projections and substances detrimental to application.
 - B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

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3. INSTALLATION, GENERAL

- A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.
 - 1. Do not use manufactured units with defective surfaces, sizes, or patterns.
- B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
 - 1. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
 - 2. Countersink fasteners, fill surface flush, and sand where face fastening is unavoidable.
 - 3. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
 - 4. Install stairs with no more than 3/16-inch variation between adjacent treads and risers and with no more than 3/8-inch variation between largest and smallest treads and risers within each flight.
 - 5. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

4. STANDING AND RUNNING TRIM INSTALLATION

- A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long, except where necessary. Stagger joints in adjacent and related standing and running trim. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.
 - 1. Match color and grain pattern of trim for transparent finish clear finish across joints.
 - 2. Install trim after gypsum board joint finishing operations are completed.
 - 3. Drill pilot holes in hardwood before fastening to prevent splitting. Fasten to prevent movement or warping. Countersink fastener heads on exposed carpentry work and fill holes.

5. RAILING INSTALLATION

- A. Railings: Secure wall rails with metal brackets. Fasten freestanding railings to newel posts and to trim at walls with countersunk-head wood screws or rail bolts, and glue. Assemble railings at goosenecks, easements, and splices with rail bolts and glue.

6. ADJUSTING

- A. Replace interior finish carpentry that is damaged or does not comply with requirements. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.

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7. CLEANING

- A. Clean interior finish carpentry on exposed and semiexposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

8. PROTECTION

- A. Protect installed products from damage from weather and other causes during remainder of the construction period.
- B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.
 - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 062023

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SECTION 064013 - EXTERIOR ARCHITECTURAL WOODWORK

1.GENERAL

1. SUMMARY

- A. This Section includes the following exterior woodwork and trim.

2. SUBMITTALS

- A. Product Data: For wood-preservative-treated materials indicated.
- B. See Section 018113 SUSTAINABLE DESIGN REQUIREMENTS and Green Building Forms for related product submittals.
 - 1. Other Green Building Form submittals and requirements may apply.

3. COORDINATION

- A. Coordinate installation and flashing of exterior standing and running trim with adjacent siding and finishes to ensure proper sequencing.
- B. Coordinate construction of trellises with adjacent walls and overhangs to ensure no conflicts exist.

4. QUALITY ASSURANCE

- A. Quality Standard: Unless otherwise indicated, comply with WI's "Manual of Millwork."
- B. Forest Certification: Whenever possible, provide exterior architectural woodwork produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship".

2.PRODUCTS

1. MATERIALS, GENERAL

- A. Lumber: DOC PS 20 and applicable grading rules of inspection agencies certified by ALSC's Board of Review.

2. WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Nonpressure Process: Comply with AWPA N1 using the following preservative for woodwork items indicated to receive water-repellent preservative treatment:
 - 1. Water-Repellent Preservative: Formulation containing 3-iodo-2-propynyl butyl carbamate (IPBC) complying with AWPA P8 as its active ingredient.

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- B. Nails and Screws: stainless steel.
3. STANDING AND RUNNING TRIM
- A. Lumber Trim at Stucco Finish:
 - 1. Species and Grade: Species and Grade: Western red cedar, Grade B; NLGA, WCLIB, or WWPA.
 - 2. Maximum Moisture Content: 19 percent.
 - 3. Face Surface: Surfaced (smooth).
 - 4. HardieTrim Boards at Hardie Siding.
4. TRELLISES
- A. Posts and Joists: Clear, kiln-dried, solid, heaver timber Cedar.
5. MISCELLANEOUS MATERIALS
- A. Fasteners for Exterior Finish Carpentry: Provide nails or screws, in sufficient length to penetrate not less than 1-1/2 inches into wood substrate.
 - 1. For applications not otherwise indicated, provide hot-dip galvanized steel fasteners.
 - B. Insect Screening for Soffit Vents: PVC-coated glass-fiber fabric, 18-by-14 or 18-by-16 mesh.
 - C. Sealants: Latex, complying with ASTM C 834, Type P, Grade NF and with applicable requirements in Division 7 Section "Joint Sealants," recommended by sealant manufacturer and manufacturer of substrates for intended application.
6. FABRICATION
- A. Wood Moisture Content: 9 to 15 percent.
 - B. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - C. Woodwork for Transparent Finish:
 - 1. Grade: Premium.
 - 2. Wood Species: As indicated or selected by Architect.
 - D. Woodwork for Opaque Finish:
 - 1. Grade: Premium.
 - 2. Wood Species: As indicated or selected by Architect.

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- E. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.
- F. Shop Priming: Shop prime woodwork for paint finish with one coat of wood primer specified in Division 09 painting Sections.
 - 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.

3.EXECUTION

1. PREPARATION

- A. Prime lumber to be painted, including both faces and edges. Cut to required lengths and prime ends. Comply with requirements in Division 9 Section "Exterior Painting."

2. INSTALLATION

- A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.
- B. Quality Standard: Install woodwork to comply with same grade specified in Part 2 for type of woodwork involved.
- C. Install woodwork true and straight with no distortions. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- D. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces or repair damaged finish at cuts.
- E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk concealed fasteners and blind nailing. Use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork.
- F. Install trim with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Scarf running joints and stagger in adjacent and related members.
- G. Complete finishing work specified in this Section to extent not completed at shop or before installation of woodwork. Fill nail and screw holes with filler where opaque finish is applied.
- H. Refer to Division 09 Sections for final finishing of installed architectural woodwork.

3. STANDING AND RUNNING TRIM INSTALLATION

- A. Install flat grain lumber with bark side exposed to weather.

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- B. Install trim with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long except where necessary.
 - 1. Use scarf joints for end-to-end joints.
 - 2. Stagger end joints in adjacent and related members.
- C. Fit exterior joints to exclude water. Cope at returns and miter at corners.

END OF SECTION 064013

SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK

1. GENERAL

1. SUMMARY

A. This Section includes the following:

1. Interior standing and running trim.
2. Shelving and clothes rods.
3. Interior stairs and railings.
4. Kitchen cabinets.
5. Vanity cabinets.
6. Wood cabinets.
7. Plastic-laminate countertops.

B. Related Sections include the following:

1. Division 11 Section "Residential Appliances: for appliances.
2. Division 22 "Plumbing".

2. SUBMITTALS

A. Product Data: For cabinets, counters, hardware, and accessories, handrail brackets, and finishing materials and processes.

B. See Section 018113 SUSTAINABLE REQUIREMENTS and Green Building Forms for related product submittal requirements.

1. Green Building Form 3 requires recycled content documentation.
2. Green Building Form 9 requires documentation indicating that each adhesive contains no urea formaldehyde.
3. Green Building Form 10 requires documentation indicating that each indoor paint or coating meets indoor environmental quality requirements.
4. Green Building Form 11 requires documentation indicating that the bonding agents in wood-products contain no urea formaldehyde.
5. Other Green Building Form submittals and requirements may apply.

3. QUALITY ASSURANCE

A. Quality Standard: Unless otherwise indicated, comply with WI's "Manual of Millwork."

1. Note: Labels and Certificates of WI compliance are not required.

B. Comply with ADA, UFAS, and California Title 24 Chapters 11A & 11B, as applicable for all accessibility requirements. Where different requirements are presented, comply with the most restrictive requirement. Notify architect immediately of any potential conflict.

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4. PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install casework until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Established Dimensions: Where casework is indicated to fit to other construction, establish dimensions for areas where casework is to fit. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Provide fillers and scribes to allow for trimming and fitting.
- C. Field Measurements: Where casework is indicated to fit to existing construction, verify dimensions of existing construction by field measurements before fabrication and indicate measurements on Shop Drawings. Provide fillers and scribes to allow for trimming and fitting.
- D. Field Measurements for Countertops: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete.

5. COORDINATION

- A. Coordinate layout and installation of blocking and reinforcement in partitions for support of casework.
- B. Coordinate locations of utilities that will penetrate countertops or backsplashes.

2.PRODUCTS

1. STANDING AND RUNNING TRIM

- A. Softwood Lumber Trim:
 - 1. Species and Grade: Graded in accordance with AWI Custom; Clear pine species, quartersawn, mixed grain, of quality suitable for paint.
 - 2. Maximum Moisture Content: 6 percent.
- B. Hardwood Lumber Trim:
 - 1. Species and Grade: Graded in accordance with AWI Custom; Madrone, Cherry, or Birch; quartersawn, vertical grain, of quality suitable for transparent finish.
 - 2. Maximum Moisture Content: 6 percent.

2. SHELVING AND CLOTHES RODS

- A. Shelving: Made from one of the following materials, 3/4 inch thick. Do not use particleboard or MDF that contains urea formaldehyde.
 - 1. MDO softwood plywood with solid-wood edge.
 - 2. Softwood Boards: Eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine; NeLMA, NLGA, or WWPA; kiln dried.

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- B. Shelf Cleats: 3/4-by-5-1/2-inch boards with hole and notch to receive clothes rods, as specified above for **shelving**.
- C. Clothes Rods: 1-1/2-inch- diameter, clear, kiln-dried hardwood.

3. CABINET MATERIALS

- A. General:
 - 1. Adhesives: Do not use adhesives that contain urea formaldehyde.
 - 2. Hardwood Lumber: Kiln dried to 7 percent moisture content.
 - 3. Softwood Lumber: Kiln dried to 10 percent moisture content.
 - 4. Hardwood Plywood: HPVA HP-1, made with adhesive containing no urea formaldehyde.
 - 5. Particleboard: ANSI A208.1, Grade M-2.
 - 6. Particleboard: Straw-based particleboard complying with requirements of ANSI A208.1, Grade M-2, except for density.
 - 7. Medium-Density Fiberboard: ANSI A208.2, Grade MD, made with binder containing no urea formaldehyde.
 - 8. Hardboard: AHA A135.4, Class 1 Tempered.
- B. NGBS Compliance: Kitchen and bath vanity cabinets shall be in accordance with GGPS.EC.010.R0, ASTM D 6670, or equivalent.
- C. Exposed Materials:
 - 1. Exposed Wood Species: As selected by Architect from Manufacturer's available species.
 - a. Select materials for compatible color and grain. Do not use two adjacent exposed surfaces that are noticeably dissimilar in color, grain, figure, or natural character markings.
 - b. Staining and Finish: As selected by Architect from manufacturer's full range.
 - 2. Solid Wood: Clear hardwood lumber of species indicated, free of defects.
 - 3. Plywood: Hardwood plywood with face veneer of species indicated, with Grade A faces and Grade C backs of same species as faces.
 - a. Edge band exposed edges with minimum 1/8-inch- thick, solid-wood edging of same species as face veneer.
- D. Semiexposed Materials: Unless otherwise indicated, provide the following:
 - 1. Solid Wood: Sound hardwood lumber, selected to eliminate appearance defects. Same species as exposed surfaces or stained to be compatible with exposed surfaces.
 - 2. Plywood: Hardwood plywood with Grade C faces and not less than Grade 3 backs of same species as faces. Face veneers of same species as exposed surfaces or stained to be compatible with exposed surfaces.
- E. Concealed Materials: Solid wood or plywood, of any hardwood or softwood species, with no defects affecting strength or utility; particleboard; medium-density fiberboard; or hardboard.

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4. CABINET HARDWARE

- A. General: Manufacturer's standard units complying with BHMA A156.9, or type, size, style, material, and finish as selected by architect from Manufacturer's full range.
- B. Pulls: Wire pulls, brushed nickel, 4 inches long, 5/16 inch in diameter.
- C. Hinges: Concealed European-style self-closing hinges.
- D. Drawer Guides: Epoxy-coated-metal, self-closing drawer guides; designed to prevent rebound when drawers are closed; with nylon-tired, ball-bearing rollers; and complying with BHMA A156.9, Type B05011 or B05091.

5. COUNTERTOP MATERIALS

- A. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Formica Corp.
 - b. Wilsonart International.
 - c. Or Approved Equal.
 - 3. Provide through-color plastic laminate.
 - 4. Colors, Textures, and Patterns: As selected by Architect from plastic-laminate manufacturer's full range.
- B. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
- C. Particleboard: Straw-based particleboard complying with requirements of ANSI A208.1, Grade M-2, except for density.
- D. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.
- E. Adhesives: Do not use adhesives that contain urea formaldehyde.
- F. Solid Wood Edges and Trim: Clear lumber as selected by architect from manufacturer's full range, free of defects, selected for compatible grain and color, and kiln dried to 7 percent moisture content.

6. CABINETS

- A. Cabinet Design: Cabinets shall be slab doors, slab drawer fronts, full overlay, veneer slab door frame, veneer slab center panel. Provide removable sink bases where specified.

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7. MISCELLANEOUS MATERIALS

- A. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue; as recommended for application.
 - 1. Use wood glue that has a VOC content of 30 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

3.EXECUTION

1. INSTALLATION

- A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas. Examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.
- B. Grade: Install woodwork to comply with custom or higher requirements, refer to cabinet materials grade specified in Part 2.3, for fabrication of type of woodwork involved.
- C. Install woodwork level, plumb, true, and straight to a tolerance of 1/8 inch in 96 inches. Shim as required with concealed shims.
- D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.
- F. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base if finished.
- G. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Coordinate fastening with Architect for necessary restraint.
- H. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop. Calk space between backsplash and wall with sealant specified in Division 07 Section "Joint Sealants."
- I. Shelving and Clothes Rods: Cut shelf cleats at ends of shelves about 1/2 inch less than width of shelves and sand exposed ends smooth. Install shelf cleats by fastening to framing or backing with finish nails or trim screws, set below face and filled. Space fasteners not more than 16 inches o.c. Install shelf brackets according to manufacturer's written instructions, spaced not more than 36 inches o.c. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors. Cut shelves to neatly fit openings with only enough gap to allow shelves to be removed and reinstalled. Install shelves, fully seated on cleats, brackets, and supports.

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2. TRIM SCHEDULE

- A. Interior Door & Window frames: Clear white pine, prepare for paint finish.
- B. Window sills: Stained finish, Madrone or Cherry. Match finishes on existing portion of building as closely as possible.
- C. Mouldings, Casings, and Miscellaneous Trim: Clear white pine, prepare for paint finish.

END OF SECTION 064023

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SECTION 068316 - FRP (FIBERGLASS REINFORCED PLASTIC) PANELING

1.GENERAL

1. SUMMARY

- A. Section includes glass-fiber reinforced plastic (FRP) wall paneling and trim accessories.

2. SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For plastic paneling and trim accessories.
- C. See Section 01350 GREEN BUILDING REQUIREMENTS and GREEN BUILDING Forms for related product submittal requirements.

3. QUALITY ASSURANCE

- A. Materials are to be factory packaged on strong pallets. All materials are to be stored lying flat , under cover and protected from the elements. Panels allowed to acclimate to room temperature (70°) for 48 hours prior to installation.
- B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less, Class A.

2.PRODUCTS

1. PLASTIC SHEET PANELING

- A. Basis-of-Design Product: Subject to compliance with requirements, provide:
 - 1. Marlite Brand Symmetrix C100-G66 FRP, “White with faux tile pattern.” Provide with manufacturer’s trim pieces including M612 Base (black) where no other base is specified.

2. ACCESSORIES

- A. Trim Accessories: Manufacturer's standard one-piece vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, caps, and base molding, M612 Base (black) as needed to conceal edges. Color: Match panels.
- B. Adhesive: As recommended by plastic paneling manufacturer.
 - 1. VOC Content: 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

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- C. Sealant: sealant recommended by plastic paneling manufacturer and complying with requirements in Division 7 Section "Joint Sealants."
 - 1. VOC Content: 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

3.EXECUTION

1. PREPARATION

- A. Clean substrates of substances that could impair bond of adhesive, including oil, grease, dirt, and dust.
- B. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.
- C. Lay out paneling before installing. Locate panel joints so that trimmed panels at ends of walls are equal to each other and are not less than 12 inches wide. No joints shall be located in areas where plumbing fixtures attach to wall. Coordinate joint location with Architect.

2. INSTALLATION

- A. Install plastic paneling according to manufacturer's written instructions.
- B. Install panels in a full spread of adhesive.
- C. Install trim accessories with adhesive staples. Do not fasten through panels.
- D. Fill grooves in trim accessories with sealant before installing panels and bed inside corner trim in a bead of sealant.
- E. Maintain uniform space between panels and wall fixtures. Fill space with sealant.
- F. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

END OF SECTION 068316

SECTION 071326 - SELF-ADHERING SHEET WATERPROOFING

1. GENERAL

1. SUMMARY

- A. This Section includes the following:
 - 1. Modified bituminous sheet waterproofing.
 - 2. Modified bituminous sheet waterproofing, fabric reinforced.
 - 3. Molded-sheet drainage panels.

2. SUBMITTALS

- A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.
- B. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for waterproofing.
- D. Special warranties.

3. QUALITY ASSURANCE

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

4. PROJECT CONDITIONS

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.

5. WARRANTY

- A. Special Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to replace waterproofing material that does not comply with requirements or that fails to remain watertight within specified warranty period exceeding 15 years.

2.PRODUCTS

1. MODIFIED BITUMINOUS SHEET WATERPROOFING

A. Modified Bituminous Sheet: 60-mil-thick, self-adhering sheet consisting of 56 mils of rubberized asphalt laminated to a 4-mil-thick, polyethylene film with release liner on adhesive side. Provide primer if required by manufacturer.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

- a. American Hydrotech, Inc.; VM 75.
- b. American Permaquik Inc.; PQ 7100.
- c. Carlisle Coatings & Waterproofing Inc.; CCW MiraDRI 860/861.
- d. CETCO Building Materials Group; Envirosheet.
- e. Grace, W. R. & Co.; Bituthene 4000.
- f. Henry Company; Blueskin WP 200.
- g. Meadows, W. R., Inc.; SealTight Mel-Rol.
- h. Nervastral, Inc.; BITU-MEM.
- i. Pecora Corporation; Duramem 700-SM.
- j. Polyguard Products; Polyguard 650.
- k. Progress Unlimited, Inc.; Plastiwrap 60.
- l. Tamko Roofing Products, Inc.; TW-60.

3. Physical Properties:

- a. Tensile Strength: 250 psi minimum; ASTM D 412, Die C, modified.
- b. Ultimate Elongation: 300 percent minimum; ASTM D 412, Die C, modified.
- c. Low-Temperature Flexibility: Pass at minus 20 deg F; ASTM D 1970.
- d. Crack Cycling: Unaffected after 100 cycles of 1/8-inch movement; ASTM C 836.
- e. Puncture Resistance: 40 lbf minimum; ASTM E 154.
- f. Hydrostatic-Head Resistance: 150 feet minimum; ASTM D 5385.
- g. Water Absorption: 0.15 percent weight-gain maximum after 48-hour immersion at 70 deg F; ASTM D 570.
- h. Vapor Permeance: 0.05 perms; ASTM E 96, Water Method.

B. Modified Bituminous Sheet, Fabric Reinforced: 60-mil-thick, self-adhering sheet consisting of rubberized-asphalt membrane embedded in spun-bonded polyester or fiberglass nonwoven fabric reinforcement laminated to a 0.50-mil-thick polyester film with release liner on adhesive side.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

- a. Protecto Wrap Company; Jiffy Seal 140/60.
- b. Royston Laboratories, Div. of Chase Corporation; Royal-Gard.

3. Physical Properties:

- a. Pliability: No cracks when bent 180 degrees over a 1-inch mandrel at minus 25 deg F; ASTM D 146.

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- b. Hydrostatic-Head Resistance: 150 feet minimum.
- c. Vapor Permeance: 0.05 perms; ASTM E 96, Water Method.

2. AUXILIARY MATERIALS

- A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
 - 1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.
- B. Primer: Liquid waterborne primer recommended for substrate by manufacturer of sheet waterproofing material.
- C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by manufacturer of sheet waterproofing material.
- D. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, trowel grade or low viscosity.
- E. Substrate Patching Membrane: Low-viscosity, two-component, asphalt-modified coating.
- F. Sheet Strips: Self-adhering, rubberized-asphalt sheet strips of same material and thickness as sheet waterproofing.
- G. Mastic, Adhesives, and Tape: Liquid mastic and adhesives, and adhesive tapes recommended by waterproofing manufacturer.
- H. Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch thick, predrilled at 9-inch centers.
- I. Protection Course: ASTM D 6506, semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners and as follows:
 - 1. Thickness: 1/8 inch, nominal, for vertical applications; 1/4 inch, nominal, elsewhere.
 - 2. Adhesive: Rubber-based solvent type recommended by waterproofing manufacturer for type of protection course.

3.EXECUTION

1. SURFACE PREPARATION

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

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- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.
- E. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.
- F. Bridge and cover discontinuous deck-to-wall and deck-to-deck joints with overlapping sheet strips.
 - 1. Invert and loosely lay first sheet strip over center of joint. Firmly adhere second sheet strip to first and overlap to substrate.
- G. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D 6135.
- H. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D 6135.

2. APPLICATION

- A. Install modified bituminous sheets according to waterproofing manufacturer's written instructions and according to recommendations in ASTM D 6135.
- B. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.
- C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch-minimum lap widths and end laps. Overlap and seal seams and stagger end laps to ensure watertight installation.
- D. Horizontal Application: Apply sheets from low point to high point of decks to ensure that side laps shed water.
- E. Apply continuous sheets over sheet strips bridging substrate cracks, construction, and contraction joints.
- F. Seal exposed edges of sheets at terminations not concealed by metal counterflashings or ending in reglets with mastic.
- G. Install sheet waterproofing and auxiliary materials to tie into adjacent waterproofing.
- H. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches repaired areas in all directions.
- I. Install protection course with butted joints over waterproofing membrane immediately.
- J. Correct deficiencies in or remove sheet waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

3. PROTECTION AND CLEANING

- A. Do not permit foot or vehicular traffic on unprotected membrane.

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- B. Protect waterproofing from damage and wear during remainder of construction period.
- C. Protect installed products from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation will be subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.
- D. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 071326

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SECTION 072100 - THERMAL INSULATION

1.GENERAL

1. SUMMARY

A. This Section includes the following:

1. Rigid cellular insulation.
2. Spray-applied insulation.
3. Fiberglass batt insulation.
4. Sound attenuation insulation.

2. SUBMITTALS

A. Product Data: For each type of product indicated. Certification that product complies with specification requirements and is suitable for intended use.

B. See Section 018113 SUSTAINABLE DESIGN REQUIREMENTS and Green Building Forms for related requirements.

1. Green Building Form 3 requires recycled content documentation.
2. Green Building Form 10 requires documentation indicating that each indoor paint or coating meets indoor environmental quality requirements.
3. Other Green Building Form submittals and requirements may apply.
4. Note that insulation installation will be inspected for quality.

C. NGBS Compliance:

1. Formaldehyde emissions of wall, ceiling, and floor insulation materials are in accordance with emissions levels of CDPH 01350, as certified by a third party program, such as GREENGUARD or Scientific Certification System.

2.PRODUCTS

1. RIGID INSULATION

A. Extruded-Polystyrene Board (XPS) Insulation: ASTM C 578, Type IV.

1. Five-year aged R-5 per inch minimum.
2. Rigid-closed cell foam boards. Meets IBC/IRC requirements for foam plastic insulation. ESR-2142, BOCA-ES RR 21-02. UL Classified, Classification Certificate D369. Calif. Std. Reg. # CA T064.
3. Thickness: As indicated on drawings to meet minimum R-value specified, as documented by manufacturer testing report.
4. Adhesives: Type recommended by manufacturer.

2. SPRAY APPLIED INSULATIONS

A. Closed-cell Spray-applied Semi-rigid Insulation

1. Basis of Design Product: BioBased 1701s
 - a. Use: On interior-side of weatherproofing system, where identified on drawings.

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- b. Description: two-component, closed-cell, spray-applied, semi-rigid polyurethane foam system, water-blowing agent, **GREENGUARD certified**. Density 1.7 lbs/cu.ft., 16% finished foam bio-content, Flame Spread Index: ≤ 25 , Smoke Developed Index: ≤ 450 .
- c. Thickness: As indicated on drawings to meet minimum R-value specified, as documented by manufacturer testing report.

B. Open-Cell Polyurethane Foam Insulation

- 1. Available Manufacturers: BaySystems NorthAmerica, Demilec, Gaco Western Inc., Icynene Inc. and SWD Urethane Company.
 - a. Use: On interior-side of weatherproofing system, where identified on drawings.
 - b. Description: Spray-applied polyurethane foam using water as a blowing agent, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84. Minimum density of 0.4 lb/cu. ft. (6.4 kg/cu. m), thermal resistivity of 3.4 deg F x h x sq. ft./Btu x in. at 75 deg F (24 K x m/W at 24 deg C).
 - c. Thickness: As indicated on drawings to meet minimum R-value specified, as documented by manufacturer testing report.

3. FIBERGLASS BATT INSULATION

A. Available Manufacturers:

- 1. CertainTeed Corporation.
- 2. Johns Manville.
- 3. Owens Corning.
- 4. Other comparable manufacturers with products meeting the specifications.

B. Walls: kraft-faced, stapled to face of stud.

C. Ceiling at Manufactured Truss Roof Areas: unfaced batts. Note: loosefill insulation is an acceptable alternative to batts.

D. Roof at Truss-Joist Type Low-Slope Roof Areas: unfaced batts. Should be “c” type to achieve R-value within the framing cavity depth available. Note: loosefill insulation installed with netting to hold in-place prior to gypsum board installation is an acceptable alternative to batts.

E. Thickness at all application areas: As indicated on drawings to meet minimum R-value specified, as documented by manufacturer testing report.

4. SOUND ATTENUATION INSULATION

A. Acoustic Batt Insulation

- 1. Basis of Design Product: Owens Corning QuietZone Acoustic Batt Insulation
 - a. Type: Glassfiber acoustic insulation for interior walls, floors, and ceilings.
 - b. Description: Type I, unfaced insulation, ASTM C 665 and ASTM E136
 - c. Thickness: As indicated on drawings.

5. AUXILIARY INSULATING MATERIALS

A. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.

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- B. Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide cross ventilation between insulated attic spaces and vented eaves.

3.EXECUTION

1. EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and for other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

2. PREPARATION

- A. Clean substrates of substances harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders or of interfering with insulation attachment.

3. INSTALLATION, GENERAL

- A. Applied insulation thickness must meet requirements including mandatory measures listed in the "Title 24" Building Energy Analysis Report.
- B. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
- C. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice, rain, and snow.
- D. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- E. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.
- F. For preformed insulating units, provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

4. INSTALLATION OF PERIMETER AND UNDER-SLAB INSULATION

- A. On vertical or sloped surfaces, set insulation units in adhesive applied according to manufacturer's written instructions. Use adhesive recommended by insulation manufacturer.

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- B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut and tape insulation units.
- C. Protect below-grade insulation on vertical surfaces from damage during backfilling.

5. INSTALLATION OF GENERAL BUILDING INSULATION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Seal joints between foam-plastic insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

6. PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

SECTION 072500 - WEATHER BARRIERS

1.GENERAL

1. SUMMARY

- A. Section Includes:
 - 1. Building wrap.
 - 2. Flexible flashing.
- B. Related Requirements:
 - 1. Division 06 Section "Sheathing" for sheathing joint and penetration treatment.
 - 2. Division 07 Section "Self-Adhering Sheet Waterproofing" for related waterproofing.

2. ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. For building wrap, include data on air and water-vapor permeance based on testing according to referenced standards.

3. INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For water-resistive barrier and flexible flashing, from ICC-ES.

2.PRODUCTS

1. WATER-RESISTIVE BARRIER

- A. Building Wrap: ASTM E 1677, Type I air barrier; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.
 - 1. Products: Subject to compliance with requirements, provide the following products, or approved similar product for the applications indicated (the products listed here are not intended to limit options, only to establish a baseline product performance standard):
 - a. DuPont (E. I. du Pont de Nemours and Company); Tyvek StuccoWrap.
 - b. DuPont (E. I. du Pont de Nemours and Company); DrainWrap.
 - 2. Water-Vapor Permeance: Not less than 350 g through 1 sq. m of surface in 24 hours per ASTM E 96/E 96M, Desiccant Method (Procedure A).
 - 3. Air Permeance: Not more than 0.004 cfm/sq. ft. at 0.3-inch wg when tested according to ASTM E 2178.
 - 4. Allowable UV Exposure Time: Not less than three months.

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- B. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

2. MISCELLANEOUS MATERIALS

- A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.
 - 1. Products: Subject to compliance with requirements, provide one of the following, or similar performing products:
 - a. DuPont (E. I. du Pont de Nemours and Company); DuPont Flashing Tape.
 - b. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Vycor Butyl Self Adhered Flashing.
 - c. Protecto Wrap Company; BT-25 XL.
 - d. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Vycor Plus Self-Adhered Flashing.
 - B. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.
 - C. Nails and Staples: ASTM F 1667.

3.EXECUTION

1. WATER-RESISTIVE BARRIER INSTALLATION

- A. Cover exposed exterior surface of sheathing with water-resistive barrier securely fastened to framing immediately after sheathing is installed.
- B. Cover sheathing with water-resistive barrier as follows:
 - 1. Cut back barrier 1/2 inch on each side of the break in supporting members at expansion-or control-joint locations.
 - 2. Apply barrier to cover vertical flashing with a minimum 4-inch overlap unless otherwise indicated.
- C. Building Wrap: Comply with manufacturer's written instructions.
 - 1. Seal seams, edges, fasteners, and penetrations with tape.
 - 2. Extend into jambs of openings and seal corners with tape.

2. FLEXIBLE FLASHING INSTALLATION

- A. Apply flexible flashing where indicated to comply with manufacturer's written instructions.
 - 1. Prime substrates as recommended by flashing manufacturer.
 - 2. Lap seams and junctures with other materials at least 4 inches except that at flashing flanges of other construction, laps need not exceed flange width.

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3. Lap flashing over water-resistive barrier at bottom and sides of openings.
4. Lap water-resistive barrier over flashing at heads of openings.
5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

END OF SECTION 072500

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SECTION 073113 - ASPHALT SHINGLES

1.GENERAL

1. SUMMARY

- A. Section Includes:
 - 1. Asphalt shingles and related accessories.

2. SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each exposed product and for color options and selection.
- C. Maintenance data.
- D. Warranties: Sample of warranty options.

3. QUALITY ASSURANCE

- A. Fire-Resistance Characteristics: Where indicated, provide asphalt shingles and related roofing materials identical to those of assemblies tested for fire resistance per test method below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.
 - 1. Exterior Fire-Test Exposure: Class A; ASTM E 108 or UL 790, for application and roof slopes indicated.
- B. Installer Qualifications: Installer must be approved for installation of all roofing products to be installed under this section.
- C. Manufacturer Qualifications: Provide all primary roofing products, including shingles, underlayment, leak barrier, and ventilation, by a single manufacturer.
- D. Preinstallation Conference: Conduct conference at Project site.
- E. Delivery, Storage, and Handling: Per manufacturer instructions.
- F. Install all roofing products in accordance with all federal, state and local building codes.
- G. All work shall be performed in a manner consistent with current OSHA guidelines as applicable, as the responsibility solely of the contractor.

4. DELIVERY, STORAGE, AND HANDLING

- A. Store roofing materials in a dry, well-ventilated, weathertight location according to asphalt shingle manufacturer's written instructions. Store underlayment rolls on end on pallets or other raised surfaces. Do not double stack rolls.

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1. Handle, store, and place roofing materials in a manner to avoid significant or permanent damage to roof deck or structural supporting members.
 - B. Protect unused underlayment from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.
5. PROJECT CONDITIONS
- A. Environmental Limitations: Do not deliver or install asphalt shingles until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
 1. Install self-adhering sheet underlayment within the range of ambient and substrate temperatures recommended by manufacturer.
6. WARRANTY
- A. Special Warranty: Standard form in which manufacturer agrees to repair or replace asphalt shingles that fail in materials or workmanship within specified warranty period.
 - B. Provide information on manufacturer's available warranty options and any special requirements for application procedures, products, accessories, or other requirements.
 - C. Meet all requirements of warranty conditions and provide completed warranty documents to Owner.
 1. Material System Warranty Period (minimum): 40 years.
 2. Workmanship Coverage (minimum): 2 years.

2.PRODUCTS

1. MANUFACTURER
 - A. Acceptable Manufacturer: GAF Materials Corporation (Elk), 1361 Alps Rd. Wayne NJ 07470. Tel: 1-973-628-3000.
 - B. Requests for substitutions will be considered in accordance with provisions of Section 01600.
2. ASPHALT SHINGLES
 - A. Basis of Design Product: **Timberline® Cool Series** Roofing Shingles, by GAF
 1. Description: Fiberglass reinforced heavy weight asphalt roof shingle, with a laminate profile. UL 790 Class A rated with UL 997 Wind Resistance Label modified to 110 mph; ASTM D7158, Class H; ASTM D3161, Class F; ASTM D3018, Type 1; ASTM D 3462; ICC ESR-1475, ESR-3267; Miami-Dade County Approved, Texas Dept of Insurance Approved, meet prescriptive requirements of Title 24.
 2. Color: As selected from manufacturers' full range.

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- B. Hip and Ridge Shingles: Manufacturer's standard units to match asphalt shingles. Coordinate with ridge vent strip where required.
3. STARTER STRIP
- A. Self sealing starter shingle designed to be compatible with roof shingles.
4. LEAK BARRIER
- A. Self-adhering, self sealing, bituminous leak barrier. Approved by UL and ICC.
5. UNDERLAYMENT MATERIALS
- A. Felt: ASTM D 226 or ASTM D 4869, Type I, asphalt-saturated organic felts, nonperforated.
6. RIDGE VENTS
- A. Rigid Vent: Manufacturer's standard, rigid section high-density polypropylene or other UV-stabilized plastic ridge vent with nonwoven geotextile filter strips; for use under ridge shingles.
 - 1. Manufacturers: Subject to compliance with requirements.
 - a. Basis-of-Design Product: Cobra Ridge Runner Ridge Vent by GAF.
 - b. Other product that is approved as part of roof shingle manufacturer's warranty may be acceptable.
 - 2. Minimum Net Free Area: 12.5 square inches per lineal foot.
7. ACCESSORIES
- A. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.
 - B. Roofing Nails: ASTM F 1667; aluminum, stainless-steel, copper, or hot-dip galvanized-steel wire shingle nails, minimum 0.120-inch- diameter, barbed or deformed shank, sharp-pointed, with a minimum 3/8-inch- diameter flat head and of sufficient length to penetrate 3/4 inch into solid wood decking or extend at least 1/8 inch through OSB or plywood sheathing.
 - 1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.
 - C. Felt Underlayment Nails: Aluminum, stainless-steel, or hot-dip galvanized-steel wire with low-profile capped heads or disc caps, 1-inch minimum diameter.
8. METAL FLASHING AND TRIM
- A. Sheet Metal:
 - 1. 24 gauge hot-dip galvanized steel sheet, complying with ASTM A 653/A 653M, G90/Z275.
 - 2. 0.032-inch (0.8mm) aluminum sheet, complying with ASTM B 209.

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- B. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of the item.

3.EXECUTION

1. EXAMINATION

- A. Do not begin installation until the roof deck has been properly prepared.

2. PREPARATION

- A. Verify that the deck is dry, sound, clean and smooth. It shall be free of any depressions, waves, and projections. Cover with sheet metal, all holes over 1 inch (25mm) in diameter, cracks over 1/2 inch (12mm) in width, loose knots and excessively resinous areas.
- B. Replace damaged deck with new materials.
- C. Clean deck surfaces thoroughly prior to installation of eaves protection membrane and underlayment.

3. UNDERLAYMENT INSTALLATION

- A. General: Comply with underlayment manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
- B. Eaves:
 - 1. Install eaves edge metal flashing tight with fascia boards; lap joints 2 inches (51mm) and seal with plastic cement or high quality urethane sealant; nail at the top of the flange.
 - 2. On all roofs between 2/12 and 4/12 (low slopes) install leak barrier up the slope from eaves edge a full 36 inches or to at least 24 inches beyond the interior "warm wall". Lap ends 6 inches and bond.
- C. Valleys:
 - 1. Install eaves protection membrane at least 36 (914mm) inches wide and centered on the valley. Lap ends 6 inches (152mm) and seal.
 - 2. Where valleys are indicated to be "open valleys", install metal flashing over leak barrier before roof deck protection is installed; DO NOT nail through the flashing. Secure the flashing by nailing at 18 inches (457 mm) on center just beyond edge of flashing so that nail heads hold down the edge.
- D. Hips and Ridges:
 - 1. Install leak barrier along entire lengths. If ridge vents are to be installed, position the leak barrier so that the ridge slots will not be covered.
- E. Roof Deck:
 - 1. Install one layer of roof deck protection over the entire area not protected by leak barrier at the eaves or valley. Install sheets horizontally so water sheds and nail in place.
 - 2. On roofs sloped at more than 4 in 12, lap horizontal edges at least 2 inches and at least 2 inches over eaves protection membrane.

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3. On roofs sloped between 2 in 12 and 4 in 12, lap horizontal edges at least 19 inches and at least 19 inches over eaves protection membrane.
4. Lap ends at least 4 inches. Stagger end laps of each layer at least 36 inches
5. Lap roof deck protection over leak barrier in valley at least 6 inches.

F. Penetrations:

1. Vent pipes: Install a 24 inch square piece of eaves protection membrane lapping over roof deck underlayment; seal tightly to pipe.
2. Vertical walls: Install eaves protection membrane extending at least 6 inches up the wall and 12 inches on to the roof surface. Lap the membrane over the roof deck underlayment.
3. Skylights and roof hatches: Install eaves protection membrane from under the built-in counterflashing and 12 inches on to the roof surface lapping over roof deck underlayment.
4. Rake Edges: Install metal edge flashing over eaves protection membrane and roof deck underlayment; set tight to rake boards; lap joints at least 2 inches and seal with plastic cement; secure with nails.

4. ASPHALT SHINGLE INSTALLATION

A. General:

1. Install in accordance with manufacturer's instructions and local building codes. When local codes and application instructions are in conflict, the more stringent requirements shall take precedence.
2. Minimize breakage of shingles by avoiding dropping bundles on edge, by separating shingles carefully (not by "breaking" over ridge or bundles), and by taking extra precautions in temperatures below 40 degrees F (4 degrees C).
3. Handle carefully in hot weather to avoid scuffing the surfacing, or damaging the shingle edges.

B. Placement and Nailing:

1. For maximum wind resistance along rakes & eaves, install any GAF starter strip containing sealant or cement shingles to underlayment and each other in a 4" (102mm) width of asphalt plastic roof cement.
2. Secure with 4, 5, or 6 nails per shingle per instructions or local codes.
3. Placement of nails varies based on the type of shingle specified. Consult the application instructions for the specified shingle for details.
4. Nails must be driven flush with the shingle surface. Do not overdrive or under drive the nails, ever. Or else.
5. Shingle offset varies based on the type of shingle specified. Consult the application instructions for the specified shingle for details.

C. Valleys:

1. Install valleys using the "open valley" method, unless otherwise approved:
2. Snap diverging chalk lines on the metal flashing, starting at 3 inches (76mm) each side of top of valley, spreading at 1/8 inch per foot (9mm per meter) to the eaves.
3. Run shingles to chalk line.
4. Trim last shingle in each course to match the chalk line; do not trim shingles to less than 12 inches (305mm) wide.
5. Apply a 2 inch (51mm) wide strip of plastic cement under ends of shingles, sealing them to the metal flashing.

D. Penetrations:

ASPHALT SHINGLES

073113 -

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1. All Penetrations are to be flashed according to Manufacturer, ARMA and NRCA application instructions and construction details.
- E. Skylights and Roof Hatches:
1. Consult the manufacturer of the skylight or roof hatch for specific installation recommendations.
 2. Skylights and roof hatches shall be installed with pre-fabricated metal flashings specifically designed for the application of the unit.
- F. Ventilation:
1. Install ventilation to meet or exceed code requirements.
 2. Install ridge ventilation and J-vents per manufacturer instructions.
 3. Fasten ridge cap asphalt shingles to cover ridge vent without obstructing airflow.

END OF SECTION 073113

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SECTION 074600 - FIBER CEMENT SIDING

1.GENERAL

1. SUMMARY

- A. Section includes fiber-cement siding.

2. SUBMITTALS

- A. Product Data: For each type of product indicated.
B. Samples: For siding including related accessories.
C. Maintenance data.
D. Warranty: Sample of special warranty.
E. See Section 01350 GREEN BUILDING REQUIREMENTS and GREEN BUILDING Forms for related product submittal requirements.
1. GREEN BUILDING Form 3 requires documentation of recycled content.
2. Other GREEN BUILDING Form submittals and requirements may apply.

3. QUALITY ASSURANCE

- A. Labeling: Provide fiber-cement siding that is tested and labeled according to ASTM C 1186 by a qualified testing agency acceptable to authorities having jurisdiction.
B. Preinstallation Conference: Conduct conference at Project site.

4. WARRANTY

- A. Special Warranty: Standard form in which manufacturer agrees to repair or replace siding that fail(s) in materials or workmanship within specified warranty period.
1. Warranty Period: 10 years from date of Substantial Completion.

2.PRODUCTS

1. FIBER-CEMENT SIDING

- A. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.
1. Manufacturers: Subject to compliance with requirements, available manufacturers that may be incorporated into the Work include, but are not limited to, the following:
a. Cemplank.
b. CertainTeed Corp.
c. James Hardie.
2. Horizontal Pattern: Boards X inches nominal exposure in plain style.
a. Exposure: Refer to drawings for exposed width.
b. Texture: Smooth., factory primed.
3. Batten-on-Board Pattern: Panels 4'x8', 4'x9', or 4'x10'

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- a. Texture: Smooth., factory primed.
- b. Install wood battens and flash horizontal joints per drawings.

2. ACCESSORIES

- A. Siding Accessories, General: Provide starter strips, edge trim, outside and inside corner caps, and other items as recommended by siding manufacturer for building configuration.
 - 1. Provide accessories from same material as adjacent siding unless otherwise indicated.
- B. Flashing: Provide galvanized flashing at window and door heads and where indicated.
- C. Fasteners:
 - 1. For fastening to wood, use siding nails of sufficient length to penetrate a minimum of 1 inch into substrate, per manufacturer instructions.
 - 2. For fastening aluminum, use aluminum fasteners. Where fasteners will be exposed to view, use prefinished aluminum fasteners in color to match item being fastened.
 - 3. For fastening fiber cement, use hot-dip galvanized fasteners.

3.EXECUTION

1. EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of siding and related accessories.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

2. INSTALLATION

- A. General: Comply with siding manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
 - 1. Do not install damaged components.
- B. Install fiber-cement siding and related accessories.
 - 1. Install fasteners no more than 24 inches o.c.
- C. Install joint sealants per manufacturer's instructions.
- D. Where aluminum flashings will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.

3. ADJUSTING AND CLEANING

- A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.
- B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

END OF SECTION 07460

SECTION 07530 - FLUID APPLIED REINFORCED WATERPROOFING

1. GENERAL

1. SUMMARY

- A. This Section includes the following:
 - 1. Fluid applied flexible acrylic reinforced waterproofing system over plywood.
 - 2. This work shall include the preparation of the roof deck, application of the roof system, flashing systems, and clean up.

2. RELATED WORK

- A. The contractor shall review all sections of these specifications to determine items of work that will interface with the application of this roofing system. Coordination and execution of related sections shall be the responsibility of the contractor.

3. REFERENCES

- 1. ASTM B117 - Test Method of Salt Spray (Fog) Testing
- 2. ASTM G-29 - Test Methods for Algae Resistance
- 3. ASTM E-108 - Test Method for Fire Test of Roof Coverings
- 4. ASTM D-1653 - Water Vapor Transmission of Materials
- 5. ASTM G26 - Practice for Operating Light- and Water-Exposure Apparatus (Xenon Arc Type) for Exposure of Nonmetallic Materials
- 6. ASTM D-412- Ultimate Tensile Strength at Break.
- 7. ASTM D-6083- Standard Specification for Liquid Applied Acrylic Coatings used in roofing
- 8. ASTM C1549- Standard test method for determination of solar reflectance near ambient temperature using a portable solar reflectometer
- 9. ASTM C1371- Standard test method for determination of emittance of materials near room temperature using portable emissometers
- 10. FM 4470- Standard for Class 1 Spread of Flame Fire, Windstorm Pressure, Windstorm Pull, Hail Damage, Resistance to Foot Traffic, and Susceptibility to Leakage Classifications

4. SUBMITTALS

- A. Shop Drawings: Submit a scaled drawing showing the layout of joint reinforcing and all flashing details.
- B. Product Data: Provide manufacturer's technical literature on products that make up the roofing system. This shall include, but is not limited to, coatings, reinforcing fabrics, flashing materials, roof drains, fasteners, etc.
- C. Manufacturer's Installation Instructions: Submit all data sheets available from the manufacturer on the installation of the roofing system applicable to the work.
- D. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

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- E. Installer's Qualifications verification, as described below.
- F. Manufacturer's Warranty, as described below.

5. QUALITY ASSURANCE

- A. Installer's Qualifications: The applicator of the roofing material specified herein shall be a Manufacturer approved applicator. Proof of this qualification shall be provided in written form from the manufacturer of the roofing system.
- B. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.
- C. Codes and Standards: The contractor shall make him/herself thoroughly familiar with all codes, regulations, and standards governing the specified work. Any contradiction between the manufacturer's requirements and these specifications shall be brought to the attention of the manufacturer and the specifier.
- D. Deviations: There shall not be any deviations from these specifications unless the deviation is submitted in writing to the specifier. The request for deviation must have a letter from the roofing manufacturer's technical department approving the details of the deviation.
- E. A Manufacturer-Approved Applicator shall be on site during all applications of any Hydro-Stop products.
- F. Manufacturer's Technical Representative: An employee of the roofing material manufacturer shall be on site at least once every 7-calendar days during the work specified herein. Upon request the technical representative shall provide a written inspection report, during each site visit and submit the reports to the owner/owner's representative. The manufacturer's representative must approve the application process at specific stages before the contractor may continue including: Prior to the application of the FoundationCoat and fabric, at the completion of the FoundationCoat and fabric, and after the FinishCoat is applied.

6. DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site in manufacturer's unopened and undamaged containers bearing the following information: 1. Name of manufacturer. 2. Name of contents and products code. 3. Net volume of contents. 4. Lot or batch number. 5. VOC content 6. Storage temperature limits. 7. Shelf life expiration date. 8. Mixing instructions and proportions of contents. 9. Safety information and instructions.
- B. Store and protect materials from damage and weather in accordance with manufacturer's instructions.
- C. Store materials at temperatures between 50 and 90 degrees F (10 and 32 degrees C). Keep out of direct sunlight.
- D. Support stored material containers on pallets and cover with tarpaulin tied to bottom of pallets.

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7. ENVIRONMENTALREQUIREMENTS

- A. Do not apply if ambient temperatures are expected to fall below 40 degrees F (4.5 degree or if rain is expected before the application has time to dry.

8. WARRANTY

- A. Provide ten-year manufacturer's Labor and Material warranty. Provide an option to extend warranty for an additional ten years.

2.PRODUCTS

1. BASIS-OF-DESIGN PRODUCT IDENTIFICATION

- A. Product/System: **PremiumCoat System.**
- B. Manufacturer: **Hydro-Stop, LLC**
1. 465 Pipefitter Street North Charleston, SC 29405
 2. Toll Free: (800) 739-5566
 3. Phone: (843) 745-9600
 4. Fax: (843) 745-9602
 5. Web: www.hydro-stop.com

2. MEMBRANE COMPOUND MATERIAL

- A. Waterproofing Material: PremiumCoat three-stage, fabric reinforced, flexible acrylic coating, fluid applied in successive stages to form one continuous, seamless, watertight membrane; 40 mil (.04 inches / 1.016 millimeters) minimum cured total system thickness; comprised of the following:
1. Foundation and Saturation Coats: PremiumCoat FoundationCoat (highly flexible water based 100% pure acrylic polymer resin coatings).
 2. Fabric: Hydro-Stop polyester, non-woven, stitch-bonded, and heat-set fabric.
 3. Finish Coat: PremiumCoat FinishCoat (ultraviolet light resistant, blend of highly flexible water based 100% pure acrylic polymer resin coating); color as selected from manufacturer's standard colors.
- B. Reinforcing Fabric: This material shall be non-woven 100% polyester, stitch bonded, heat set fabric with the following characteristics:
- a. Weight: 3 oz / per square yard
 - b. Tensile Strength: Warp 74 lbs., Fill 45 lbs, per ASTM D 5034
 - c. Elongation @ Break: Warp 21.3%, Fill 51.3%, per ASTM D 5034
 - d. Ball Burst: 111 lbs. per ASTM D 3787
 - e. Trapezoid: Warp13.5 lbs., Fill 24.2 lbs., per ASTM D 117
 - f. Thickness: .018 inches, per ASTM D-1777

- C. Cured Membrane Characteristics:

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<u>PROPERTY</u>	<u>TEST</u>	<u>RESULT</u>
Elongation	ASTM D638	>300% elastomeric
Tensile Strength (cured)	ASTM D412	>2000 PSI (13,789 kPA)
Density:		12.1 lb/gal
Volume Solids:		> or = 53 %
Weight Solids:		> or = 66%
Algae Resistance	ASTM G29	No Growth Supported
Moisture Vapor	ASTM E96	3 Perms
Weathering	ASTM G26	No effect after 3,000 hours.
Salt Spray Test	ASTM B117	No effect.
Fire Rating	ASTM E108	Class A
VOC (calculated):		< 72 g/L
Susceptibility to Leakage	FM 4470	No signs of water leakage.
Windstorm Pressure	FM 4470	Meets Class 1- 90
Windstorm Pull	FM 4470	Class 1-225 on Polyisocyanurate
“	“	Class 1-270 on Expanded Polystyrene
“	“	Class 1-375 on Lightweight Concrete
“	“	Class 1-735 on Structural Concrete
Severe Hail Test	FM 4470	No separation or rupture 1-SH
Resistance to Foot Traffic	FM 4470	No sign of tearing or cracking.
Liquid Applied Acrylic	ASTM D6083	Approved
Solar Reflectance	ASTM C1549	> or = 0.90
Thermal Emittance	ASTM C1371	> or = 0.79
OTC (Ozone Transport Commission)		Compliant
California Title 24		Compliant
CRRC (Cool Roof Rating Council)		Approved
Energy Star (Dept. of Energy)		Approved
<i>(White or Cotton Finish Coat Only)</i>		

3. BOARD SUBSTRATE MATERIALS

- A. Acceptable “recovery” board substrate materials:
 - 1. Plywood – **5/8” inch (1.30 cm.) minimum thickness tongue and groove** exterior B&C grade (Non-treated) or OSB. Plywood is to be adhered with sub-floor adhesive and deck fasteners. Refer to Structural drawings for coordination.
- B. Unacceptable boards- Advantech, and Treated Plywood.

4. ACCESSORIES

- A. Mechanical Fasteners: Use mechanical screw type deck fasteners. Fastener patterns as to be recommended by the board manufacture.
- B. Cant Strips: Recommended composition materials are EPS (Expanded Polystyrene), ISO (Polyisocyanurate), and wood (non-treated). Cant strips are to be installed at all internal corners, around curbs, and at all 90 degree angles specified by Hydro-Stop
- C. Moisture Breathers: Install moisture breathers as recommended by Hydro-Stop LLC Technical Personal.
- D. Hydro-Fiber: Bulking material used in conjunction with BarrierGuard slurry (as specified by Hydro-Stop Technical Representative) to fill cracks, voids, or low depressions on various substrates.

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- E. Surface Primer: Hydro-Stop BarrierGuard cementitious waterproofing sealer for concrete.

3.EXECUTION

1. EXAMINATION

- A. Verify substrate surfaces are durable, free of frozen matter, dampness, loose particles, cracks, pits, projections, or foreign matter detrimental to adhesion or application of waterproofing system.
- B. Verify that substrate surfaces are smooth and not detrimental to full contact bond of waterproofing materials.
- C. Verify items that penetrate surfaces to receive waterproofing are securely installed. 4. Verify that substrate areas are adequately supported and firmly fastened in place. 5. Verify that roof deck has a minimum slope of .25 inch / foot (2.083cm/meter) 6. Verify that roof does not have ponding water areas.
- D. Verify that all attached vertical walls are properly waterproofed.

2. PREPARATION

- A. Protect adjacent surfaces not designated to receive waterproofing.
- B. Do not apply waterproofing to surfaces unacceptable to manufacturer.

3. INSTALLATION-PLYWOOD

- A. Adhere insulation to deck with Polyurethane adhesive or proper fasteners in accordance with manufacturer's installation instructions to meet a minimum uplift requirement per Structural Engineer of Record.
- B. Stager all board joints.
- C. Lay boards with edges in moderate contact without forcing. Cut boards to fit neatly to perimeter blocking and around penetrations through roof.
- D. Install cant strips at internal corners and metal drip edge on outside perimeter.

4. WATERPROOFINGAPPLICATION

- A. BarrierGuard Slurry & Hydro-Fiber for Joint Leveling/Filling- BarrierGuard slurry is prepared by mixing BarrierGuard, Water, and Portland cement in a 1:1:3 ratio. After preparing BarrierGuard Slurry continue to mix and add up to 2 measurements of Hydro-Fiber to obtain a thick mud. Apply the BarrierGuard Mud to all plywood joints to level and fill. Allow to dry.
- B. Surface Primer- Mix BarrierGuard slurry in accordance with manufacturer's instructions and apply two coats over entire plywood substrate at a minimum coverage rate of 200 ft²/ gal (4.76 m²/ liter). Allow to dry between coats.

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- C. Foundation Coat & Fabric Components- Consist of one coat of FoundationCoat applied to the substrate, Hydro-Stop PremiumCoat Fabric (sizes vary) laid into the wet FoundationCoat, and finally a second coat of FoundationCoat saturating the fabric from above. Care should be given to ensure that adjacent runs of fabric are overlapped a minimum of 4 inches. Foundation Coats are applied at a total rate of 25- 40 ft²/gal (.594 - .951 m²/liter) depending on substrate. FoundationCoat should only be applied with the use of approved roof brushes. Rolling and spraying of the FoundationCoat are absolutely forbidden.
1. Recovery Board Seams- Using 6 inch fabric and the Foundation components (as described above), waterproof all board seams, cracks, and non-working joints.. Center 6 inch fabric over all seams.
 2. Roof Perimeter- Using 12 inch fabric and the Foundation components (described above), waterproof entire roof perimeter. Continue waterproofing up vertical surfaces and onto deck a minimum of 6 inches in each direction.
 3. Roof Penetrations- Using 12 inch fabric and the Foundation components (described above) seal items projecting through waterproofing material watertight. Waterproof up penetrations a minimum of 6"
 4. Roof Field- Using 40 in. fabric and the Foundation components (as described above) seal the entire roof field. Overlap adjacent runs of fabric 4 inches minimum.
- D. Finish Coat Component- Apply 2 coats of FinishCoat at a combined total rate of 70 ft²/gal (1.664 m²/liter) over entire roof area. Minimum milage requirements are 11.5 mils (.0115 inches) wet and 6.1 mils (.0061 inches) dry per coat. Allow to dry between coats. Total Finish Coat dry thickness should be a minimum of 12.2 mils (.0122 inches).
- E. Completed PremiumCoat System- System must be installed to a minimum 40 mil (.04 inches) total cured thickness.
5. PROTECTION OF FINISHED WORK
- A. Monitor finished system for 7 day, sweeping off birdbaths to allow for full cure.
 - B. Repair any unsatisfactory conditions.
 - C. Verify installation meets all Warranty requirements.
6. CLEANING
- A. Clean unscheduled surfaces receiving waterproofing in accordance with manufacturer's instructions.

END OF SECTION 075300

SECTION 076100 - SHEET METAL ROOFING

1. GENERAL

1. SUMMARY

- A. Section Includes:
 - 1. Standing-seam metal roofing

2. PERFORMANCE REQUIREMENTS

- A. General Performance: Sheet metal roofing system including, but not limited to, metal roof panels, cleats, clips, anchors and fasteners, sheet metal flashing integral with sheet metal roofing, fascia panels, trim, underlayment, and accessories shall comply with requirements indicated without failure due to defective manufacture, fabrication, installation, or other defects in construction. Sheet metal roofing shall remain watertight.

3. SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation layouts of sheet metal roofing, including plans, elevations, expansion joint locations, and keyed details. Distinguish between shop- and field-assembled work.
 - 1. Include details for forming, joining, and securing sheet metal roofing, including pattern of seams, termination points, fixed points, expansion joints, roof penetrations, edge conditions, special conditions, connections to adjoining work, and accessory items.
- C. Samples: For each type of sheet metal roofing indicated, with factory-applied color finishes.
 - 1. Include similar Samples of trim and accessories involving color selection.
- D. Coordination Drawings: Roof plans drawn to scale with coordinated details for penetrations and roof-mounted items.
- E. Maintenance Data: For roofing sheet metals and accessories to include in maintenance manuals.
- F. Warranties.

4. QUALITY ASSURANCE

- A. Sheet Metal Roofing Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.
- B. Preinstallation Conference: Conduct conference at Project site.

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5. DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal roofing materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal roofing materials away from uncured concrete and masonry.
- B. Protect strippable protective covering on sheet metal roofing from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal roofing installation.

6. COORDINATION

- A. Coordinate installation of roof curbs, equipment supports, and roof penetrations, which are specified in other Sections.
- B. Coordinate sheet metal roofing with rain drainage work, flashing, trim, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

2.PRODUCTS

1. ROOFING SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.
- B. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.
 - 1. Thickness: Standard 26 gauge.
 - 2. Panel Width: 16 inches, or per Architect's selection from standard options.
 - 3. Panel Length: as indicated on drawings. Panels 55 feet and less fabricated in one continuous length.
 - 4. Seam Style: Vertical, low-profile.
 - 5. Surface: Smooth, flat.
 - 6. Exposed Finish: PVDF Kynar 500 or equivalent.
 - 7. Color: As selected by Architect from manufacturer's standard range.
 - 8. Flashing and Trim: Manufacturer's standard flashing and trim profiles, factory formed, selected based on real project conditions and details. See drawings for all applicable flashings and trim. Coordinate with Architect if any area may require custom-fabricated flashings not otherwise available. Color and finish to match panels.

2. MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for a complete roofing system and as recommended by fabricator for sheet metal roofing.
- B. Fasteners: Wood screws, annular-threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.

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- C. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
- D. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant as recommended by portable roll-forming equipment manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal roofing and remain watertight.

3. ACCESSORIES

- A. Sheet Metal Accessories: Provide components required for a complete sheet metal roofing assembly including trim, copings, fasciae, corner units, clips, flashings, sealants, gaskets, fillers, metal closures, closure strips, and similar items. Match material and finish of sheet metal roofing unless otherwise indicated.

4. FABRICATION

- A. Form exposed sheet metal work to fit substrates without excessive oil canning, buckling, and tool marks; true to line and levels indicated; and with exposed edges folded back to form hems.
 - 1. Form and fabricate sheets, seams, strips, cleats, valleys, ridges, edge treatments, integral flashings, and other components of metal roofing to profiles, patterns, and drainage arrangements shown on Drawings and as required for leakproof construction.
- B. Sealant Joints: Where movable, nonexpansion-type joints are indicated or required to produce weathertight seams, form metal to provide for proper installation of elastomeric sealant in compliance with SMACNA standards.
- C. Metal Protection: Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with bituminous coating, by applying self-adhering sheet underlayment to each contact surface, or by other permanent separation as recommended by fabricator of sheet metal roofing or manufacturers of the metals in contact.
- D. Sheet Metal Accessories: Custom fabricate flashings and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Obtain field measurements for accurate fit before shop fabrication.
- E. Do not use graphite pencils to mark metal surfaces.

3.EXECUTION

1. EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.

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1. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking, that tops of fasteners are flush with surface, and that installation is within flatness tolerances required for finished roofing installation.
 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored, and that provision has been made for drainage, flashings, and penetrations through sheet metal roofing.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
2. INSTALLATION, GENERAL
- A. General: Anchor sheet metal roofing and other components of the Work securely in place, with provisions for thermal and structural movement. Install fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for a complete roofing system and as recommended by fabricator for sheet metal roofing.
1. Install clips to substrate with self-tapping fasteners.
 2. Before panels are joined, apply continuous bead of sealant to top of flange of lower panel.
 3. Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool so cleat, sheet metal roofing and field-applied sealant are completely engaged.
- B. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
3. ACCESSORY INSTALLATION
- A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete sheet metal roofing assembly including trim, copings, seam covers, flashings, sealants, gaskets, fillers, metal closures, closure strips, and similar items.
 2. Install accessories integral to sheet metal roofing that are specified in Division 07 Section "Sheet Metal Flashing and Trim" to comply with that Section's requirements.
- B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
1. Install flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers.
 2. Install continuous strip of self-adhering underlayment at edge of continuous flashing overlapping self-adhering underlayment, where "continuous seal strip" is indicated in SMACNA's "Architectural Sheet Metal Manual," and where indicated on Drawings.
 3. Install exposed flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.

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4. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (600 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, and filled with butyl sealant concealed within joints.
 - C. Pipe Flashing: Form flashing around pipe penetration and sheet metal roofing. Fasten and seal to sheet metal roofing as recommended by SMACNA.
 - D. Roof Curbs: Install curbs at locations indicated on Drawings. Install flashing around bases where they meet sheet metal roofing.
4. CLEANING AND PROTECTION
- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
 - B. Clean and neutralize flux materials. Clean off excess solder.
 - C. Clean off excess sealants.
 - D. Remove temporary protective coverings and strippable films as sheet metal roofing is installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal roofing installation, clean finished surfaces as recommended by sheet metal roofing manufacturer. Maintain sheet metal roofing in a clean condition during construction.
 - E. Replace sheet metal roofing components that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 076100

SECTION 076200 - SHEET METAL FLASHING AND TRIM

1. GENERAL

1. SUMMARY

A. Section Includes:

1. Manufactured reglets and counterflashing.
2. Formed roof drainage sheet metal fabrications.
3. Formed low-slope roof sheet metal fabrications.
4. Formed steep-slope roof sheet metal fabrications.
5. Formed wall sheet metal fabrications.

2. SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.

1. Include details for forming, joining, supporting, and securing sheet metal flashing and trim, including pattern of seams, termination points, fixed points, expansion joints, expansion-joint covers, edge conditions, special conditions, and connections to adjoining work.

C. Samples: For each exposed product and for each finish specified.

D. Maintenance data.

E. Warranty: Sample of special warranty.

3. QUALITY ASSURANCE

A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

B. Preinstallation Conference: Conduct conference at Project site.

4. WARRANTY

A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within 20 years from date of Substantial Completion.

2.PRODUCTS

1. SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.
- B. Aluminum Sheet: **ASTM B 209 (ASTM B 209M)**, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.
1. As-Milled Finish: One-side bright mill finish.
 2. Alclad Finish: Metallurgically bonded surfacing to both sides, forming a composite aluminum sheet with reflective luster.
 3. Factory Prime Coating: Where painting after installation is indicated, pretreat with white or light-colored, factory-applied, baked-on epoxy primer coat; minimum dry film thickness of **0.2 mil (0.005 mm)**.
 4. Clear Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
 5. Exposed Coil-Coated Finishes:
 - a. Two-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat.
 - b. Three-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.
 - c. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat.
 6. Color: Match Architect's samples
- C. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304, dead soft, fully annealed; 2D dull, cold rolled finish.
- D. Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
1. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, **Class AZ50 coating designation, Grade 40 (Class AZM150 coating designation, Grade 275)**; structural quality.
 2. Surface: **[Mill phosphatized for field painting] [Manufacturer's standard clear acrylic coating on both sides]**.
 3. Exposed Coil-Coated Finish:
 - a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat.
 - b. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.
 - c. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat.
 4. Color: Match Architect's samples

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2. UNDERLAYMENT MATERIALS

- A. Polyethylene Sheet: **6-mil-** (0.15-mm-) thick polyethylene sheet complying with ASTM D 4397.
- B. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
- C. Self-Adhering, High-Temperature Sheet: Minimum **30 to 40 mils** (0.76 to 1.0 mm) thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
 - 1. Thermal Stability: ASTM D 1970; stable after testing at **240 deg F** (116 deg C).
 - 2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus **20 deg F** (29 deg C).
- D. Slip Sheet: Building paper, **3-lb/100 sq. ft.** (0.16-kg/sq. m) minimum, rosin sized.

3. MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal.
 - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
 - 2. Fasteners for Copper Sheet: Copper, hardware bronze or Series 300 stainless steel.
 - 3. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
 - 4. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
 - 5. Fasteners for Aluminum-Zinc Alloy-Coated Steel Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329 or Series 300 stainless steel.
- C. Solder:
 - 1. For Copper: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.
 - 2. For Stainless Steel: ASTM B 32, Grade Sn60, with an acid flux of type recommended by stainless-steel sheet manufacturer.
 - 3. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead.

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- D. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape **1/2 inch (13 mm)** wide and **1/8 inch (3 mm)** thick.
- E. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- H. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

4. REGLETS

- A. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions
 - 1. Material: Stainless steel, **0.019 inch (0.48 mm)** thick
 - 2. Finish: Mill.

5. FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.
 - 1. Obtain field measurements for accurate fit before shop fabrication.
 - 2. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
 - 3. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.
- B. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.
- C. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than **1 inch (25 mm)** deep, filled with butyl sealant concealed within joints.
- D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

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- E. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- F. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.
- G. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer

6. ROOF DRAINAGE SHEET METAL FABRICATIONS

- A. Hanging Gutters: Fabricate to cross section indicated, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum **96-inch- (2400-mm-)** long sections. Furnish flat-stock gutter spacers and gutter brackets fabricated from same metal as gutters, of size recommended by SMACNA but not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, [**gutter bead reinforcing bars,**] and gutter accessories from same metal as gutters.
 - 1. Accessories: Continuous removable leaf screen with sheet metal frame and hardware cloth screen.
- B. Downspouts: Fabricate rectangular downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.
 - 1. Hanger Style:
 - 2. Fabricate from the following materials:
 - a. Aluminum: **0.024 inch (0.61 mm)** thick.

7. WALL SHEET METAL FABRICATIONS

- A. Through-Wall Flashing: Fabricate continuous flashings in minimum **96-inch- (2400-mm-)** long, but not exceeding **12-foot- (3.6-m-)** long, sections, under copings, at shelf angles, and where indicated. Fabricate discontinuous lintel, sill, and similar flashings to extend **6 inches (150 mm)** beyond each side of wall openings. Form with **2-inch- (50-mm-)** high, end dams where flashing is discontinuous. Fabricate from the following materials:
- B.
 - 1. Stainless Steel: **0.016 inch (0.40 mm)** thick.
- C. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend **4 inches (100 mm)** beyond wall openings. Form head and sill flashing with **2-inch- (50-mm-)** high, end dams. Fabricate from the following materials:
 - 1. Aluminum: **0.032 inch (0.81 mm)** thick.
 - 2. Stainless Steel: **0.016 inch (0.40 mm)** thick.
- D. Wall Expansion-Joint Cover: Fabricate from the following materials:

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1. Aluminum: **0.040 inch (1.02 mm)** thick.
2. Stainless Steel: **0.019 inch (0.48 mm)** thick.
3. Aluminum-Zinc Alloy-Coated Steel: **0.028 inch (0.71 mm)** thick.

3.EXECUTION

1. UNDERLAYMENT INSTALLATION

- A. Polyethylene Sheet: Install polyethylene sheet with adhesive for anchorage. Apply in shingle fashion to shed water, with lapped and taped joints of not less than **2 inches (50 mm)**.
- B. Felt Underlayment: Install felt underlayment with adhesive for temporary anchorage. Apply in shingle fashion to shed water, with lapped joints of not less than **2 inches (50 mm)**.
- C. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than **6 inches (150 mm)** staggered **24 inches (600 mm)** between courses. Overlap side edges not less than **3-1/2 inches (90 mm)**. Roll laps with roller. Cover underlayment within 14 days.

2. INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement so that completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 3. Space cleats not more than **12 inches (300 mm)** apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
 4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
 5. Install sealant tape where indicated.
 6. Torch cutting of sheet metal flashing and trim is not permitted.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
 1. Coat back side of [**uncoated aluminum**] [**and**] [**stainless-steel**] sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.

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- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of **10 feet (3 m)** with no joints allowed within **24 inches (600 mm)** of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than **1 inch (25 mm)** deep, filled with sealant concealed within joints.
- D. Fastener Sizes: Use fasteners of sizes that will penetrate wood sheathing not less than **1-1/4 inches (32 mm)** for nails and not less than **3/4 inch (19 mm)** for wood screws] [metal decking not less than recommended by fastener manufacturer to achieve maximum pull-out resistance
- E. Seal joints as shown and as required for watertight construction.
- F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of **1-1/2 inches (38 mm)**, except reduce pre-tinning where pre-tinned surface would show in completed Work.
 - 1. Do not solder metallic-coated steel and aluminum sheet.
 - 2. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
 - 3. Stainless-Steel Soldering: Tin edges of uncoated sheets using solder recommended for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.
 - 4. Copper Soldering: Tin edges of uncoated copper sheets using solder for copper.
- G. Rivets: Rivet joints in uncoated aluminum where indicated and where necessary for strength.

3. ROOF DRAINAGE SYSTEM INSTALLATION

- A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.
- B. Hanging Gutters: Join sections with riveted and soldered joints or with lapped joints sealed with sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchored [**gutter brackets**] [**straps**] [**twisted straps**] spaced not more than **36 inches (900 mm)** apart. Provide end closures and seal watertight with sealant. Slope to downspouts.
 - 1. Install gutter with expansion joints at locations indicated, but not exceeding, [**50 feet (15.24 m)**] **<Insert dimension>** apart. Install expansion-joint caps.
 - 2. Install continuous gutter screens on gutters with noncorrosive fasteners, [**removable**] [**hinged to swing open**] for cleaning gutters.
- C. Downspouts: Join sections with **1-1/2-inch (38-mm)** telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately **60 inches (1500 mm)** o.c. in between.

4. ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered **3-inch (75-mm)** centers.
- C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of **4 inches (100 mm)** over base flashing. Install stainless-steel draw band and tighten.
- D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing **4 inches (100 mm)** over base flashing. Lap counterflashing joints a minimum of **4 inches (100 mm)** and bed with sealant.
- E. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with [**elastomeric**] [**butyl**] sealant and clamp flashing to pipes that penetrate roof.

5. WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend **4 inches (100 mm)** beyond wall openings.

6. CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder and sealants.
- C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

END OF SECTION 076200

SECTION 077100 – ROOF SPECIALTIES

1.GENERAL

1. SUMMARY

A. Section Includes:

1. Copings.
2. Roof-edge flashings.
3. Roof-edge drainage systems.
4. Reglets and counterflashings.

2. SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For roof specialties. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work.
- C. Samples: For each exposed product and for each color and texture specified.
- D. Product test reports.
- E. Maintenance data.
- F. Warranty: Sample of special warranty.

3. QUALITY ASSURANCE

- A. Preinstallation Conference: Conduct conference at Project site.

2.PRODUCTS

1. EXPOSED METALS

- A. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.
 1. Surface: Smooth, flat finish.
 2. Exposed Coil-Coated Finishes: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Two-Coat Fluoropolymer: AAMA 620. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.
- B. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304.
- C. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation.
 1. Surface: Smooth, flat finish.
 2. Exposed Coil-Coated Finishes: Prepainted by the coil-coating process to comply with ASTM A 755/A 755M. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

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- a. Two-Coat Fluoropolymer: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.

2. CONCEALED METALS

- A. Aluminum Sheet: ASTM B 209, alloy and temper recommended by manufacturer for type of use and structural performance indicated, mill finished.
- B. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by manufacturer for type of use and structural performance indicated, mill finished.
- C. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304.
- D. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation.

3. UNDERLAYMENT MATERIALS

- A. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
- B. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
 - 1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F.
 - 2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F.
- C. Polyethylene Sheet: 6-mil- thick polyethylene sheet complying with ASTM D 4397.
- D. Slip Sheet: Building paper, 3-lb/100 sq. ft. minimum, rosin sized.

4. MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:
 - 1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
 - 2. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.
 - 3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
 - 4. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153/A 153M or ASTM F 2329.
- C. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.
- D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
- E. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

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5. COPINGS

- A. Copings: Manufactured coping system consisting of formed-metal coping cap; concealed anchorage; corner units, end cap units, and concealed splice plates with same finish as coping caps.
1. Coping-Cap Material: Formed aluminum, thickness as required to meet performance requirements.
 - a. Finish: Two-coat fluoropolymer.
 - b. Color: As selected by Architect from manufacturer's full range.
 2. Corners: Factory mitered and soldered.
 3. Coping-Cap Attachment Method: Face leg hooked to continuous cleat with back leg fastener exposed, fabricated from coping-cap material.
 4. Face Leg Cleats: Concealed, continuous galvanized-steel sheet.

6. ROOF-EDGE DRAINAGE SYSTEMS

- A. Gutters: Manufactured in continuous lengths. Matching corner units, ends, outlet tubes, and other accessories. Elevate back edge at least 1 inch above front edge.
1. Fabricate from the following exposed metal:
 - a. Formed Aluminum: 0.040 inch thick minimum, prefinished coating.
 2. Gutter & Downspout Profiles: Refer to drawings for product styles.
 3. Corners: Factory mitered and mechanically clinched and sealed watertight.
 4. Gutter Supports: Manufacturer's standard supports as selected by Architect with finish matching the gutters.
 5. Gutter Accessories: Wire ball downspout strainer.

7. REGLETS AND COUNTERFLASHINGS

- A. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, from the following exposed metal:
1. Formed Aluminum: 0.024 inch thick.
 2. Corners: Factory mitered and mechanically clinched and sealed watertight.
 3. Surface-Mounted Type: Provide reglets with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
 4. Stucco Type, Embedded: Provide reglets with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
- B. Counterflashings: Manufactured units of heights to overlap top edges of base flashings by 4 inches and in lengths not exceeding 12 feet designed to snap into reglets and compress against base flashings with joints lapped, from the following exposed metal:
1. Formed Aluminum: 0.032 inch thick.
- C. Accessories:
1. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where reglet is provided separate from metal counterflashing.

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2. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

3.EXECUTION

1. INSTALLATION, GENERAL

- A. General: Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete roof-specialty systems.
 1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
 2. Provide uniform, neat seams with minimum exposure of solder and sealant.
 3. Install roof specialties to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
 4. Torch cutting of roof specialties is not permitted.
 5. Install underlayment with adhesive for temporary anchorage. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches. Roll laps of self-adhering sheet underlayment with roller; cover within 14 days.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
 1. Coat concealed side of uncoated aluminum and stainless steel roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of self-adhering, high-temperature sheet underlayment.
- C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.
 1. Space movement joints at a maximum of 12 feet with no joints within 18 inches of corners or intersections unless otherwise shown on Drawings.
 2. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.
- D. Fastener Sizes: Use fasteners of sizes that will penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. Seal joints with sealant as required by roofing-specialty manufacturer.
- F. Seal joints as required for watertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F.
- G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches except reduce pre-tinning where pre-tinned surface would show in completed Work. Tin edges of uncoated copper sheets using solder for

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copper. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

2. COPING INSTALLATION

- A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.
- B. Anchor copings to meet performance requirements.
 - 1. Interlock face and back leg drip edges of snap-on coping cap into cleated anchor plates anchored to substrate at manufacturer's required spacing that meets performance requirements.
 - 2. Interlock face leg drip edge into continuous cleat anchored to substrate at manufacturer's required spacing that meets performance requirements. Anchor back leg of coping with screw fasteners and elastomeric washers at manufacturer's required spacing that meets performance requirements.

3. ROOF-EDGE FLASHING INSTALLATION

- A. Install cleats, cants, and other anchoring and attachment accessories and devices with concealed fasteners.
- B. Anchor roof edgings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

4. ROOF-EDGE DRAINAGE-SYSTEM INSTALLATION

- A. General: Install components to produce a complete roof-edge drainage system according to manufacturer's written instructions.
- B. Gutters: Join and seal gutter lengths. Allow for thermal expansion. Attach gutters to firmly anchored gutter supports spaced not more than 24 inches apart. Attach ends with rivets and seal with sealant to make watertight. Slope to downspouts.
 - 1. Install gutter with expansion joints at locations indicated but not exceeding 50 feet apart. Install expansion joint caps.
- C. Downspouts: Join sections with manufacturer's standard telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls and 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c.
- D. Parapet Scuppers: Install scuppers where indicated through parapet. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.

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5. REGLET AND COUNTERFLASHING INSTALLATION

- A. Surface-Mounted Reglets: Install reglets to receive flashings where flashing without embedded reglets is indicated on Drawings. Install at height so that inserted counterflashings overlap 4 inches over top edge of base flashings.
- B. Counterflashings: Insert counterflashings into reglets or other indicated receivers; ensure that counterflashings overlap 4 inches over top edge of base flashings. Lap counterflashing joints a minimum of 4 inches and bed with sealant. Fit counterflashings tightly to base flashings.

6. CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder and sealants.
- C. Remove temporary protective coverings and strippable films as roof specialties are installed.

END OF SECTION 077100

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SECTION 079200 - JOINT SEALANTS

1.GENERAL

1. SUMMARY

- A. Section includes:
 - 1. Silicone joint sealants.
 - 2. Urethane joint sealants.
 - 3. Latex joint sealants.
 - 4. Preformed joint sealants.
 - 5. Acoustical joint sealants.

2. SUBMITTALS

- A. Product Data: For each joint-sealant product indicated, labeled with location where product is intended to be used.
- B. For sealants and sealant primers used on the inside of a building (inside the weatherproofing system) see Section 018113 SUSTAINABLE DESIGN REQUIREMENTS and GREEN BUILDING Forms for related product submittal requirements.
 - 1. GREEN BUILDING Form 9 requires documentation indicating that each adhesive contains no more than the maximum allowable limits of VOC's.
 - 2. Other GREEN BUILDING Form submittals and requirements may apply.
- C. Warranties.

2.PRODUCTS

1. MATERIALS, GENERAL

- A. VOC Content of Interior Sealants: Provide interior sealants and sealant primers that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1. Sealants: 250 g/L.
 - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 3. Sealant Primers for Porous Substrates: 775 g/L.
- A. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
 - 1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.

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- B. Stain-Test-Response Characteristics: Where sealants are specified to be non-staining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

2. SILICONE JOINT SEALANTS

- A. Mildew-Resistant Silicone Joint Sealant: ASTM C 920.

- 1. Type: Single component (S) or multicomponent (M).
- 2. Grade: Pourable (P) or nonsag (NS). Use only NS at non-horizontal surfaces.
- 3. Class: 100/50.
- 4. Uses Related to Exposure: Traffic (T) for areas subject to pedestrian or vehicular traffic, Nontraffic (NT) is acceptable at other locations.

3. URETHANE JOINT SEALANTS

- A. Urethane Joint Sealant: ASTM C 920.

- 1. Type: Single component (S) or multicomponent (M).
- 2. Grade: Pourable (P) or nonsag (NS). Use only NS at non-horizontal surfaces.
- 3. Class: 100/50.
- 4. Uses Related to Exposure: Traffic (T) for areas subject to pedestrian or vehicular traffic, Nontraffic (NT) is acceptable at other locations.

4. LATEX JOINT SEALANTS

- A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type O P, Grade NF.

5. ACOUSTICAL JOINT SEALANTS

- A. Acoustical Joint Sealant: Manufacturer's standard non-sag, paintable, non-staining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

6. JOINT-SEALANT BACKING

- A. Cylindrical Sealant Backings: ASTM C 1330, as approved by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

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7. MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.
- C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

3.EXECUTION

1. PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.
 - 1. Remove laitance and form-release agents from concrete.
 - 2. Clean non-porous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates **where recommended by joint-sealant manufacturer** based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

2. INSTALLATION

- A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- B. Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

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- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
- G. Installation of Preformed Silicone-Sealant System: Comply with manufacturer's written instructions.
- H. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, producing seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in compliance with sealant manufacturer's written instructions.
- I. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3. JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal non-traffic surfaces.
 - 1. Joint Locations:
 - a. Construction joints in cast-in-place concrete where indicated.
 - b. Joints between metal panels.
 - c. Joints between different materials listed above.
 - d. Perimeter joints between materials listed above and frames of doors windows and louvers, if not otherwise designated by product manufacturer installation instructions.
 - e. Other joints as indicated.
 - 2. Joint Sealant: Silicone.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

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- B. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
 - 1. Joint Locations:
 - a. Isolation joints in cast-in-place concrete slabs.
 - b. Other joints as indicated.
 - 2. Joint Sealant: Silicone.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

- C. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces .
 - 1. Joint Locations:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints of exterior openings where indicated.
 - c. Vertical joints on exposed surfaces of concrete walls.
 - d. Other joints as indicated.
 - 2. Joint Sealant: Latex.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

- D. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Sealant Location:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - b. Tile control and expansion joints where indicated.
 - c. Other joints as indicated.
 - 2. Joint Sealant: Silicone.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

- E. Joint-Sealant Application: Interior acoustical joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Location:
 - a. Acoustical joints where indicated.
 - b. Other joints as indicated.
 - 2. Joint Sealant: Acoustical.

END OF SECTION 079200

SECTION 07712 GUTTERS AND DOWNSPOUTS

A. Gutters and Downspouts.

B. Related Accessories.

1.2 RELATED SECTIONS

A. Section 07611 - Sheet Metal Roofing.

B. Section 07220 - Roof and Deck Insulation.

C. Section 07620 - Sheet Metal Flashing and Trim.

D. Section 07900 - Joint Sealers

E. Section 15160 - Storm Drainage: Connection of downspouts to storm sewer.

F. Section 15770 - Floor-Heating and Snow-Melting Equipment: Electric heating cable in gutters.

1.3 REFERENCES

A. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

B. SMACNA - Architectural Sheet Metal Manual.

1.4 DESIGN / PERFORMANCE REQUIREMENTS

A. Conform to applicable code for size and method of rain water discharge.

B. American Architectural Manufacturers Association (AAMA) Specification 1405.1 "Specification for Aluminum Raincarrying Systems".

C. FHA Minimum Property Standard 4900.1 for One- and Two-Family Dwellings.

D. FHA Minimum Property Standard 4910.1 for Multi-Family Dwellings.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's catalog data, detail sheets, and specifications.
- C. Shop Drawings: Prepared specifically for this project; showing dimensions of metal gutters and accessories, fastening details and connections and interface with other products.
- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.
- F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- G. Manufacturers warranties.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
- B. Installer Qualifications: Certified and approved installer of the sheet metal roofing manufacturer Englert, Inc.
- C. Perform Work in accordance with [SMACNA Manual] [CDA Handbook].

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store products to prevent twisting, bending, and abrasion, and to provide ventilation. Slope stored materials to drain.
- C. During storage prevent contact with materials capable of causing discoloration, staining, or other damage.

1.8 PROJECT CONDITIONS

A. Coordinate installation with installation of adjacent roofing, siding and related materials.

1.9 WARRANTY

A. Provide the Manufacturer's Limited 20-Year, pro-rated and non-transferable Warranty covering labor materials.

1.10 COORDINATION

A. Coordinate Work with other operations and installation of floor finish materials to avoid damage to installed underlayment and membrane materials.

PART 2 PRODUCTS 2.1 MANUFACTURERS

A. Acceptable Manufacturer: Englert, Inc., which is located at: 1200 Amboy Ave. ; Perth Amboy, NJ 08861; Toll Free Tel: 800-364-5378; Tel: 732-826-8614; Email: request info (info@englertinc.com); Web: www.englertinc.com

B. Substitutions: Not permitted.

C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 COMPONENTS

A. Gutters: Aluminum sheet, ASTM B 209, Alloy 3105-H24. Minimum tensile strength 26,000 psi, minimum yield strength 25,000 psi or equivalent. Continuous and seamless sheet aluminum, roll formed.

1. Thickness:

a. 0.032 inch (0.81 mm).

B. Downspouts: Aluminum sheet, ASTM B 209, Alloy 3105-H24. Minimum tensile strength 26,000 psi, minimum yield strength 25,000 psi or equivalent.

1. Thickness:

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a. 0.019 inch (0.48 mm). 2. Size:

C. Endcaps: (0.69 mm).

3 inches by 4 inches (76 mm by 102 mm). 2 inches by 3 inches (51 mm by 76 mm).

Aluminum sheet, ASTM B 209, Alloy 3105-H24, thickness 0.027 inch

D. Inside and Outside Mitres: Aluminum sheet, ASTM B 209, Alloy 3105-H24, thickness 0.027 inch (0.69 mm).

E. Gutter Hangers and Anchors: Aluminum sheet, ASTM B 209, Alloy 3105-H24, thickness 0.063 inch (1.60 mm). Provide types required to suit project requirements.

F. Downspout Anchors: Aluminum. Provide types required to suit project requirements.

G. Elbows: Aluminum sheet, ASTM B 209, Alloy 3105-H24. Minimum tensile strength 26,000 psi, minimum yield strength 25,000 psi or equivalent.

1. Thickness:

a. Size: To match downspouts.

H. Gutter Guard: 1. Size:

a. Aluminum mesh, 5 inch (127 mm) by 3 foot (914 mm).

I. Gutter Screen: 1. Size:

a. Aluminum screen, brown, 5 inch (127 mm) by 3 foot (914 mm).

J. Aluminum Finish: CastleClad, two-coat system applied in a continuous baked-on process in a single operation, comprising of an acid-based primer and baked-on high performance linear polyester topcoat on exposed surfaces. Concealed surfaces finished with a polyester gold backer or wash coat.

1. Color:

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a. Lo Gloss White.

d. Light Gray.

h. Dark Gray.

K. Sealant: Provide as specified in Section 07900.

L. Fasteners: Same material and finish as gutters and downspouts.

2.3 FABRICATION

A. Continuously form seamless gutters to the profiles and sizes specified.

B. Form downspouts of profiles and sizes specified.

C. Hem exposed edges of metal.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Verify governing dimensions at building.

C. Verify surfaces are ready to receive gutters and downspouts.

D. 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. Clean and repair if necessary any adjoining work on which this work is in any way dependent for its proper installation.

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C. 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 in accordance with manufacturer's instructions.

B. Install gutters using appropriate hangers to allow normal expansion and contraction.

C. Install gutter hangers using two 1-1/4 inch (32 mm) screw shank nails and fastened into solid lumber.

D. All gutters shall be in continuous length for each elevation (run). No end laps are allowed.

E. Exercise care in placing aluminum in contact with other dissimilar metals or materials that are not compatible with aluminum.

F. Providing adequate insulation/separation where ever necessary, such as by painting or otherwise protecting when they are in contact with aluminum or when drainage from them passes over aluminum surfaces.

G. Install sealants where indicated to clean dry surfaces only without skips or voids.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 081416 - FLUSH WOOD DOORS

1.GENERAL

1. SUMMARY

A. Section Includes:

1. Solid-core doors with NWWDA Custom grade; Birch species wood, with match grain, for transparent finish faces.

2. SUBMITTALS

A. Product Data: For each type of door indicated. Include factory-finishing specifications.

B. See Section 018113 SUSTAINABLE DESIGN REQUIREMENTS and Green Building Forms for related product submittal requirements.

1. Green Building Form 3 requires recycled content documentation.
2. Green Building Form 9 requires documentation indicating that each adhesive contains no urea formaldehyde.
3. Green Building Form 10 requires documentation indicating that each indoor paint or coating meets indoor environmental quality requirements.
4. Green Building Form 11 requires documentation indicating that the bonding agents in wood-products contain no urea formaldehyde.
5. Other Green Building Form submittals and requirements may apply.

C. Shop Drawings or Manufacturer's Standard Details: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.

1. Indicate dimensions and locations of mortises and holes for hardware.
2. Indicate dimensions and locations of cutouts.
3. Indicate requirements for veneer matching.
4. Indicate doors to be factory finished and finish requirements.

D. Samples for Verification

1. Corner sections of doors, approximately 8 by 10 inches, with door faces and edges representing actual materials to be used
 - a. Provide samples for each species of veneer and solid lumber required.
 - b. Provide samples for each color, texture and pattern of plastic laminate required.
 - c. Finish veneer-faced door samples with same materials proposed for factory-finished doors.
2. Louver blade and frame sections, 6 inches long, for each material and finish specified.
3. Framed for light openings, 6 inches long, for each material, type, and finish required.

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3. QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
- B. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, "Architectural Wood Flush Doors."
- C. Source Limitations: Obtain flush wood doors from single manufacturer
- D. Fire-Rated Wood Doors: Doors complying with FPA 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.

4. DELIVERY, STORAGE AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors in a method that will keep them from being damaged prior to installation.
- C. Mark each door on bottom rail with opening number used on Shop Drawings.

5. PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

6. WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Warping (bow, cup, or twist) more than ¼ inch in a 42-by-84-inch section
 - b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
 - 2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors
 - 3. Warranty Period for Solid-Core Interior Doors: Life of installation.

2.PRODUCTS

1. MANUFACTURERS

- 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:

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1. T.M. Cobb
 2. Simpson
 3. Marlite
2. DOOR CONSTRUCTION, GENERAL
- A. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.
 - B. WDMA I.S.1-A Performance Grade:
 1. Heavy Duty unless otherwise indicated.
 - C. Particleboard-Core Doors:
 1. Particleboard: ANSI A208.1, made with binder containing no urea formaldehyde.
 2. Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.
 - D. Structural-Composite-Lumber-Core Doors:
 1. Structural Composite Lumber: WDMA I.S.10.
 - E. Fire-Protection-Rated Doors: Provide core specified or mineral core as needed to provide fire-protection rating indicated:
 1. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges
 - F. Mineral-Core Doors
 1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
 2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as needed to eliminate through-bolting hardware.
 3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements of exposed edges.
3. DOORS FOR OPAQUE FINISH. (INTERIOR RESIDENTIAL UNITS).
- A. Interior Solid-Core Doors
 1. Grade: Custom
 2. Faces: Medium-density overlay, any closed-grain hardwood of mill option.
 - a. Apply medium-density overlay to standard-thickness, closed-grain, hardwood face veneers.
 - b. Hardboard faces: AHA A135.4, Class 1 (tempered) or Class 2 (standard).
 - c. MDF Faces: ANSI A208.2, Grade 150 or 160.
 3. Exposed Vertical and Top Edges: Any closed-grain hardwood
 4. Core: Either glued wood stave or structural composite lumber
 5. Construction: Five or seven plies. Stiles and railed are bonded to core, then entire unit abrasive planed before veneering.

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6. WDMA I.S.1-A Performance Grade: Heavy Duty
 - B. Basis of Design: Masonite, 1 3/8" hardboard Flush Doors, prehung, hollow-core.
4. LOUVERS AND LIGHT FRAMES
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited, the following:
 - a. Air Louvers, Inc.
 - b. Anemostate; a Mestek company
 - c. Hiawatha Incorporated
 - d. L & L Louvers, Inc.
 - e. LL Building Products, Inc.; a division of GAF Materials Corporation
 - f. Louvers & Dampers, Inc.; a Mestek company
 - g. McGill Architectural Products
 2. Glad Type: Vision-proof, inverted V.
 3. Metal and finish: Hot-dip galvanized steel, 0.040 inch thick, factory primed for paint finish with baked-enamel or powder-coat finish.
5. FABRICATION
- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
 - B. Openings: Cut and trim openings through doors.
 1. Light Openings: Trim openings with moldings of material and profile indicated.
 2. Louvers: Install louvers in prepared openings.
 - C. Transom and Side Panels: Fabricate matching panels with same construction, exposed surfaces, and finish as specified for associated doors. Finish bottom edges of transoms and top edges of rabbeted doors same as door stiles.
6. FACTORY FINISHING
- A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
 1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on bottom edges, edges of cutouts, and mortises.

3.EXECUTION

1. EXAMINATION
 - A. Verify: Verify site conditions including substrates for accordance to manufacturer's instructions. Verify that the door frame opening is plumb, true, and level before beginning the installation process.

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- B. Proceed with installation only after unsatisfactory conditions have been corrected.

2. INSTALLATION

- A. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.
 - 1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.
- B. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
 - 1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.
- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.
- E. Site-Finished Doors: Paint doors per manufacture written instructions. Seal all 6 sides with two coats minimum.
- F. Hardware: For Installation, see Division 8 Section "Door Hardware."

3. ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416

SECTION 081613 - FIBERGLASS DOORS

1. GENERAL

1.1. SUMMARY

A. Section Includes:

1. In-Swing French Door
2. Out-Swing French Door

B. Related Sections:

1. 08 54 13 - Fiberglass Windows.
2. 07 13 26 - Self Adhering Sheet Waterproofing
3. 07 62 00 - Sheet Metal Flashing and Trim

C. Alternates

1. Reference Section 01 23 00 - Alternates

1.2. SUBMITTALS

A. Reference Section 01 33 00 - Submittal Procedure; submit following items:

1. Product Data: Submit Milgard product data.
2. Shop Drawings: Include window schedule, elevations, sections, details, & multiple-window assembly details. Include head, sill & jamb conditions; operable parts & direction/handing; and special mullion reinforcement details.
3. Samples: Submit selection samples for verification, include the following:
 - 3.1. Exterior Color: Minimum 1x4 color chips on fiberglass substrate: (Specify)
 - 3.2. Glass, showing specified tint color. (Specify)

B. Quality Assurance/Control Submittals:

1. Qualifications: Proof of Manufacturer's qualifications.
2. U-Factor and Structural Rating charts required for NFRC and AAMA labeling requirements.
3. Installation Instructions: AAMA 2400, ("Mounting Flange Installation") or AAMA 2410 ("Flush Fin Installation").

C. Closeout Submittals: Reference Section 01 78 00 – Submit following items:

1. Temporary window labels to identify windows that labels were applied to.

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2. Owner's Manual/Maintenance Instructions.
3. Special Warranties.

1.3. QUALITY ASSURANCE

- A. Overall Standards: Comply with ANSI/AAMA/101/I.S.2, except where noted herein.
- B. Manufacturer Qualifications:
 1. Minimum 10 years experience in producing vinyl windows.
 2. Member AAMA & NFRC.
- C. Certifications for Insulated Glass Units:
 1. Insulated glass units are certified to ASTM E2188/E2190 per the Associated Laboratories Incorporated (ALI) guidelines.
- E. AAMA: Windows shall be Silver Label certified with label attached to frame per AAMA requirements.
- F. NFRC: Windows shall be NFRC certified with temporary U-factor label applied to glass and an NFRC tab added to permanent AAMA frame label.

1.4. DELIVERY, STORAGE and HANDLING

- A. General: Reference Section 01 66 00 – Product Storage and Handling Requirements.
- B. Comply with Manufacturer's/Dealer's ordering instructions and lead time requirements to avoid construction delays.
- C. Delivery: Deliver materials in Manufacturer's standard packaging for protection of product.
- D. Storage & Protection: Store products away from exposure to environmental conditions that may be harmful to materials.
- E. Store materials off ground in an upright position. Provide cover from weather and construction activity.
- F. Follow Manufacturer's instructions on label applied to units.

1.5. WARRANTY

- A. Commercial Warranty:
 1. 10 Year Warranty.
 2. Warranty doors against defects in materials and workmanship including costs for replacement parts and skilled labor.

Part 2 - PRODUCTS

1.6. MANUFACTURER

A. Products supplied by the following manufacturer:

Milgard Manufacturing, Inc.

1010 54th Avenue East

Tacoma, WA 98424

(800)-Milgard (645-4273)

milgard.com

B. Door Series: Milgard Ultra™ Series

C. Substitutions: Reference Section 01 25 13 - Product Substitution Procedures

1.2. MANUFACTURED UNITS

A. Proprietary Products:

1. Ultra™ Series Doors
2. Glazing
3. Accessories
4. Substitutions: No substitutions permitted.

1.3. MATERIALS

A. Fiberglass: AAMA 305 glass fiber reinforced thermoset profile.

B. Weatherstripping:

1. Vinyl compression bulb seal

1.4. SYSTEM DESCRIPTION

A. General Performance Requirements: Products and systems provided must be manufactured, fabricated, and installed to the following performance criteria:

1. Comply with ANSI/AAMA/NWDA 101/I.S.2, except as noted herein
2. Performance Class: (Specify)
3. Performance Grade: (Specify)
4. U-Factor (NFRC 100): (Specify)
5. SHGC – Solar Heat Gain Coefficient (NFRC 200): (Specify)

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6. OITC – Outdoor-Indoor Transmission Class (ASTM E90): (Specify)
7. STC – Sound Transmission Class (ASTM E90): (Specify)

B. Structural Requirements: Products and systems provided must be capable of withstanding wind loads based on testing units representative of those indicated for Project that pass AAMA/NWWDA 101/I.S.2/NAFS, Uniform Structural Load Test:

1. Design Wind Loads: Determine design wind loads, according to ASCE, Section 6, applicable to Product from basic wind speeds (MPH) at 33 feet above grade, based upon mean roof heights indicated on Elevations/Drawings
 - a. Basic Wind Speed: (85)
 - b. Importance Factor: (Specify)
 - c. Exposure Category: (Specify)
 - d. Wind Load Requirement: (Specify)

1.5. DOOR TYPES

A. In-swing French Door – [3642 Series, 1-3/8” nail fin setback] [3642 Series, 1” nail fin setback] [3642, 2-1/4” Z-bar] [3642, 1-3/4” Z-bar] [3662 Series, 1-3/8” nail fin setback] [3662 Series, 1” nail fin setback] [3662, 2-1/4” Z-bar] [3662, 1-3/4” Z-bar]:

1. Frame: 5-7/8” minimum depth. Multi-chambered fiberglass pultrusion.
2. Panel:
 - a. Top Rail: 4-3/16” x 1-3/4”. Multi-chambered fiberglass pultrusion.
 - b. Bottom Rail: 8-5/8” x 1-3/4”. Multi-chambered fiberglass pultrusion.
 - c. Stiles: 4-3/16” x 1-3/4”. Multi-chambered fiberglass pultrusion.
 - d. Reinforcement: Extruded aluminum profiles at corners and lock. Corner reinforcement shall engage rails minimum 4” and stiles minimum 10”.
3. Sill: 5-7/8” x 1-13/16” high. Multi-chambered fiberglass pultrusion.
4. Sightlines: Equal for operating and fixed panel(s).
5. Structural Class: SHD-C45 (2 panel only).
6. Hardware:
 - a. Handle and lock: interior and exterior pull with lever-operated 2-point jamb lock.

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- b. Keyed exterior cylinder lock. Schlage compatible.
 - c. Hinges: Two-way adjustable lift-off hinges.
7. Weatherstripping: Foam filled bulb seal.
- a. Sill Sweep: Rubber dual-fin sweep.
- B. Out-swing French Door – [3645 Series, 1-3/8” nail fin setback] [3645 Series, 1” nail fin setback] [3645, 2-1/4” Z-bar] [3645, 1-3/4” Z-bar] [3665 Series, 1-3/8” nail fin setback] [3665 Series, 1” nail fin setback] [3665, 2-1/4” Z-bar] [3665, 1-3/4” Z-bar]:
- 1. Frame: 5-7/8” minimum depth. Multi-chambered fiberglass pultrusion.
 - 2. Panel:
 - a. Top Rail: 4-3/16” x 1-3/4”. Multi-chambered fiberglass pultrusion.
 - b. Bottom Rail: 8-5/8” x 1-3/4”. Multi-chambered fiberglass pultrusion.
 - c. Stiles: 4-3/16” x 1-3/4”. Multi-chambered fiberglass pultrusion.
 - d. Reinforcement: Extruded aluminum profiles at corners and lock. Corner reinforcement shall engage rails minimum 4” and stiles minimum 10”.
 - 3. Sill: 5-7/8” x 1-13/16” high. Multi-chambered fiberglass pultrusion.
 - 4. Sightlines: Equal for operating and fixed panel(s).
 - 5. Structural Class: SHD-C45 (2 panel only).
 - 6. Hardware:
 - a. Handle and lock: interior and exterior pull with lever-operated 2-point jamb lock.
 - b. Keyed exterior cylinder lock. Schlage compatible.
 - c. Hinges: Two-way adjustable lift-off hinges.
 - 7. Weatherstripping: Foam filled bulb seal.
 - a. Sill Sweep: Rubber dual-fin sweep.
- C. ADA Qualified Swing Door – [3942 In-Swing, 4-9/16” wall] [3962 In-Swing, 6-9/16” wall] [3945 Out-Swing, 4-9/16” wall] [3965 Out-Swing, 6-9/16” wall]
- 1. Fin Type: [1-3/8” nail fin setback] [1” nail fin setback] [2-1/4” Z-bar] [1-3/4” Z-bar]

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2. Frame: 5-15/16" minimum depth. Multi-chambered fiberglass pultrusion.
3. Panel:
 - a. Top Rail: 4-3/16" x 1-3/4". Multi-chambered fiberglass pultrusion.
 - b. Bottom Rail: 8-5/8" x 1-3/4". Multi-chambered fiberglass pultrusion.
 - c. Stiles: 4-3/16" x 1-3/4". Multi-chambered fiberglass pultrusion.
 - d. Reinforcement: Extruded aluminum profiles at corners and lock. Corner reinforcement shall engage rails minimum 4" and stiles minimum 10".
4. Sill: 5-7/8" x 1/2" high. Multi-chambered fiberglass pultrusion.
5. Sightlines: Equal for operating and fixed panel(s).
6. Structural Class: SHD-PG40 (2 panel Outswing only).
7. Hardware:
 - a. Handle and lock: interior and exterior pull with lever-operated 2-point jamb lock.
 - b. Keyed exterior cylinder lock. Schlage compatible.
 - c. Hinges: Two-way adjustable lift-off hinges.
8. Weatherstripping: Foam filled bulb seal.
 - a. Sill Sweep: Rubber dual-fin sweep.

1.6. GLAZING

A. Insulated Glass Units: ASTM E 774, Class A

1. Glazing Type: Dual or Triple Glaze (Specify)
 - a. SunCoat® Low-E/Clear
2. Overall IG Unit Thickness:
 - a. 7/8"
3. Spacer Type:
 - a. Stainless steel spacer
 - b. Foam spacer
4. Gas Filled:

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a. None

5. Glass Thickness:

a. Per Manufacturer's Specifications

1.9. FABRICATION

A. Fabricate frames and panels with milled and mitered joints and mechanically joined corners.

B. Trim and finish corners and welds to match adjacent surfaces.

C. Factory exterior wet silicone glaze with snap-on glazing stops matching exterior panel and frame finish. Insulated glass units shall be reglazable without dismantling panel framing.

1. Note: Field glazing is required for large window units (over 40 sq. ft).

1.10. FINISH

A. Frame and Panel Color: (Specify)

1. Exterior: [Frost] [Harmony] [Bark] [Black Bean].

2. Interior: Standard white interior. Option to match exterior.

B. Hardware: Metal finishes as supplied by Milgard

1. Satin Nickel]

1.11. SOURCE QUALITY CONTROL:

A. Inspect windows in accordance with Manufacturer's Quality Control Program as required by AAMA Silver Label Certification.

PART 3- EXECUTION

1.12. EXAMINATION

A. Examine openings in which windows will be installed.

1. Verify that framing complies with AAMA 2400 (Mounting Flange Installation) & AAMA 2410 (Flush Fin Installation).

2. Verify that fasteners in framed walls are fully driven and will not interfere with window installation.

B. Coordinate with responsible entity to correct unsatisfactory conditions.

C. Commencement of work by installer is acceptance of substrate conditions.

1.2. INSTALLATION

- A. Install doors in framed walls in accordance with AAMA 2400 (“Mounting Flange Installation”) and/or AAMA 2410 (“Flush Fin Installation”).
- B. Do not remove temporary labels.
- C. Install insect screens on operable windows.
 - 1. Hold Screens: [Please coordinate with local supplier.]

1.3. CLEANING AND FINISHING

- A. Reference Section 01 74 00 – Cleaning and Waste Management.
- B. Remove temporary labels and retain for Closeout Submittals.
- C. Clean soiled painted surfaces and glass using a mild detergent and warm water solution with soft, clean cloths.

END OF SECTION 081613

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SECTION 082110 - DOORS

1.GENERAL

1. SUMMARY

- A. Section Includes:
1. Molded panel / wood interior doors.
 2. Fiberglass entry doors.

2. SUBMITTALS

- A. Product Data: For each type of door indicated in a table/schedule format. Provide reference for each door's hardware group. Provide rough opening requirements. Jamb depth shall be indicated to finish on both sides at face of gypsum board or other material where casing trim is to be installed.
- B. Shop Drawings or Manufacturer's Standard Details: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
1. Indicate dimensions and locations of mortises and holes for hardware.
 2. Indicate dimensions and locations of cutouts.
 3. Indicate finish requirements.
- C. See Section 01350 Green Building REQUIREMENTS and Green Building Forms for related product submittal requirements, the following forms may be applicable:
1. Green Building Form 3 requires recycled content documentation.
 2. Green Building Form 6 requires chain of custody certificates and for FSC certified wood.
 3. Green Building Form 9 requires documentation indicating that each adhesive contains no urea formaldehyde.
 4. Green Building Form 11 requires documentation indicating that the bonding agents in wood-products contain no urea formaldehyde.
 5. Other Green Building Form submittals and requirements may apply.

2.PRODUCTS

1. DOOR CONSTRUCTION, GENERAL

- A. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.
- B. Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.

2. MOLDED PANEL / WOOD INTERIOR DOORS

- A. Basis of Design: Masonite, 1 3/8" interior molded panel, prehung in wood frame.
1. Style / panel design: As indicated on Drawings.
 2. Core: As indicated on Drawings.

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3. FIBERGLASS ENTRY DOORS

- A. Basis of Design: Masonite, 1 3/4" exterior composite fiberglass, prehung in wood frame.
 - 1. Style / panel design: As indicated on Drawings.
 - 2. Glazing: Insulating dual pane safety glazing.
 - 3. Core: CFC Free insulating polyurethane foam.

3.EXECUTION

1. EXAMINATION

- A. Verify: Verify site conditions including substrates for accordance to manufacturer's instructions. Verify that the door frame opening is accurately dimensioned, plumb, true, and level before beginning the installation process.

2. INSTALLATION

- A. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.
- B. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
 - 1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.
- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.
- E. Site-Finished Doors: Paint doors per manufacture written instructions. Seal all 6 sides as specified in Sections 09911 and 09912.

END OF SECTION 082110

SECTION 081613 - FIBERGLASS DOORS

PART 1 – GENERAL

Specifier note: information & data contained in this Guide is accurate as of July 2015. Due to ongoing product updates, data may change over time. Please contact your local Milgard Representative for complete product details. Please visit milgard.com for the latest updates.

1. SUMMARY

A. Section Includes:

1. Single Hung windows
2. Casement windows
3. Awning windows
4. Glazing
5. Accessories

B. Related Sections:

1. 08 16 13 - Fiberglass Doors.
2. 07 13 26 - Self Adhering Sheet Waterproofing
3. 07 62 00 - Sheet Metal Flashing and Trim

C. Alternates

1. Reference Section 01 23 00 - Alternates

2. SUBMITTALS

A. Reference Section 01 33 00 - Submittal Procedure; submit following items:

1. Product Data: Submit Milgard product data.
2. Shop Drawings: Include window schedule, elevations, sections, details, & multiple-window assembly details. Include head, sill & jamb conditions; operable parts & direction/handing; and special mullion reinforcement details.
3. Samples: Submit selection samples for verification, include the following:
 - 3.1. Exterior Color: Minimum 1x4 color chips on fiberglass substrate: (Specify)
 - 3.2. Glass, showing specified tint color. (Specify)

B. Quality Assurance/Control Submittals:

1. Qualifications: Proof of Manufacturer's qualifications.

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2. U-Factor and Structural Rating charts required for NFRC and AAMA labeling requirements.
3. Installation Instructions: AAMA 2400, (“Mounting Flange Installation”) or AAMA 2410 (“Flush Fin Installation”).

C. Closeout Submittals: Reference Section 01 78 00 – Submit following items:

1. Temporary window labels to identify windows that labels were applied to.
2. Owner’s Manual/Maintenance Instructions.
3. Special Warranties.

3. QUALITY ASSURANCE

A. Overall Standards: Comply with ANSI/AAMA/101/L.S.2, except where noted herein.

B. Manufacturer Qualifications:

1. Minimum 10 years experience in producing vinyl windows.
2. Member AAMA & NFRC.

C. Certifications for Insulated Glass Units:

1. Insulated glass units are certified to ASTM E2188/E2190 per the Associated Laboratories Incorporated (ALI) guidelines.

E. AAMA: Windows shall be Silver Label certified with label attached to frame per AAMA requirements.

F. NFRC: Windows shall be NFRC certified with temporary U-factor label applied to glass and an NFRC tab added to permanent AAMA frame label.

4. DELIVERY, STORAGE and HANDLING

A. General: Reference Section 01 66 00 – Product Storage and Handling Requirements.

B. Comply with Manufacturer’s/Dealer’s ordering instructions and lead time requirements to avoid construction delays.

C. Delivery: Deliver materials in Manufacturer’s standard packaging for protection of product.

D. Storage & Protection: Store products away from exposure to environmental conditions that may be harmful to materials.

E. Store materials off ground in an upright position. Provide cover from weather and construction activity.

F. Follow Manufacturer’s instructions on label applied to units.

5. WARRANTY

A. Commercial Warranty:

1. 10 Year Warranty.
2. Warranty windows against defects in materials and workmanship including costs for replacement parts and labor.

Part 2 - PRODUCTS

6. MANUFACTURER

A. Products supplied by the following manufacturer:

Milgard Manufacturing, Inc.

1010 54th Avenue East

Tacoma, WA 98424

(800)-Milgard (645-4273)

milgard.com

B. Window Series: Milgard Ultra™ Series

C. Substitutions: Reference Section 01 25 13 - Product Substitution Procedures

2. MANUFACTURED UNITS

A. Proprietary Products:

1. Ultra™ Series Windows
2. Glazing
3. Accessories
4. Substitutions: No substitutions permitted.

3. MATERIALS

A. Fiberglass: AAMA 305 glass fiber reinforced thermoset profile.

B. Weatherstripping:

1. Vinyl compression bulb seal

4. SYSTEM DESCRIPTION

A. General Performance Requirements: Products and systems provided must be manufactured, fabricated, and installed to the following performance criteria:

1. Comply with ANSI/AAMA/NWWDA 101/I.S.2, except as noted herein

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2. Performance Class: (Specify)
3. Performance Grade: (Specify)
4. U-Factor (NFRC 100): (Specify)
5. SHGC – Solar Heat Gain Coefficient (NFRC 200): (Specify)
6. OITC – Outdoor-Indoor Transmission Class (ASTM E90): (Specify)
7. STC – Sound Transmission Class (ASTM E90): (Specify)

B. Structural Requirements: Products and systems provided must be capable of withstanding wind loads based on testing units representative of those indicated for Project that pass AAMA/NWWDA 101/I.S.2/NAFS, Uniform Structural Load Test:

1. Design Wind Loads: Determine design wind loads, according to ASCE, Section 6, applicable to Product from basic wind speeds (MPH) at 33 feet above grade, based upon mean roof heights indicated on Elevations/Drawings
 - a. Basic Wind Speed: 115.mph
 - b. Importance Factor: (Specify)
 - c. Exposure Category: (Specify)
 - d. Wind Load Requirement: (Specify)

5. WINDOW TYPES

A. Single Hung – 3210 Series [1-3/8” nail fin setback] [1” nail fin setback] [Z-bar retrofit fin]

1. Frame: 4-1/4” minimum depth. Multi-chambered fiberglass pultrusion.
2. Sash: 1-9/16” minimum depth. Multi-chambered fiberglass pultrusion.
3. Sightlines: Equal for operating and fixed sash.
4. Structural Class: H-C30
5. Hardware:
 - a. [Cam lock locking mechanism] [Positive action locking mechanism].
 - b. Sash lift handle option.
 - c. Concealed block and tackle balancer.
6. Weatherstripping: Foam filled seal and fin seal polypropylene pile.

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B. Casement – 3510 Series [1-3/8” nail fin setback] [1” nail fin setback] [Z-bar retrofit fin]

1. Frame: 3-1/4” minimum depth. Multi-chambered fiberglass pultrusion.
2. Sash: 2-3/8” minimum depth. Multi-chambered fiberglass pultrusion.
3. Structural Class: C-C45.
4. Hardware:
 - a. Dual-arm steel rotary operator with fold-down handle.
 - b. Single lever, multi-point locking system.
 - c. Four bar stainless steel hinge.
5. Weatherstripping: Vinyl compression bulb seal.

C. Awning – 3410 Series [1-3/8” nail fin setback] [1” nail fin setback] [Z-bar retrofit fin]

1. Frame: 3-1/4” minimum depth. Multi-chambered fiberglass pultrusion.
2. Sash: 2-3/8” minimum depth. Multi-chambered fiberglass pultrusion.
3. Structural Class: AP-C35.
4. Hardware:
 - a. Single-arm steel rotary scissor operator with fold-down handle.
 - b. Dual lever locking system.
 - c. Two bar stainless steel hinge.
5. Weatherstripping: Vinyl compression bulb seal.

6. GLAZING

A. Insulated Glass Units: ASTM E 774, Class A

1. Glazing Type: Dual Glaze
 - a. SunCoat® Low-E/Clear
2. Overall IG Unit Thickness:
 - a. 7/8”
3. Spacer Type:
 - a. Foam spacer

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4. Gas Filled:
 - a. None
5. Glass Thickness:
 - a. Per Manufacturer's Specifications

7. GRIDS/GRILLES/MUNTINS:

A. Simulated Divided Lite (SDL): (Specify)

1. Craftsman: 1-1/8" wide profiled painted wood grid applied to interior glass, 1-1/16" wide sculptured aluminum bar internal grid.

8. INSECT SCREENS: Provide tight fitting screen (with hardware) for operating windows

A. Screen Frame:

1. Extruded aluminum (Double Hung Retrofit, Casement, Awning)

B. Screen Mesh:

1. Fiberglass screen mesh (standard)

9. FABRICATION

- A. Fabricate frames and sash with milled and mitered joints and mechanically joined corners.
- B. Trim and finish corners and welds to match adjacent surfaces.
- C. Factory exterior wet silicone glaze with snap-on glazing stops matching exterior sash and frame finish. Insulated glass units shall be reglazable without dismantling sash framing.
 1. Note: Field glazing is required for large window units (over 40 sq. ft).

10. FINISH

A. Frame and Sash Color: (Specify)

1. Exterior: [Frost] [Harmony] [Bark] [Black Bean].
2. Interior: Standard white interior. Option to match exterior.

B. Simulated Divided Lite (SDL) Muntins:

1. Interior Wood Grids: Painted to match frame and sash interior finish.
2. Internal Shadow Bars: Mill finished aluminum
3. Exterior Fiberglass Grid: Match exterior color of window

C. Hardware: Metal finishes as supplied by Milgard

1. Brushed Chrome

D. Screen Frame Color:

1. Interior Mounted Screens: [Frost] [Harmony] [Bark] [Black Bean].

11. SOURCE QUALITY CONTROL:

- A. Inspect windows in accordance with Manufacturer's Quality Control Program as required by AAMA Silver Label Certification.

PART 3- EXECUTION

12. EXAMINATION

- A. Examine openings in which windows will be installed.
 1. Verify that framing complies with AAMA 2400 (Mounting Flange Installation) & AAMA 2410 (Flush Fin Installation).
 2. Verify that fasteners in framed walls are fully driven and will not interfere with window installation.
- B. Coordinate with responsible entity to correct unsatisfactory conditions.
- C. Commencement of work by installer is acceptance of substrate conditions.

2. INSTALLATION

- A. Install windows in framed walls in accordance with AAMA 2400 ("Mounting Flange Installation") and/or AAMA 2410 ("Flush Fin Installation").
- B. Do not remove temporary labels.
- C. Install insect screens on operable windows.
 1. Hold Screens: [Please coordinate with local supplier.]

3. CLEANING AND FINISHING

- A. Reference Section 01 74 00 – Cleaning and Waste Management.
- B. Remove temporary labels and retain for Closeout Submittals.
- C. Clean soiled painted surfaces and glass using a mild detergent and warm water solution with soft, clean cloths.

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END OF SECTION 085413

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FIBERGLASS DOORS 08161

SECTION 087100 - DOOR HARDWARE

1. GENERAL

1. SUMMARY

A. This Section includes the following:

1. Commercial door hardware.
2. Residential door hardware.

2. SUBMITTALS

A. Product Data and Warranty: For each type of product indicated.

B. Samples: For each exposed finish.

C. Door Hardware Schedule: Prepared by or under the supervision of installer, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final door hardware set with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.

2. Content: Include the following information:

- a. Identification number, location, hand, fire rating, and material of each door and frame.
- b. Type, style, function, size, quantity, and finish of each door hardware item. Include description and function of each lockset and exit device.
- c. Complete designations of every item required for each door or opening including name and manufacturer,
- d. Fastenings and other pertinent information.
- e. Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door schedule.
- f. Explanation of abbreviations, symbols, and codes contained in schedule.
- g. Mounting locations for door hardware
- h. Door and frame sizes and materials.
- i. List of related door devices specified in other Sections for each door and frame.

3. Submittal Sequence: Submit the final door hardware sets at earliest possible date, particularly where approval of the door hardware sets must precede fabrication of other work that is critical in Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the door hardware sets.

D. Keying Schedule: Prepared by or under the supervision of the installer, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

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- E. See Section 018113 SUSTAINABLE DESIGN REQUIREMENTS and Green Building Forms for related product submittal requirements.
 - 1. Green Building Form 3 requires recycled content documentation.
 - 2. Other Green Building Forms may apply.

3. QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by lock manufacturer.
 - 1. Installer's responsibilities include supplying and installing door hardware and providing a qualified Architectural Hardware Consultant available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
 - 2. Installer shall have warehousing facilities in Project's vicinity
 - 3. Scheduling Responsibility: Preparation of door hardware and keying schedules.
- B. Keying Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system.
- C. Source Limitations: Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.
- D. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorizes having jurisdiction, for fire ratings indicated, based on testing according to UBC Standard 7-2.
- E. Comply with ADA, UFAS (residential and public areas), and California Title 24 Chapters 11A (residential units) & 11B (public areas), as applicable for all accessibility requirements. Where different requirements are presented, comply with the most restrictive requirement. Notify architect immediately of any potential conflict.
 - 1. UFAS requirements included for convenience (cross reference with applicable sections of the CBC):
 - a. UFAS 4.13.10 DOOR HARDWARE: Handles, pulls, latches, locks, and other operating devices on accessible doors shall have a shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist to operate. Lever-operated mechanisms, push-type mechanisms, and U-shaped handles are acceptable designs. When sliding doors are fully open, operating hardware shall be exposed and usable from both sides. In dwelling units, only doors at accessible entrances to the unit itself shall comply with the requirements of this paragraph. Doors to hazardous areas shall have hardware complying with 4.29.3. Mount no hardware required for accessible door passage higher than 48 in (1220 mm) above finished floor.
 - b. UFAS 4.13.10* DOOR CLOSERS: If a door has a closer, then the sweep period of the closer shall be adjusted so that from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 in (75 mm) from the latch, measured to the leading edge of the door.
 - c. UFAS 4.13.11* DOOR OPENING FORCE. The maximum force for pushing or pulling open a door shall be as follows:
 - 1) Fire doors shall have the minimum opening force allowable by the appropriate administrative authority.
 - 2) Other doors:
 - a) exterior hinged doors: [5 lbf, per CBC.
 - b) interior hinged doors: 5 lbf

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c) sliding or folding doors: 5 lbf

Note: These forces do not apply to the force required to retract latch bolts or disengage other devices that may hold the door in a closed position.

4. DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivery to Project site.
- B. Tag each item or package separately with identification related to the final door hardware sets, and include basic installation instructions, templates, and necessary fasteners with each item or package.

5. COORDINATION

- A. Templates: Distribute door hardware templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

2.PRODUCTS

1. HINGES, GENERAL

- A. Template Requirements: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.
- B. Hinge Base Metal: Unless otherwise indicated, provide the following:
 - 1. Exterior Hinges: Stainless steel, with stainless-steel pin.
 - 2. Interior Hinges: Stainless steel, with stainless-steel pin.
- C. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for outswinging exterior doors.
- D. Fasteners: Stainless Steel; comply with the following:
 - 1. Machine Screws: For metal doors and frames. Install into drilled and tapped holes.
 - 2. Wood Screws: For wood doors and frames.
 - 3. Threaded-to-the-Head Wood Screws: For fire-rated wood doors.
 - 4. Screws: Phillips flat-head; wood screws for wood doors and frames. Finish screw heads to match surface of hinges.
- E. Butts and Hinges: BHMA A156.1.

2. LOCKS AND LATCHES, GENERAL

- A. Accessibility Requirements: Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.

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- B. Latches and Locks for Means of Egress Doors: Comply with NFPA 101. Latches shall not require more than 15 lbf to release the latch. Locks shall not require use of a key, tool, or special knowledge for operation.
- C. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors.
- D. Backset: 2-3/4 inches, unless otherwise indicated.
- E. Lock Functions: Lock sets must meet the following ANSI A156.2 grades:
Series 4000, Grade 1 at building entrance doors series 4000, Grade 2 at living unit entrance doors and common area doors, series 4000 Grade 3 at doors within the units, in conformance with MPS 508-6.1 and comply with the following:
 - 1. Bored Locks: BHMA A156.2.
 - 2. Mortise Locks: BHMA A156.13.
- F. Levers: At passage-type doorways, levers shall comply with California accessibility requirements.
- G. Door Locks: Keyed in like-group-types as noted in schedule. Grand master keyed. Include construction keying.
- H. Supply 2 change keys for each lock and master keys, each tagged.

3. LOCK CYLINDERS

- A. Function Type: As indicated on Drawings on Door Schedule.
- B. Manufacturer: Same manufacturer as for locks and latches.

4. EXIT DEVICES/ PANIC HARDWARE

- A. General features:
 - 1. Independent lab-tested 1,000,000 cycles.
 - 2. Push-through push-pad design. No exposed push-pad fasteners, no exposed cavities when operated. Return stroke fluid dampeners and rubber bottoming dampeners, plus anti-rattle devices.
 - 3. 0.75-inch throw deadlocking latchbolts.
 - 4. End caps: impact-resistant, flush-mounted. No raised edges or lips to catch carts or other equipment.
 - 5. No exposed screws to show through glass doors.
 - 6. Non-handed basic device design with center case interchangeable with all functions, no extra parts required to effect change of function.
 - 7. Releasable in normal operation with 15-lb. maximum operating force per California State Fire Marshal Standard 12-10-3, and with 32 lb. maximum pressure under 250-lb. load to the door.
 - 8. Exterior doors scheduled with XP-series devices: Static load force resistance of at least 2000 pounds.
 - 9. Where devices span over door lite frame and the face of the selected lite manufacturer's frame is raised from the face of the door, furnish panic hardware manufacturer's fitted shims or glass-bead kits at no additional cost to the project.

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10. Comply with CBC Section 1003.3.1.9.

- B. Specific features:
- C. Non-Fire Rated Devices: cylinder dogging.
- D. Lever Trim: breakaway type, stainless steel, compression spring drive, match lockset lever.
- E. Rod and latch guards with sloped full-width kickplates for doors fitted with surface vertical rod devices with bottom latches.
- F. Fire-Labeled Devices: UL label indicating "Fire Exit Hardware". Vertical rod devices less bottom rod (LBR) unless otherwise scheduled.

5. DOOR PULLS

- A. Door Pulls at bypassing sliding closet doors:
 - 1. Basis of Design: Linnea, Flush Pull, Product #: RPR-150
 - a. Availability: Linnea LLC, Hillsboro, OR. Sales: 503-693-9401
 - b. Website: <http://www.linnea-home.com/FlushPullsThumbs.html>
 - c. Finish: Satin Stainless Steel
 - d. Mounting: Glue one unit in exterior side of each door leaf.

6. CLOSERS

- A. Accessibility Requirements: Comply with the following maximum opening-force requirements:
 - 1. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
 - 2. Sliding or Folding Doors: 5 lbf applied parallel to door at latch.
- B. Door Closers for Means of Egress Doors: Comply with NFPA 101. Door closers shall not require more than 30 lbf to set door in motion and not more than 15 lbf to open door to minimum required width.
- C. Hold-Open Closers/Detectors: Coordinate and interface integral smoke detector and closer device with fire alarm system.
- D. Flush Floor Plates: Provide finish cover plates for floor closers unless thresholds are indicated. Match door hardware finish, unless otherwise indicated.
- E. Recessed Floor Plates: Provide recessed floor plates with insert of floor finish material for floor closers unless thresholds are indicated. Provide extended closer spindle to accommodate thickness of floor finish.
- F. Size of Units: Unless otherwise indicated, comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
- G. Type: Surface Closers, BHMA A156.4, Grade 1. Provide type of arm required for closer to be located on interior side of door.

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7. STOPS AND HOLDERS

A. Stops and Bumpers:

1. Provide wall stops for swinging doors without closers unless other type of stops are indicated or required.

B. Silencers for Door Frames: BHMA A156.16, Grade 1; neoprene or rubber; provided by door manufacturer or fabricated for drilled-in application to frame.

8. DOOR GASKETING

A. Standard: BHMA A156.22.

B. General: Provide continuous weather-strip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated or scheduled. Provide noncorrosive fasteners for all applications.

1. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
2. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
3. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

C. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

D. Gasketing Materials: ASTM D 2000 and AAMA 701/702.

9. THRESHOLDS

A. Standard: BHMA A156.21.

B. Accessibility Requirements: Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high overall and not more than 1/4 inch vertical rise.

10. KICK PLATES

A. Four beveled edges, .050 inches minimum thickness, height and width as scheduled. Sheet-metal screws of bronze or stainless steel to match other hardware. Provide kick-plates on the push-side of all public doors.

11. FABRICATION

A. Base Metals: Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality approved equal to or greater than that of specified door hardware units and BHMA A156.18. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.

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- B. Fasteners: Provide screws according to commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.
 - 1. Comply with NFPA 80 for fasteners of door hardware in fire-rated applications.
- C. Finishes: BHMA A156.18, as indicated in door hardware sets.

3.EXECUTION

1. EXAMINATION

- A. Examine doors and frames, with installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

2. INSTALLATION

- A. Wood Doors: Comply with DHI A115-W Series.
- B. Steel Doors and Frames: Comply with DHI A115 Series
- C. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.
- D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
- E. Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Door Closers: Unless otherwise required by authorities having jurisdiction, adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.
- F. Occupancy Adjustment: Approximately six months after date of Substantial Completion, installer shall examine and readjust, including adjusting operating forces, each item of door hardware necessary to ensure function of doors, door hardware, and electrified door hardware.

3. CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.

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- C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

4. DEMONSTRATION

- A. Engage a factory-authorized service representation to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes.

END OF SECTION 087100

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SECTION 088000 - GLAZING

1. GENERAL

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.

2. SUMMARY

- A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

- 1. Windows.
- 2. Doors.

3. DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- C. Interspace: Space between lites of an insulating-glass unit.

4. PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Delegated Design: Design glass, including comprehensive engineering analysis according to ASTM E 1300 by a qualified professional engineer, using the following design criteria:
 - 1. Design Wind Pressures: As indicated on Drawings.
 - 2. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.
 - a. Wind Design Data: As indicated on Drawings.
 - b. Basic Wind Speed: 85 mph (38 m/s) V(ASD).
 - c. Exposure Category: B.
 - 3. Design Snow Loads: As indicated on Drawings.
 - 4. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressure based on glass type factors for short-duration load.

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5. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch (25 mm), whichever is less.
 6. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
5. SUBMITTALS
- A. Product Data: For each glass product and glazing material indicated.
 - B. CALGREEN Submittals:
 1. Product Data for 4.504.2.1: For glazing sealants used inside of the weatherproofing system, including printed statement of VOC content.
 - C. Warranties: Sample of special warranties.
6. QUALITY ASSURANCE
- A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved by coated-glass manufacturer.
 - B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
 - C. Source Limitations for Glass: Obtain laminated glass and insulating glass from single source from single manufacturer for each glass type.
 - D. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.
 - E. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 1. GANA Publications: GANA's "Glazing Manual."
 2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
 - F. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
 - G. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other

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openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F (250 deg C), and the fire-resistance rating in minutes.

- H. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

7. DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

8. PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 - 1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F (4.4 deg C).

9. WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
 - 1. Warranty Period: 10 years from date of Substantial Completion.
- B. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form in which laminated-glass manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
 - 1. Warranty Period: Five years from date of Substantial Completion.
- C. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

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1. Warranty Period: 10 years from date of Substantial Completion.

2.PRODUCTS

1. GLASS PRODUCTS, GENERAL

- A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

2. FLAT GLASS PRODUCTS

- 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. Milgard
- B. Flat Glass (Type FG-A): Clear, 3/16" minimum thick.
- C. Safety Glass (Type FG-B): Clear; fully tempered conforming to ANSI Z97.1; 1/4" minimum thick.
- D. Mirror Glass (Type FG-H): Clear float type with copper and silver coating, organic overcoating, square and lapped edges, 1/4" minimum thick.

3. INSULATING GLASS

- 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. Milgard
- B. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.

4. GLAZING GASKETS

- A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:
 1. Neoprene complying with ASTM C 864.
 2. EPDM complying with ASTM C 864.
 3. Silicone complying with ASTM C 1115.
 4. Thermoplastic polyolefin rubber complying with ASTM C 1115.
- B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.

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1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.
 - C. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock-strips, complying with ASTM C 542, black.
5. GLAZING SEALANTS
- A. General:
 1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 3. VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D.
 4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
 - B. Glazing Sealant (Type GC-F): Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dow Corning Corporation; 799.
 - b. Polymeric Systems, Inc.; PSI-631.
 - c. Schnee-Morehead, Inc., an ITW company; SM5731 Poly-Glaze Plus.
 - C. Glazing Sealants for Fire-Rated Glazing Products: Products that are approved by testing agencies that listed and labeled fire-resistant glazing products with which they are used for applications and fire-protection ratings indicated.
6. MISCELLANEOUS GLAZING MATERIALS
- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
 - B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
 - C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
 - D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

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- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.
- G. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

7. FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

3.EXECUTION

1. EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Presence and functioning of weep systems.
 - 3. Minimum required face and edge clearances.
 - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

2. PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3. GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

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- B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.
 - C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
 - D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
 - E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
 - F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
 - G. Provide spacers for glass lites where length plus width is larger than **50 inches (1270 mm)**.
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
 - H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
 - I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
 - J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
 - K. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
 - L. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.
4. TAPE GLAZING
- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
 - B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

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- C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
 - D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
 - E. Do not remove release paper from tape until right before each glazing unit is installed.
 - F. Apply heel bead of elastomeric sealant.
 - G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
 - H. Apply cap bead of elastomeric sealant over exposed edge of tape.
5. GASKET GLAZING (DRY)
- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
 - B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
 - C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
 - D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
 - E. Install gaskets so they protrude past face of glazing stops.
6. SEALANT GLAZING (WET)
- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
 - B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
 - C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

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7. LOCK-STRIP GASKET GLAZING

- A. Comply with ASTM C 716 and gasket manufacturer's written instructions. Provide supplementary wet seal and weep system unless otherwise indicated.

8. CLEANING AND PROTECTION

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.
- E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 088000

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SECTION 088300 - MIRRORS

1. GENERAL

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.

2. SUMMARY

- A. Section includes the following types of silvered flat glass mirrors:
 - 1. Annealed monolithic glass mirrors.
 - 2. Film-backed glass mirrors qualifying as safety glazing.
- B. Related Sections:
 - 1. Division 08 Section "Glazing" for glass with reflective coatings used for vision and spandrel lites.
 - 2. Division 10 Section "Toilet, Bath, and Laundry Accessories" for metal-framed mirrors.

3. SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. Mirrors. Include description of materials and process used to produce each type of silvered flat glass mirror specified that indicates sources of glass, glass coating components, edge sealer, and quality-control provisions.
- B. Shop Drawings: Include mirror elevations, edge details, mirror hardware, and attachments to other work.
- C. Samples: For each type of the following products:
 - 1. Mirrors: 12 inches square, including edge treatment on two adjoining edges.
 - 2. Mirror Clips: Full size.
 - 3. Mirror Trim: 12 inches long.
- D. Qualification Data: For qualified Installer.
- E. Product Certificates: For each type of mirror and mirror mastic, from manufacturer.
- F. Preconstruction Test Reports: From mirror manufacturer indicating that mirror mastic was tested for compatibility and adhesion with mirror backing film and substrates on which mirrors are installed.
- G. Maintenance Data: For mirrors to include in maintenance manuals.
- H. Warranty: Sample of special warranty.

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4. QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- B. Source Limitations for Mirrors: Obtain mirrors from single source from single manufacturer.
- C. Source Limitations for Mirror Accessories: Obtain mirror glazing accessories from single source.
- D. Glazing Publications: Comply with the following published recommendations:
 - 1. GANA's "Glazing Manual" unless more stringent requirements are indicated. Refer to this publication for definitions of glass and glazing terms not otherwise defined in this Section or in referenced standards.
 - 2. GANA Mirror Division's "Mirrors, Handle with Extreme Care: Tips for the Professional on the Care and Handling of Mirrors."
- E. Safety Glazing Products: For film-backed mirrors, provide products complying with testing requirements in 16 CFR 1201 for Category II materials.
- F. Preconstruction Mirror Mastic Compatibility Test: Submit mirror mastic products to mirror manufacturer for testing to determine compatibility of mastic with mirror backing [**paint**] [**film**] and substrates on which mirrors are installed.

5. DELIVERY, STORAGE, AND HANDLING

- A. Protect mirrors according to mirror manufacturer's written instructions and as needed to prevent damage to mirrors from moisture, condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with mirror manufacturer's written instructions for shipping, storing, and handling mirrors as needed to prevent deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors.

6. PROJECT CONDITIONS

- A. Environmental Limitations: Do not install mirrors until ambient temperature and humidity conditions are maintained at levels indicated for final occupancy.

7. WARRANTY

- A. Special Warranty: Manufacturer's standard form in which mirror manufacturer agrees to replace mirrors that deteriorate within specified warranty period. Deterioration of mirrors is defined as defects developed from normal use that are not attributed to mirror breakage or to maintaining and cleaning mirrors contrary to manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.
 - 1. Warranty Period: Five years from date of Substantial Completion.

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2.PRODUCTS

1. SILVERED FLAT GLASS MIRRORS

A. Glass Mirrors, General: ASTM C 1503; low-lead mirror coating process.

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. Arch Aluminum & Glass Co., Inc.
- b. Avalon Glass and Mirror Company.
- c. Binswanger Mirror; a division of Vitro America, Inc.
- d. D & W Incorporated
- e. Donisi Mirror Company.
- f. Gardner Glass, Inc.
- g. Gilded Mirrors, Inc.
- h. Guardian Industries.
- i. Head West.
- j. Independent Mirror Industries, Inc.
- k. Lenoir Mirror Company.
- l. Maran-Wurzell Glass & Mirror.
- m. National Glass Industries.
- n. Stroupe Mirror Co., Inc.
- o. Sunshine Mirror; Westshore Glass Corp.
- p. Virginia Mirror Company, Inc.
- q. Walker Glass Co., Ltd.

B. Clear Glass: Mirror Glazing Quality; ultraclear (low-iron) float glass with a minimum 91 percent visible light transmission.

1. Nominal Thickness: 6.0 mm.

C. Tempered Clear Glass: Mirror Glazing Quality, for blemish requirements; and comply with ASTM C 1048 for Kind FT, Condition A, tempered float glass before silver coating is applied.

1. Nominal Thickness: 6.0 mm.

2. MISCELLANEOUS MATERIALS

A. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

B. Edge Sealer: Coating compatible with glass coating and approved by mirror manufacturer for use in protecting against silver deterioration at mirrored glass edges.

C. Mirror Mastic: An adhesive setting compound, asbestos-free, produced specifically for setting mirrors and certified by both mirror manufacturer and mastic manufacturer as compatible with glass coating and substrates on which mirrors will be installed.

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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. Franklin International; Titebond Division.
 - b. Laurence, C. R. Co., Inc.
 - c. Macco Adhesives; Liquid Nails Division.
 - d. OSI Sealants, Inc.
 - e. Palmer Products Corporation.
 - f. Pecora Corporation.
 - g. Royal Adhesives & Sealants; Gunther Mirror Mastics Division.
 - h. Sommer & Maca Industries, Inc.

- D. Film Backing for Safety Mirrors: Film backing and pressure-sensitive adhesive; both compatible with mirror backing paint as certified by mirror manufacturer.

3. MIRROR HARDWARE

- A. Top and Bottom Aluminum J-Channels: Aluminum extrusions with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover bottom and top edges of each mirror in a single piece.

1. Bottom Trim: J-channels formed with front leg and back leg not less than 3/8 and 7/8 inch (9.5 and 22 mm) in height, respectively, and a thickness of not less than 0.05 inch (1.3 mm).

- a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- 1) Laurence, C. R. Co., Inc.; CRL Standard "J" Channel.
- 2) Sommer & Maca Industries, Inc.; Aluminum Shallow Nose "J" Moulding Lower Bar.
- 3) Sommer & Maca Industries, Inc.; Heavy Gauge Aluminum Shallow Nose "J" Moulding Lower Bar.

2. Top Trim: J-channels formed with front leg and back leg not less than 5/8 and 1 inch (16 and 25 mm) in height, respectively, and a thickness of not less than [0.04 inch (1.0 mm)] [0.062 inch (1.57 mm)].

- a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- 1) Laurence, C. R. Co., Inc.; CRL Deep "J" Channel.
- 2) Sommer & Maca Industries, Inc.; Aluminum Deep Nose "J" Moulding Upper Bar.
- 3) Sommer & Maca Industries, Inc.; Heavy Gauge Aluminum Deep Nose "J" Moulding Lower Bar.

3. Finish: Clear bright anodized.

- B. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.

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- C. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

4. FABRICATION

- A. Mirror Sizes: To suit Project conditions, cut mirrors to final sizes and shapes.
- B. Cutouts: Fabricate cutouts for notches and holes in mirrors without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrors.
- C. Mirror Edge Treatment: Flat high-polished.
 - 1. Seal edges of mirrors with edge sealer after edge treatment to prevent chemical or atmospheric penetration of glass coating.
 - 2. Require mirror manufacturer to perform edge treatment and sealing in factory immediately after cutting to final sizes.
- D. Film-Backed Safety Mirrors: Apply film backing with adhesive coating over mirror backing paint as recommended in writing by film-backing manufacturer to produce a surface free of bubbles, blisters, and other imperfections.

3.EXECUTION

1. EXAMINATION

- A. Examine substrates, over which mirrors are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance of the Work.
- B. Verify compatibility with and suitability of substrates, including compatibility of mirror mastic with existing finishes or primers.
- C. Proceed with installation only after unsatisfactory conditions have been corrected and surfaces are dry.

2. PREPARATION

- A. Comply with mastic manufacturer's written installation instructions for preparation of substrates, including coating substrates with mastic manufacturer's special bond coating where applicable.

3. INSTALLATION

- A. General: Install mirrors to comply with mirror manufacturer's written instructions and with referenced GANA publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.

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- B. Provide a minimum air space of 1/8 inch (3 mm) between back of mirrors and mounting surface for air circulation between back of mirrors and face of mounting surface.
- C. Wall-Mounted Mirrors: Install mirrors with mastic and mirror hardware. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.
 - 1. Top and Bottom Aluminum J-Channels: Provide setting blocks 1/8 inch thick by 4 inches long at quarter points. To prevent trapping water, provide, between setting blocks, two slotted weeps not less than 1/4 inch wide by 3/8 inch long at bottom channel.
 - 2. Install mastic as follows:
 - a. Apply barrier coat to mirror backing where approved in writing by manufacturers of mirrors and backing material.
 - b. Apply mastic to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrors and face of mounting surface.
 - c. After mastic is applied, align mirrors and press into place while maintaining a minimum air space of 1/8 inch between back of mirrors and mounting surface.

4. CLEANING AND PROTECTION

- A. Protect mirrors from breakage and contaminating substances resulting from construction operations.
- B. Do not permit edges of mirrors to be exposed to standing water.
- C. Maintain environmental conditions that will prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.
- D. Wash exposed surface of mirrors not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash mirrors as recommended in writing by mirror manufacturer.

END OF SECTION 088300

SECTION 092400 - PORTLAND CEMENT PLASTERING

1.GENERAL

1. SUMMARY

- A. This Section includes the following:
1. Exterior plasterwork (Stucco).

2. SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each type of factory-prepared finish coat indicated; 12 by 12 inches, and prepared on rigid backing.
- C. CalGreen Submittals: See Section 018113_SUSTAINABLE DESIGN REQUIREMENTS and Green Building Forms for related product submittal requirements.
1. Green Building Form 3 requires documentation of recycled content.
 2. Other Green Building Forms may also apply.
- D. Pre-installation Conference: Hold conference to coordinate installation including layout of locations of control joints.

2.PRODUCTS

1. ACCESSORIES

- A. General: Comply with ASTM C 1063 and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.
- B. Expanded-Metal Lath: ASTM C 847 with ASTM A 653/A 653M, G60, hot-dip galvanized.
- C. General Accessories: Fabricated from high-impact.
1. Cornerbeads: With perforated flanges. Small-nose style.
 2. Casing Beads: With perforated flanges in depth required to suit plaster bases indicated and flange length required to suit applications indicated. Square-edge style.
 3. Control Joints: One-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
 4. Expansion Joints: Two-piece type, formed to produce slip-joint and square-edged 1/2-inch- wide reveal; with perforated concealed flanges.

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2. MISCELLANEOUS MATERIALS

- A. Water for Mixing: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.
- B. Bonding Compound: ASTM C 932. Where plaster is adhered to concrete substrates.
- C. Fasteners for Attaching Metal Lath to Substrates: Complying with ASTM C 1063.
- D. Acoustical Sealant for Joints: Non-sag, paintable, non-staining, latex sealant.

3. PLASTER MATERIALS

- A. Portland Cement: ASTM C 150, Type I.
- B. Colorants for Job-Mixed Finish-Coats: Colorfast mineral pigments that produce finish plaster color to match Architect's sample.
- C. Lime: ASTM C 206, Type S; or ASTM C 207, Type S.
- D. Sand Aggregate: ASTM C 897.
- E. Ready-Mixed Finish-Coat Plaster: Mill-mixed portland cement, aggregates, coloring agents, and proprietary ingredients. Color: As selected by Architect from manufacturer's full range.

4. PLASTER MIXES

- A. General: Comply with ASTM C 926 for applications indicated.
- B. Portland Cement Plaster Mixes:
 - 1. Base Coats: Scratch and brown coats for three-coat plasterwork.
 - a. Provide mixes, or manufactured pre-blended mixes to suit Project conditions.
 - 2. Finish-Coat Mixes: Provide consistent field-mixed finish plaster, or manufactured pre-blended mixes to suit Project conditions based on ASTM C 926.

3.EXECUTION

1. PREPARATION

- A. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.
- B. Prepare solid-plaster bases that are smooth or that do not have the suction capability required to bond with plaster according to ASTM C 926.
- C. Install weather barrier as required based on wall substrate material.

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2. INSTALLING ACCESSORIES

- A. Install metal lath, weep screeds, and related accessories according to ASTM C 1063.
- B. Reinforcement for External Corners:
 - 1. Install lath-type external-corner reinforcement at exterior locations.
 - 2. Install cornerbead at interior locations.
- C. Control Joints: Install control joints in specific locations approved by Architect for visual effect as follows:
 - 1. As required to delineate plasterwork into areas (panels) of the following maximum sizes:
 - a. Vertical Surfaces: 144 sq. ft. (13.4 sq. m).
 - b. Horizontal and other Nonvertical Surfaces: 100 sq. ft. (9.3 sq. m).
 - 2. At distances between control joints of not greater than 18 feet (5.5 m) o.c.
 - 3. As required to delineate plasterwork into areas (panels) with length-to-width ratios of not greater than 2-1/2:1.
 - 4. Where control joints occur in surface of construction directly behind plaster.
 - 5. Where plasterwork areas change dimensions, to delineate rectangular-shaped areas (panels) and to relieve the stress that occurs at the corner formed by the dimension change.

3. PLASTER APPLICATION

- A. General: Comply with ASTM C 926.
- B. Bonding Compound: Apply on concrete plaster bases.
- C. Plaster Finish Coats: Apply to provide finish texture as approved by Architect.
- D. Elastomeric Finish System: Apply coating system according to manufacturer's written instructions. Color to be approved by Architect.

4. CUTTING AND PATCHING

- A. Cut, patch, replace, and repair plaster as necessary to accommodate other work and to restore cracks, dents, and imperfections. Repair or replace work to eliminate blisters, buckles, crazing (check cracking), dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

END OF SECTION 092400

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SECTION 092900 - GYPSUM BOARD AND ACCESSORIES

1.GENERAL

1. SUMMARY

- A. This Section includes the following:
 - 1. Interior gypsum board.
 - 2. Exterior gypsum board for ceilings and soffits.
 - 3. Tile backing panels.

2. SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. CalGreen Submittals: See Section 018113 SUSTAINABLE DESIGN REQUIREMENTS and GREEN BUILDING Forms for related requirements.
 - 1. GREEN BUILDING Form 3 requires recycled content documentation.
 - 2. GREEN BUILDING Form 7 requires documentation indicating VOC content for each adhesive.
 - 3. GREEN BUILDING Form 1 requires documentation of Construction Waste Management.
 - 4. Other GREEN BUILDING Form submittals and requirements may apply.

2.PRODUCTS

1. RECYCLED CONTENT OF GYPSUM PANELS

- A. Provide gypsum panel products with recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of 20 percent by weight.

2. PANELS, GENERAL

- A. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

3. GYPSUM BOARD

- A. General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.
- B. Regular Type: Thickness: 1/2 inch. or 5/8 inch. per details.
- C. Fire Resistant: Thickness: 5/8 inch, Type X

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- D. Moisture- and Mold-Resistant Type: Core: 5/8 inch, Type X.
 - 1. Examples: USG's Sheetrock Brand: Humitek, and National Gypsum's: XP Wallboard.
- E. Exterior type: Glass-Mat Gypsum Sheathing Board: ASTM C 1177/C 11&&M.
 - 1. Product: Provide "Dens-Glass Gold" by G-P Gypsum.
 - 2. Core: 1/2 inch regular, or 5/8" Type X per details.

4. TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A108.1
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Custom Building Products; Wonderboard.
 - b. FinPan, Inc.; Util-A-Crete Concrete Backer Board.
 - c. USG Corporation; DUROCK Cement Board.
 - 2. Thickness: 1/2 inch or 5/8 inch per details.

5. TRIM ACCESSORIES

- A. Trim: ASTM C 1047.
 - 1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc. Interior trim may be paper-faced. Shape as required per details.

6. JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
 - 1. Interior Gypsum Wallboard: Paper.
 - 2. Glass-Matt Gypsum Sheathing Board: 10 by 10 glass mesh.
 - 3. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 - 3. Fill Coat: For second coat, use drying-type, all-purpose compound.
 - 4. Finish Coat: For third coat, use drying-type, all-purpose compound.
 - 5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.
- D. Joint Compound for Exterior Applications:

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1. Exterior Gypsum Soffit Board: Use setting-type taping compound and setting-type, sandable topping compound.
2. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.

E. Joint Compound for Tile Backing Panels:

1. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.
2. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
3. Cementitious Backer Units: As recommended by backer unit manufacturer.

7. AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Steel Drill Screws (if attached to cold-formed metal framing): ASTM C 1002, unless otherwise indicated.
 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- C. Acoustical Sealant.

8. TEXTURE FINISHES

- A. Primer: As recommended by textured finish manufacturer.
- B. Aggregate Finish: Water-based, job-mixed, aggregated, drying-type texture finish for spray application.
 1. Available Products: Subject to compliance with requirements.
 2. Texture: skip, smooth/imperfect, Provide samples to Architect for Owner's selection.

3.EXECUTION

1. APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations, and trim

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edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

- D. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members, or provide control joints to counteract wood shrinkage.

2. APPLYING TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A108.1, at locations indicated to receive tile.
- B. Areas Not Subject to Wetting: Install regular-type gypsum wallboard panels to produce a flat surface except at showers, tubs, and other locations indicated to receive water-resistant panels.
- C. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3. INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Interior Trim: Install in all typical locations per manufacturer's instructions.
- C. Aluminum Trim: Install in locations indicated on Drawings, per manufacturer's instructions.

4. FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below:
 - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 - 2. Level 2: Panels that are substrate for tile.
 - 3. Level 4: At panel surfaces that will be exposed to view, unless otherwise indicated
 - a. Primer and its application to surfaces are specified in other Division 09 Sections.
- E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

5. APPLYING TEXTURE FINISHES

- A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.
- B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture free of starved spots or other evidence of thin application or of application patterns.
- C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture-finish manufacturer's written recommendations.

6. PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 093013 - CERAMIC TILE

1.GENERAL

1. SUMMARY

A. Section Includes:

1. Ceramic tile.

2. SUBMITTALS

A. Product Data: For each type of product indicated.

B. See Section 01350 GREEN BUILDING REQUIREMENTS and GREEN BUILDING Forms for related product submittal requirements.

1. GREEN BUILDING Form 3 requires recycled content documentation.
2. GREEN BUILDING Form 9 requires documentation indicating VOC content for each adhesive.
3. Other GREEN BUILDING Form submittals and requirements may apply.

C. Samples:

1. Each type and composition of tile and for each color and finish required.

2.PRODUCTS

1. SETTING MATERIALS

- A. Unmodified thin-set mortar recommended.

2. TILE PRODUCTS

A. ANSI Ceramic Tile Standard: Provide Standard grade tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

B. Walls:

1. Module Size: As selected by Architect from manufr's standard range.
2. Thickness: 5/16 inch.
3. Face: Plain with modified square edges.
4. Descriptions in first subparagraph below are defined in ASTM C 242. If inserting another description, also include list of products meeting that description.
5. Tile Color and Pattern: As selected by Architect from manufr's standard range.
6. Grout Color: As selected by Architect from manufacturer's full range.
7. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile.
8. Base: Coved 3/8" min.
9. Wainscot Cap and External Corners: Bullnose

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10. Internal Corners: Field-buttet square corners. For coved base and cap use angle pieces designed to fit with stretcher shapes.

C. Floors:

1. Product to be slip-resistant and suitable strength and durability for use as flooring.
2. Module Size: As selected by Architect from manufr's standard range.
3. Thickness: 1/4 inch.
4. Face: Plain with modified square edges.
5. Descriptions in first subparagraph below are defined in ASTM C 242. If inserting another description, also include list of products meeting that description.
6. Tile Color and Pattern: As selected by Architect from manufacturer's full range.
7. Grout Color: As selected by Architect from manufacturer's full range.
8. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile.

3. THRESHOLDS

- A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.
 1. Metal profile edge: Smooth transition, such as, but not limited to Schluter-RENO-U.

4. GROUT MATERIALS

- A. Polymer-Modified Tile Grout: ANSI A118.7.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide:
 - a. **Custom Building Products, Polyblend, Non-sanded Tile Grout**, or comparable product by another reputable manufacturer meeting the requirements.
 2. Polymer Type: Dry, redispersible form, prepackaged with other dry ingredients.
- B. Grout for Pregrouted Tile Sheets (if used): Same product used in factory to pregrout tile sheets.

5. MISCELLANEOUS MATERIALS

- A. Grout Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.
 1. Products: Subject to compliance with requirements, provide:
 - a. **AquaMix, Sameday Grout Sealer**, or similar product meeting the requirements by another reputable manufacturer.

3.EXECUTION

1. EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
 1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances

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that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.

2. PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Blending: For tile exhibiting color variations, use factory blended tile or blend tiles at Project site before installing.
- C. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3. INSTALLATION

- A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
- E. Joint Widths: Unless otherwise indicated, install tile with the following joint widths: 1/16 inch.
- F. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- G. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
 - 1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
 - 2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

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- H. Metal Edge Strips: Install at threshold where exposed edge of tile flooring meets polished concrete that finishes flush with top of tile.
- I. Grout Sealer: Apply grout sealer to grout joints in tile floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.
- J. Install cementitious backer units and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated.
- K. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness and bonded securely to substrate.

END OF SECTION 093013

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

1. GENERAL

1. SUMMARY

A. Section Includes:

1. Resilient base.
2. Resilient molding accessories.

B. Related Sections:

1. Division 9 Section "Resilient Floor Tile for resilient floor tile."
2. Division 9 Section "Sheet Vinyl Floor Coverings" for resilient sheet floor coverings.

2. SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For each type of product indicated.

3. DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

4. PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 68 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Install resilient products after other finishing operations, including painting, have been completed.

D. completed.

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5. EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish not less than 10 linear feet (3 linear m) for every 500 linear feet (150 linear m) or fraction thereof, of each type, color, pattern, and size of resilient product installed.

2.PRODUCTS

1. RESILIENT BASE

A. Resilient Base:

- 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. Allstate Rubber Corp.; Stoler Industries.
 - b. Armstrong World Industries, Inc.
 - c. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
 - d. Endura Rubber Flooring; Division of Burke Industries, Inc.
 - e. Estrie Products International; American Biltrite (Canada) Ltd.
 - f. Flexco, Inc.
 - g. Johnsonite.
 - h. Mondo Rubber International, Inc.
 - i. Musson, R. C. Rubber Co.
 - j. Nora Rubber Flooring; Freudenberg Building Systems, Inc.
 - k. PRF USA, Inc.
 - l. Roppe Corporation, USA.
 - m. VPI, LLC; Floor Products Division.

B. Resilient Base Standard: ASTM F 1861.

- 1. Material Requirement: Type TS (rubber, vulcanized thermoset).
- 2. Manufacturing Method: Group I (solid, homogeneous) or Group II (layered).
- 3. Style: Cove (base with toe).

C. Minimum Thickness: 0.125 inch.

D. Height: As indicated on Drawings.

E. Lengths: Coils in manufacturer's standard length.

F. Outside Corners: Job formed or preformed.

G. Inside Corners: Job formed or preformed.

H. Finish: As selected by Architect from manufacturer's full range.

I. Colors and Patterns: As selected by Architect from full range of industry colors.

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2. RESILIENT MOLDING ACCESSORY

A. Resilient Molding Accessory:

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. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
 - b. Flexco, Inc.
 - c. Johnsonite.
 - d. R.C.A. Rubber Company (The).
 - e. Roppe Corporation, USA.
 - f. VPI, LLC; Floor Products Division.

B. Description: Carpet edge for glue-down applications Nosing for carpet Nosing for resilient floor covering Reducer strip for resilient floor covering Joiner for tile and carpet Transition strips.

C. Material: Rubber.

D. Colors and Patterns: As selected by Architect from full range of industry colors.

3. INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - a. Cove Base Adhesives: Not more than 50 g/L.
 - b. Rubber Floor Adhesives: Not more than 60 g/L.

C. Stair-Tread-Nose Filler: Two-part epoxy compound recommended by resilient tread manufacturer to fill nosing substrates that do not conform to tread contours.

D. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of tiles, and in maximum available lengths to minimize running joints.

E. Floor Polish: Provide protective liquid floor polish products as recommended by resilient stair tread manufacturer.

3.EXECUTION

1. EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

2. PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates for Resilient Stair Treads and Accessories: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.
 - 4. Moisture Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- D. 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.
- E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3. RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

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- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Preformed Corners: Install preformed corners before installing straight pieces.
- H. Job-Formed Corners:
 - 1. Outside Corners: Use straight pieces of maximum lengths possible. Form without producing discoloration (whitening) at bends.
 - 2. Inside Corners: Use straight pieces of maximum lengths possible.

4. RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of [**carpet**] [**resilient floor covering**] that would otherwise be exposed.

5. 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.
- D. Floor Polish: Remove soil, visible adhesive, and surface blemishes from resilient stair treads before applying liquid floor polish.
 - 1. Apply two coats.
- E. Cover resilient products until Substantial Completion.

END OF SECTION 096513

SECTION 096543 - LINOLEUM FLOORING

1.GENERAL

1. SUMMARY

- A. Section Includes:
 - 1. Linoleum tile flooring.

2. SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. For sealants and sealant primers used on the inside of a building (inside the weatherproofing system) see Section 01350 Green Building REQUIREMENTS and Green Building Forms for related product submittal requirements.
 - 1. Green Building Form 9 requires documentation indicating that each adhesive contains no more than the maximum allowable limits of VOC's.
 - 2. Other Green Building Form submittals and requirements may apply.
- C. Shop Drawings: For each type of floor covering. Include floor covering layouts, locations of seams, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
- D. Samples: In manufacturer's standard size, but not less than 6-by-9-inch sections of each different color and pattern of floor covering required.
- E. Maintenance data.

3. QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

4. PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer in spaces to receive floor coverings.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer.
- C. Close spaces to traffic during floor covering installation.
- D. Close spaces to traffic for 48 hours after floor covering installation.
- E. Install floor coverings after other finishing operations, including painting, have been completed.

2.PRODUCTS

- A. Linoleum tile flooring
 - 1. Basis of design product: **Forbo Flooring Systems, Marmoleum MCT 2.0mm Tile.**
 - a. Thickness: 2.0mm minimum.
 - b. Tile Width: 13"x13"

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- c. Colors and Patterns: As selected by Architect from manufacturer's full range. ¼ turn installation.
 - d. Underlayment: Install directly over concrete, or gypcrete underlayment, or if plywood subfloor then install a 1/4" underlay-grade plywood prior to installing linoleum.
- B. NGBS Compliance: Must be in accordance with the emission concentration limits of CDPH 01350 using the office scenario, as certified by a third party program, such as the Resilient Floor Covering Institute's FloorScore Indoor Air Certification Program, or the GREENGUARD Environmental Institute's Children and Schools Certification Program.
2. INSTALLATION MATERIALS
- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated, where required.
 - B. Adhesives: Water-resistant type recommended by manufacturer to suit floor covering and substrate conditions indicated.
 - 1. Use adhesives that have a VOC content of not more than 50 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - C. Base Accessories:
 - 1. Install 1x8 maple base at all walls around perimeter of linoleum.
 - 2. Install 6" rubber base, of color selected by architect at all bathroom walls around perimeter of linoleum.
 - 3. Transitions: Use transitions as appropriate per manufacturer's standard details where interfacing with differing floor finish materials.

3.EXECUTION

1. PREPARATION
- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of floor coverings.
 - B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 - a. Moisture Testing: Perform tests recommended by manufacturer.
 - C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
 - D. Do not install floor coverings until they are same temperature as space where they are to be installed.

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1. Move floor coverings and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- E. Sweep and vacuum clean substrates to be covered by floor coverings immediately before installation.
2. FLOOR COVERING INSTALLATION
 - A. Comply with manufacturer's written instructions for installing floor coverings.
 - B. Layout floor coverings and allow them to stabilize before cutting and fitting.
 - C. Lay out floor coverings as follows:
 1. Install cartons in consecutive order.
 2. To avoid shading through the installation, shuffle tiles from several cartons.
 3. Install tiles in alternating directions (quarter turned).
 - D. Scribe and cut floor coverings to butt neatly and tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, and door frames.
 - E. Extend floor coverings into toe spaces, door reveals, closets, and similar openings.
 - F. Maintain reference markers, holes, or openings that are in place or marked for future cutting by repeating on floor coverings as marked on substrates. Use chalk or other nonpermanent marking device.
 - G. Adhere floor coverings to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
3. CLEANING AND PROTECTION
 - A. Comply with manufacturer's written instructions for cleaning and protection of floor covering.
 - B. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor covering before applying liquid floor polish.
 - C. Cover floor coverings until Substantial Completion.

END OF SECTION 096543

SECTION 099113 - EXTERIOR PAINTING

1. GENERAL

1. SUMMARY

- A. This Section includes surface preparation and the application of paint systems on the following exterior substrates:
 - 1. Steel.
 - 2. Galvanized metal.
 - 3. Aluminum (not anodized or otherwise coated).
 - 4. Wood.
 - 5. Exterior portland cement (stucco).

2. SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each finish and for each color and texture required.

3. QUALITY ASSURANCE

- A. MPI Standards:
 - 1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
 - 2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

4. DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45°F.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

5. PROJECT CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50°-95°F.
- B. Do not apply paints in snow, rain, fog or mist; when relative humidity exceeds 85%; at temperatures less than 5°F above the dew point; or to damp or wet surfaces.

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6. EXTRA MATERIALS

- A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. of each material and color applied.

2.PRODUCTS

1. PAINT, GENERAL

A. Manufacturer:

1. Glidden Professional

Other Manufacturers:

2. Benjamin Moore
3. Sherwin Williams

B. 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.

C. Colors: As selected by Architect from manufacturer's full range. Refer to Exterior Elevations for color locations.

D. VOC Content of Field Applied Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); these requirements do not apply to primers or finishes that are applied in a fabrication of finishing shop:

1. Flat Paints, Coatings and Primers: VOC content of not more than 50 g/L.
2. Nonflat Paint and Coatings: VOC content of not more than 100 g/L
3. Nonflat High-Gloss Paint and Coatings: VOC content of not more than 150 g/L.
4. Aluminum Roof Coatings: VOC content of not more than 400 g/L.
5. Bituminous Roof Coatings: VOC content of not more than 50 g/L.
6. Bond Breakers: VOC content of not more than 350 g/L.
7. Concrete Curing Compounds: VOC content of not more than 350 g/L
8. Concrete/masonry Sealers: VOC content of not more than 100 g/L.
9. Driveway Sealers: VOC content of not more than 50 g/L.
10. Dry Fog Coatings: VOC content of not more than 150 g/L.
11. Faux Finishing Coatings: VOC content of not more than 350 g/L.
12. Fire Resistive Coatings: VOC content of not more than 350 g/L/
13. Floor Coatings: VOC content of not more than 100 g/L.
14. Form Release Compounds: VOC content of not more than 250 g/L.
15. High temperature coatings: VOC content of not more than 420 g/L.
16. Industrial maintenance coatings: VOC content of not more than 250 g/L.

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17. Low solids coatings: VOC content of not more than 120 g/L.
18. Magnesite cement coatings: VOC content of not more than 450 g/L.
19. Mastic texture coatings: VOC content of not more than 100 g/L.
20. Metallic pigmented coatings: 500 g/L.
21. Primers, Sealers, and Undercoaters: VOC content of not more than 100 g/L.
22. Pretreatment Wash Primers: VOC content of not more than 420 g/L.
23. Reactive penetrating sealers: VOC content of not more than 350 g/L.
24. Roof coatings: VOC content of not more than 50 g/L.
25. Rust preventative Coatings: 250 g/L.
26. Shellacs, Clear: VOC content of not more than 730 g/L.
27. Shellacs, Opaque: VOC content of not more than 550, g/L.
28. Swimming Pool Coatings: VOC content of not more than 340 g/L.
29. Traffic marking coatings: VOC content of not more than 100 g/L.
30. Tub and Tile Refinish Coatings: 420 g/L.
31. Waterproofing Membranes: VOC content of not more than 250 g/L.
32. Wood coatings: 275 g/L.
33. Wood preservatives: VOC content of not more than 350 g/L.
34. Zinc-rich primers: VOC content of not more than 340 g/L.

3.EXECUTION

1. EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 1. Concrete: 12 percent.
 2. Wood: 15 percent.
 3. Plaster: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

2. PREPARATION AND APPLICATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.

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1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
 - C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
 - D. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
 - E. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.
3. EXTERIOR PAINTING SCHEDULE
- A. Steel Substrates:
 1. Quick-Drying Enamel System: MPI EXT 5.1A.
 - a. Prime Coat: Quick-drying alkyd metal primer.
 - b. Intermediate Coat: Quick-drying enamel matching topcoat.
 - c. Topcoat: Quick-drying enamel (semigloss).
 - B. Galvanized-Metal Substrates:
 1. Latex Over Water-Based Primer System: MPI EXT 5.3H.
 - a. Prime Coat: Waterborne galvanized-metal primer.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex (semigloss).
 - C. Aluminum Substrates:
 1. Latex System: MPI EXT 5.4H.
 - a. Prime Coat: Quick-drying primer for aluminum.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex (semigloss).
 - D. Dressed Lumber Substrates: Including architectural woodwork and trellis.
 1. Latex System: MPI EXT 6.3L.
 - a. Prime Coat: Exterior latex wood primer.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex (semigloss).
 - E. Wood Panel Substrates: Including fascias.
 1. Latex System: MPI EXT 6.4K.
 - a. Prime Coat: Exterior latex wood primer.

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- b. Intermediate Coat: Exterior latex matching topcoat.
- c. Topcoat: Exterior latex (semigloss).

- F. Stucco Substrates:
 - 1. Elastomeric Finish

END OF SECTION 099113

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SECTION 099123 - INTERIOR PAINTING

1. GENERAL

1. SUMMARY

- A. This Section includes surface preparation and the application of paint systems on the following interior substrates:
 - 1. Concrete.
 - 2. Steel.
 - 3. Wood.
 - 4. Gypsum board.

2. SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each finish and for each color and texture required.
- C. Product List: Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.
- D. CalGreen Submittals: 018113 SUSTAINABLE DESIGN REQUIREMENTS and Green Building Forms for related product requirements.
 - 1. Green Building Form 10 requires documentation indicating that each paint or coating meets indoor environmental quality requirements, particularly for VOC content.
 - 2. Field verification of on-site product containers may also be required.

3. QUALITY ASSURANCE

- A. MPI Standards:
 - 1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
 - 2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

4. PROJECT CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50°-95°F.
- B. Do not apply paints when relative humidity exceeds 85%; at temperatures less than 5°F above the dew point; or to damp or wet surfaces.

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5. EXTRA MATERIALS

- A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
 - 1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. of each material and color applied.

2.PRODUCTS

1. PAINT, GENERAL

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work included, but are not limited to, the following:
 - 1. Glidden Professional
 - 2. Benjamin Moore
 - 3. ICI Paints
- B. 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.
- C. VOC Content of Field-Applied Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); these requirements do not apply to primers or finishes that are applied in a fabrication or finishing shop:
 - 1. Flat Paints, Coatings and Primers: VOC content of not more than 50 g/L.
 - 2. Nonflat Paint and Coatings: VOC content of not more than 100 g/L
 - 3. Nonflat High-Gloss Paint and Coatings: VOC content of not more than 150 g/L.
 - 4. Bond Breakers: VOC content of not more than 350 g/L.
 - 5. Concrete Curing Compounds: VOC content of not more than 350 g/L
 - 6. Concrete/masonry Sealers: VOC content of not more than 100 g/L.
 - 7. Dry Fog Coatings: VOC content of not more than 150 g/L.
 - 8. Faux Finishing Coatings: VOC content of not more than 350 g/L.
 - 9. Fire Resistive Coatings: VOC content of not more than 350 g/L/
 - 10. Floor Coatings: VOC content of not more than 100 g/L.
 - 11. Form Release Compounds: VOC content of not more than 250 g/L.
 - 12. High temperature coatings: VOC content of not more than 420 g/L.
 - 13. Industrial maintenance coatings: VOC content of not more than 250 g/L.
 - 14. Low solids coatings: VOC content of not more than 120 g/L.
 - 15. Magnesite cement coatings: VOC content of not more than 450 g/L.
 - 16. Mastic texture coatings: VOC content of not more than 100 g/L.
 - 17. Metallic pigmented coatings: 500 g/L.
 - 18. Primers, Sealers, and Undercoaters: VOC content of not more than 100 g/L.
 - 19. Pretreatment Wash Primers: VOC content of not more than 420 g/L.

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20. Reactive penetrating sealers: VOC content of not more than 350 g/L.
21. Rust preventative Coatings: 250 g/L.
22. Shellacs, Clear: VOC content of not more than 730 g/L.
23. Shellacs, Opaque: VOC content of not more than 550, g/L.
24. Swimming Pool Coatings: VOC content of not more than 340 g/L.
25. Tub and Tile Refinish Coatings: 420 g/L.
26. Waterproofing Membranes: VOC content of not more than 250 g/L.
27. Wood coatings: 275 g/L.
28. Wood preservatives: VOC content of not more than 350 g/L.
29. Zinc-rich primers: VOC content of not more than 340 g/L.

D. Chemical Components of Field-Applied Interior Paints and Coatings: Provide topcoat paints and coatings that comply with the following chemical restrictions; these requirements do not apply to primers or finishes that are applied in a fabrication or finishing shop:

1. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
2. Restricted Components: Paints and coatings shall not contain any of the following:
 - a. Acrolein.
 - b. Acrylonitrile.
 - c. Antimony.
 - d. Benzene.
 - e. Butyl benzyl phthalate.
 - f. Cadmium.
 - g. Di (2-ethylhexyl) phthalate.
 - h. Di-n-butyl phthalate.
 - i. Di-n-octyl phthalate.
 - j. 1,2-dichlorobenzene.
 - k. Diethyl phthalate.
 - l. Dimethyl phthalate.
 - m. Ethylbenzene.
 - n. Formaldehyde.
 - o. Hexavalent chromium.
 - p. Isophorone.
 - q. Lead.
 - r. Mercury.
 - s. Methyl ethyl ketone.
 - t. Methyl isobutyl ketone.
 - u. Methylene chloride.
 - v. Naphthalene.
 - w. Toluene (methylbenzene).
 - x. 1,1,1-trichloroethane.
 - y. Vinyl chloride.

E. Colors: As selected by Owner from manufacturer's full range

3.EXECUTION

1. EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Wood: 15 percent.
 - 3. Gypsum Board: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 - 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

2. PREPARATION AND APPLICATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
- C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- D. Painting Mechanical and Electrical Work: Paint indicted items exposed in occupied spaces.
- E. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- F. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3. INTERIOR PAINTING SCHEDULE

- A. Concrete Substrates, Traffic Surfaces:
 - 1. Water-Based Clear Sealer System: MPI INT 3.2G.
 - a. First Coat: Interior/exterior clear concrete floor sealer (water based).
 - b. Topcoat: Interior/exterior clear concrete floor sealer (water based).

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B. Steel Substrates:

1. Institutional Low-Odor/VOC Latex System: MPI INT 5.1S.
 - a. Prime Coat: Rust-inhibitive primer (water based).
 - b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
 - c. Topcoat: Institutional low-odor/VOC interior latex (semigloss).

C. Galvanized-Metal Substrates:

1. Institutional Low-Odor/VOC Latex System: MPI INT 5.3N.
 - a. Prime Coat: Waterborne galvanized-metal primer.
 - b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
 - c. Topcoat: Institutional low-odor/VOC interior latex (semigloss).

D. Aluminum (Not Anodized or Otherwise Coated) Substrates:

1. Institutional Low-Odor/VOC Latex System: MPI INT 5.4G.
 - a. Prime Coat: Quick-drying primer for aluminum.
 - b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
 - c. Topcoat: Institutional low-odor/VOC interior latex (semigloss).

E. Dressed Lumber Substrates: Including architectural woodwork, doors

1. Institutional Low-Odor/VOC Latex System: MPI INT 6.3V.
 - a. Prime Coat: Interior latex-based wood primer.
 - b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
 - c. Topcoat: Institutional low-odor/VOC interior latex enamel (semigloss).

F. Gypsum Board Substrates:

1. Institutional Low-Odor/VOC Latex System: MPI INT 9.2M.
 - a. Prime Coat: Interior latex primer/sealer.
 - b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
 - c. Topcoat: Institutional low-odor/VOC interior latex (eggshell), (semigloss). Refer to finish schedule for sheen location.

END OF SECTION 099123

SECTION 09 96 53 – SILICONE ELASTOMERIC COATINGS

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes substrate preparation and application of silicone elastomeric coatings to the following exterior substrates:

1. Stucco

B. Related Sections:

1. Section 07 92 00 "Joint Sealants" for elastomeric joint sealants applied in conjunction with work of this section.

2. Section 09 91 13 "Exterior Painting" for special use paint and general field painting other than elastomeric coatings.

3. Section 09 96 00 "High Performance Coatings" for special use coatings and general field painting other than elastomeric coatings.

1.2 REFERENCE STANDARDS

A. ASTM International (ASTM): www.astm.org :

1. ASTM D 412 - Standard Test Method for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension.

2. ASTM D 522 - Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings.

3. ASTM D 711 - Standard Test Method for No-Pick-Up Time of Traffic Paint.

4. ASTM D 1653 - Standard Test Method for Water Vapor Transmission of Organic Coatings.

5. ASTM D 1737 - Method of Test for Elongation of Attached Organic Coatings with Cylindrical Mandrel Apparatus.

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6. ASTM D 2240 - Rubber Property Durometer Hardness.

7. ASTM D 2369 - Standard Test Method for Volatile Content of Coatings.

8. ASTM D 3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.

9. ASTM D 3274 - Standard Test Method for Evaluating Degree of Surface Disfigurement of Paint Films by Microbial (Fungal or Algal) Growth of Soil and Dirt.

B. Federal Government Publications: www.epa.gov/nscep/

1. 40 CFR 59, Subpart D-200 - National Volatile Organic Compound Emission Standards for Architectural Coatings.

C. Sealant, Waterproofing, and Restoration Institute (SWRI): www.swrionline.org 1. SWRI Validation Program.

D. U. S. Environmental Protection Agency (EPA): www.epa.gov

1. 40 CFR 59, Subpart D: National Volatile Organic Compound Emission Standards for Architectural Coatings.

E. US Green Building Council (USGBC): www.usgbc.org

1. Leadership in Energy and Environmental Design (LEED) Green Building Rating System.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For specified products, including:

1. Preparation instructions and recommendations.

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2. Recommended primers and accessories.

B. Samples for initial selection.

C. Samples for Verification: For each elastomeric coating indicated, for each color and texture required. Submit on step- coated sample cards with each coat labeled.

D. Product Schedule: For each product, color, and finish indicated. Provide cross reference to application areas, utilizing designations indicated on Drawings and in specifications.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified applicator.

B. Preconstruction compatibility and adhesion test reports.

C. Manufacturer's instructions for installation and field quality control testing.

D. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each coating specified to be validated by SWRI's Coating Validation Program.

E. Field quality control adhesion test reports.

F. Warranty: Sample of special warranty.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials packaged for storage in unopened containers labeled with product name, color and texture information, and local source contact information.

1. Provide [one] gallon of each type of product.

1.7 QUALITY ASSURANCE

A. Applicator Qualifications: Employer of experienced applicators equipped and trained for application of elastomeric coatings required for this Project with record of successful completion of projects of similar scope.

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B. Single Source Responsibility: Provide elastomeric coatings and related silicone joint sealants by a single manufacturer through a single source.

C. Mockups: Provide mockup of each coating system, color, and texture selected for approval by Owner. Locate as indicated or as directed. Final approval of color and texture selections will be based upon mockups. Approved mockups may remain as part of finished work.

1.8 PROJECT CONDITIONS

A. Do not install elastomeric coatings during inclement weather or when such conditions are expected. Allow wet surfaces to dry.

B. Do not install elastomeric coatings when temperature is above 100 deg F (38 deg C) or below 20 deg F (-6 deg C).

1.9 WARRANTY

A. Special Warranty, General: Manufacturer's standard project-specific form in which manufacturer agrees to repair or replace elastomeric coating that demonstrates deterioration or failure within warranty period specified due to material failure under normal use. Failure include water penetration through coating.

1. Warranty Period: [Ten] years from date of Substantial Completion.

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. Basis-of-Design Product: Provide elastomeric coatings manufactured by Dow Chemical Company., Midland MI; (877) SEALANT, (877) 732-5268; email: construction@dow.com; website: dow.com/construction , [or comparable products of other manufacturer approved by [Architect] [Owner] in accordance with Instructions to Bidders and Division 01 General Requirements].

2.2 EXTERIOR FLAT WATERBORNE, PIGMENTED SILICONE ELASTOMERIC COATINGS

A. Silicone Elastomeric Coating: Single-component, fluid-applied, water-based, pigmented silicone elastomer.

1. Basis of Design Product: DOWSILTM AllGuard Silicone Elastomeric Coating.

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2. Color: [As selected by Architect from manufacturer's full line] [Match Architect's custom color] for number of colors indicated.

3. Surface Profile: [Smooth surface] [Fine textured].

4. Volatile Organic Compound (VOC) Content: 4 g/L maximum.

5. Moisture-Vapor Transmission, ASTM D 1653: 43 perms, minimum.

6. Hardness, ASTM D 2240: 38 durometer Shore A.

7. Tensile Strength, ASTM D 412: 145 lbf/sq. in. (1.0 MPa), minimum.

8. Elongation, ASTM D 412: 600 percent, minimum.

9. Room Temperature Flexibility, ASTM D 522: 1/8 inch mandrel test; pass.

10. Low Temperature Flexibility, ASTM D 711: 1/4 inch mandrel test; pass.

11. Fungus Resistance, ASTM D 3274: No growth.

12. Mold Resistance, ASTM D 3273: No growth.

13. Solids Content, ASTM D 2369: Not less than 55 percent by weight. 2.3 ACCESSORY MATERIALS

A. General: VOC content of primers and fillers, 107 g/L or less.

B. Crack Fillers: Elastomeric coating manufacturer's recommended, factory-formulated crack fillers or sealants compatible with substrate and other materials.

C. Primer: Elastomeric coating manufacturer's recommended, factory-formulated, alkali-resistant primer compatible with substrate and other materials indicated.

D. Concrete Unit Masonry Block Filler: factory-formulated, high-performance latex block filler compatible with substrate and other materials indicated.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates to determine if work is ready to receive elastomeric coatings. Verify that surfaces are clean, dry, and free of frost, dust, dirt, grease, oil, curing compounds, form release agents, laitance, efflorescence, mildew, excess alkalinity, and other conditions affecting performance of work.

1. Verify that new concrete and mortar to receive coating application has cured adequately in accordance with substrate and coating manufacturer's instructions.

B. Preinstallation Testing: Prior to application of elastomeric coatings, perform the following tests to verify condition of substrate in accordance with manufacturer's instructions:

1. Adhesion: Perform substrate field adhesion tests on each substrate to determine if primer is required to satisfactorily adhere elastomeric coatings to substrates.

2. Alkalinity: Verify substrate is within alkalinity range acceptable to manufacturer.

3. Moisture Level: Verify substrate moisture content is acceptable to manufacturer.

C. Proceed with coating work once conditions meet elastomeric coating manufacturer's recommendations.

3.2 PREPARATION

A. General: Comply with elastomeric coating manufacturer's written instructions for preparation of substrates.

B. Hardware Removal: Remove hardware, accessories, plates, fixtures, and similar items that are not to be coated. If removal is not practical, provide protection for installed items prior to cleaning and preparation activities.

C. Cleaning: Clean substrates to remove contaminants and foreign material by pressure cleaning, wire brushing, grinding or other method recommended by elastomeric coatings manufacturer.

D. Substrate Repair: Repair deteriorated or damaged substrates, repair masonry joints, and fill cracks, voids, honeycomb, and other defects using materials as recommended by manufacturer. Allow patching materials to cure.

E. Protection: Protect adjacent surfaces not designated to receive coatings. Provide protection for pedestrians, vehicles, landscaping, and surrounding areas to prevent contact with coating materials.

3.3 APPLICATION

A. Primer: Apply primer to substrates where required based upon preinstallation testing and elastomeric coating manufacturer's recommendations, using application methods and rate of application recommended by manufacturer. Allow to dry prior to application of elastomeric coating.

1. Apply block filler as primer on concrete masonry unit substrates where required to fill pores and provide smooth, continuous water-resistant finish coat(s).

B. Elastomeric Coating: Apply elastomeric coating using application methods and rate of application recommended by manufacturer. Apply using nap roller, nylon brush, or airless sprayer, as allowed by authorities having jurisdiction.

1. Apply elastomeric coating from top to bottom of substrate. Work down vertical surface and cover rundown in process. Avoid excessive overlapping.

2. Apply coating free of cloudiness, spotting, laps, brush marks, roller tracks, and other surface imperfections. Cut in color breaks and terminations with sharp lines.

3. Apply additional coats as required to provide cured film with uniform finish, color, and appearance.

4. Provide a minimum of two coats of not less than 20 mil total wet film thickness (10 mil wet film thickness per coat) to provide finished dry film thickness of not less than 10 mils.

C. Cleaning: Remove overspray and excess material using materials and methods approved by manufacturer that will not damage adjacent materials.

D. Curing and Protection: Allow coatings to cure before exposure to traffic. Use test specimens formed at time of coating application to verify curing time. Prevent damage to coatings resulting from construction operations or other causes. Replace damaged coatings at time of Substantial Completion.

3.4 FIELD QUALITY CONTROL

A. Owner may retain testing agency to perform the following tests:

1. Verification that substrate preparation meets requirements.

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2. Testing and certification that coating materials comply with requirements.

3. Testing of application for compliance with adhesion and film thickness requirements.

B. If testing indicates products or work do not meet requirements, Owner may stop work and require Contractor to remove non-complying materials and materials applied over non-complying substrates, and correct application.

3.5 CLEANING AND PROTECTION

A. Protect work of other trades against damage from application of elastomeric coatings.

B. Remove rubbish and discarded materials from Project site daily. Clean overspray from adjacent surfaces as work progresses, using methods recommended by manufacturer.

C. Remove temporary coverings and protection upon completion. Clean and repair adjacent surfaces damaged by water repellent application.

D. Prior to substantial completion, touch up and restore damaged or defaced coated surface

END OF SECTION

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SECTION 101400 - SIGNAGE

1. GENERAL

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.

2. SUMMARY

- A. This Section includes the following:

- 1. Panel signs.

3. DEFINITIONS

- A. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."

4. SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details for signs.
 - 1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 - 2. Provide message list, typestyles, graphic elements, including tactile characters and Braille, and layout for each sign.
- C. Samples for Initial Selection: Manufacturer's color charts consisting of actual units or sections of units showing the full range of colors available for the following:
 - 1. Acrylic sheet.
- D. Maintenance Data: For signs to include in maintenance manuals.
- E. Warranty: Special warranty specified in this Section.

5. QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

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- B. Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.
- C. Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

6. PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit installation of signs in exterior locations to be performed according to manufacturers' written instructions and warranty requirements.
- B. Field Measurements: Verify recess openings by field measurements before fabrication and indicate measurements on Shop Drawings.

7. COORDINATION

- A. Coordinate placement of anchorage devices with templates for installing signs.

8. WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of metal and polymer finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image colors and sign lamination.
 - 2. Warranty Period: Five years from date of Substantial Completion.

2.PRODUCTS

1. MATERIALS

- A. Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), Type UVA (UV absorbing).

2. PANEL SIGNS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Innerface Sign Systems, Inc.
 - 2. Kroy Architectural Signage

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- B. Interior Panel Signs: Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch (1.5 mm) measured diagonally from corner to corner, complying with the following requirements:
 - 1. Acrylic Sheet: 0.060 inch (1.52 mm) thick.
 - 2. Edge Condition: In accordance with Manufacturers' specifications.
 - 3. Corner Condition: In accordance with Manufacturers' specifications.
 - 4. Mounting: In accordance with Manufacturers' specifications.
 - 5. Color: As selected by Architect from manufacturer's full range.
 - 6. Tactile Characters: Characters and Grade 2 Braille raised 1/32 inch (0.8 mm) above surface with contrasting colors.

- C. Tactile and Braille Sign: Manufacturer's standard process for producing text and symbols complying with ADA-ABA Accessibility Guidelines and with ICC/ANSI A117.1. Text shall be accompanied by Grade 2 Braille. Produce precisely formed characters with square-cut edges free from burrs and cut marks; Braille dots with domed or rounded shape.
 - 1. Panel Material: Opaque acrylic sheet.
 - 2. Raised-Copy Thickness: Not less than 1/32 inch (0.8 mm).

- D. Colored Coatings for Acrylic Sheet: For copy and frame colors, provide colored coatings, including inks, dyes, and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and are UV and water resistant for five years for application intended.
 - 1. Color: As selected by Architect from manufacturer's full range.

3. ACCESSORIES

- A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

4. FABRICATION

- A. General: Provide manufacturer's standard signs of configurations indicated.
 - 1. Preassemble signs in the shop to greatest extent possible. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in location not exposed to view after final assembly.
 - 2. Conceal fasteners if possible; otherwise, locate fasteners where they will be inconspicuous.

5. FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

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- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

6. ACRYLIC SHEET FINISHES

- A. Colored Coatings for Acrylic Sheet: For copy and frame colors, provide colored coatings, including inks, dyes, and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and that are UV and water resistant for five years for application intended.

3.EXECUTION

1. EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Verify that items, including anchor inserts, are sized and located to accommodate signs.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

2. INSTALLATION

- A. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.
 - 1. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Interior Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 inches (75 mm) of sign without encountering protruding objects or standing within swing of door.
- B. Wall-Mounted Signs: Comply with sign manufacturer's written instructions except where more stringent requirements apply.
 - 1. Two-Face Tape: Mount signs to smooth, nonporous surfaces. Do not use this method for vinyl-covered or rough surfaces.

3. CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

END OF SECTION 101400

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SECTION 1014019 - FABRICATED METAL LETTERS

Part 1 – General

1.1 Section Includes

- A. Fabricated Stainless Steel Letters

1.2 Scope

A. Furnish letters and hardware necessary to install cut metal letters shown on drawings and here-in specified.

1.3 Submittals

- A. Manufacturer’s descriptive literature and specifications.
- C. Shop Drawings
- B. Installation instructions

1.4 Quality Assurance

- A. Manufacturer to have a minimum of 20 years experience in manufacturing letters.
- B. All letters to be manufactured by one manufacturer.

Part II – Products

2.1 Materials (Metal Alloys)

- A. Stainless Steel – 304 Alloy

2.2 Finishes

A. Fabricated Stainless Steel

- 1. Brushed finish

Note: Standard grain finish is hairline. #4 finish is available by request at additional cost.

2.3 Depth

A. Fabricated Stainless Steel

- A. 1”

Note: All depths not available in all sizes. Stroke must be at least 50% of depth.

2.5 Font Styles

- A. Select from Manufacturers Standard font list
- B. Specify a custom font
- C. Provide a vector art file for custom logo shapes.

2.6 Mounting Hardware

- A. Strap Stud Mount
- B. Shadow Free Stud Mount
- C. Spacers can be used to “float” letters from wall.
- D. Paper Installation template with marked stud locations should be provided.

2.7 Fabrication

- A. Letters shall be fabricated of stainless steel. Form letters by heliarc welding process. Characters should have smooth flat faces, sharp corners, precisely formed lines and profiles, free from pits, scale, and other defects.
- B. Letter shall be as specified by owner letter style and shall be 6 inches high, as indicated on the drawings.
- C. Finish shall be Satin Anodized.
- D. Mounting shall be post/concealed and a mounting template designating stud locations is required for mounting on a wood surface
- E. Depth of letters shall be 1 inches deep.

Part III – Execution

3.1 Installation

- A. A qualified installer shall install cut metal letters.
- B. Install signs level, plumb, and at the height indicated with sign surfaces free from distortion or other defects in appearance.

3.2 Warranty

- A. Letters should be guaranteed for the life of the business against defects.

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SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

1.GENERAL

1. SUMMARY

A. This Section includes the following Toilet and Bath Accessories for:

1. Public-use restrooms.
2. Residential unit bathrooms.

2. SUBMITTALS

A. Product Data: For each type of product indicated including the following:

1. Construction details and dimensions
2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation
3. Material and finish descriptions
4. Maintenance and care instructions.

B. Samples: submit one sample of each component illustrating color and finish.

C. Product Warranties: For each product with a warranty.

1. Product Warranties: For each product with a warranty.

D. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

E. CalGreen Submittals: See Section 018113_SUSTAINABLE DESIGN REQUIREMENTS and Green Building Forms for related product submittal requirements.

1. Green Building Form 3 requires documentation of recycled content.
2. Other Green Building Forms may also apply.

3. COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

2.PRODUCTS

1. GENERAL FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

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2. PUBLIC-USE WASHROOM ACCESSORIES

- A. Manufacturer: Bobrick Washroom Equipment, Inc. Subject to compliance with requirements, provide the following products:
- B. Toilet Tissue (Roll) Dispenser : (Public Restrooms)Product: Bobrick, Contura Series, B-4388
1. Cabinet: 18-8 S, Type 304, 22 gauge (0.8mm) stainless steel. All-welded construction with satin finish on exposed surfaces.
 2. Flange: Drawn, one-piece, seamless, 18-8 S, Type 304, 22 gauge (0.8mm) stainless steel with satin finish. Flange corners and edges shall have radii that complement arc on front of door and shall have the same radii on flange corners and edges as other Bobrick ConturaSeries washroom accessories.
 3. Door: Front of door is drawn, one-piece, seamless construction, 18-8 S, Type 304, 22 gauge (0.8mm) stainless steel. 18 gauge (1.2mm) stainless steel door frame, secured to cabinet with two rivets; with satin finish on exposed surfaces and equipped with a flush tumbler lock keyed like other washroom accessories. Front of door shall have same degree of arc, radius on corners and edges as other Bobrick ConturaSeries washroom accessories.
 4. Dispensing Mechanism, Inner Housing, and Cam: 18-8 S, Type 304, 18 gauge (1.2mm) stainless steel.
 5. Spindles: Heavy-duty, one-piece, molded ABS plastic; theft-resistant, spindles retained in dispensing mechanism when door is locked.
 6. Toilet Tissue Dispensing: Unit holds two standard-core toilet tissue rolls up to 5-1/4 inches (133mm) in diameter (1800 sheets). Roll held in reserve automatically drops into place after bottom roll is depleted, depleted rolls can only be removed after unlocking door.
- C. Paper Towel (Folded) Dispenser :
1. Basis of Design: Bobrick ClassicSeries Model B-359 with Bobrick Part No. 369-130 TowelMate Accessory. TowelMate Accessory dispenses one paper towel at a time without towels sagging or falling through towel tray opening. Round nylon rod and stainless steel rod screws support stack of paper towels.
 2. Cabinet: All-welded, 18-8 S, Type 304, heavy gauge stainless steel with satin finish on exposed surfaces.
 3. Flange: Drawn, one-piece, seamless, 18-8 S, Type 304, 22 gauge (0.8mm) stainless steel with satin finish.
 4. Door: 18-8 S, Type 304, 22 gauge (0.8mm) stainless steel with satin finish, double-pan-back construction is warp-resistant; with a stainless steel cable door-swing limiter
 5. Paper Towel Dispenser: 18-8 S, Type 304, 22 gauge (0.8mm) stainless steel; rounded towel tray with hemmed opening to dispense paper towels without tearing
 6. Shelf: 18-8 S, Type 304, 22 gauge (0.8mm) stainless steel with satin finish.
 7. Hinge: Welded, full-length stainless steel piano-hinge.
 8. Locking: Tumbler lock keyed like other Bobrick washroom accessories.
 9. Capacity: 350 C-fold or 475 multifold paper towels without adjustments or adaptors.
- D. Surface-Mounted Waste Receptacle:
1. Basis of Design: Bobrick ClassicSeries Model B-279 with Bobrick Part No. 279-14 Reusable Vinyl Liner.
 2. Reusable Liner: Heavy gauge vinyl, reinforcement for grommet holes at top.
 3. Receptacle: All-welded, 18-8 S, Type 304 stainless steel with satin finish with four spot-welded interior hooks for attaching the vinyl liner; 22 gauge (0.8mm) one-piece front and

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sides, 26 gauge (0.5mm) one-piece back and bottom, hemmed top edge, bottom with recessed finger grip.

4. Reusable Liner: Heavy gauge vinyl, reinforcement for grommet holes at top.
5. Capacity: 6.4 gallons (24.2 L).

E. Surface-Mounted Vertical Soap Dispensers:

1. Basis of Design: Bobrick ClassicSeries Model B-2111.
2. Compliance: Valve is operable with one hand, without tight grasping, pinching or twisting of the wrist and with less than 5 pounds of force (22.2 N) to comply with barrier-free accessibility guidelines, including ADA-ABA and ICC/ANSI.
3. Container:
 - 1) Materials: 18-8 S, Type 304, 22 gauge (0.8mm) stainless steel with satin finish.
 - 2) Construction: Body is drawn, one-piece, seamless construction.
 4. Valve: Corrosion-resistant, black molded plastic push button and spout, antibacterial-soap-resistant plastic cylinder; soap head-holding mushroom valve, stainless steel spring, U-packing seal and duckbill. Valve dispenses commercially marketed all-purpose hand soaps.
 5. Mounting: Vandal-resistant, concealed wall plate; back plate with mounting bracket.
 6. Filling: Locked, hinged stainless steel lid for top filling opens with key provided. To prevent corrosion of tank, use only chloride-free pH-neutral liquid soaps.
 7. Refill Indication: Clear acrylic refill-indicator window.
 8. Capacity: 40 fl oz (1.2 L).

F. Grab Bar

1. Basis of Design: Bobrick Model B-6806
2. Compliance: Barrier-free accessibility guidelines, including ADA-ABA and ICC/ANSI for structural strength.
3. Capacity: Designed to support 900 lbs (408 kg) in compliant installations.
4. Description: Grab bar with 90 degree return to flange. Clearance between grab bar and finished wall is 1-1/2 inches (38mm).
5. Grab Bar Materials: 18-8 S, Type 304, 18 gauge (1.2mm) stainless steel tubing with satin finish, ends of grab bar pass through flanges and are heliacal welded to flanges to form one structural unit, outside diameter 1-1/2 inches (38mm).
6. Mounting Flanges: Concealed, 18-8 S, Type 304, 1/8 inch (3mm) thick, stainless steel plate.
7. End Flanges: 2 inches x 3-1/8 inches (50mm x 80mm) with two holes for attachment to wall.
8. Intermediate Flanges: 2-5/8 inches x 3-1/8 inches (65mm x 80mm) wide x 3-1/8 inch (80mm) diameter.
9. Snap Flange Covers: 18-8 S, Type 304, 22 gauge (0.8mm) drawn stainless steel with satin finish, 3-1/4 inch (85mm) diameter x 1/2 inches (13mm) deep; snap over mounting flange to conceal mounting screws.
10. Configuration and Length: As indicated on Drawings.

G. Sanitary-Napkin Disposal Unit:

1. Basis-of-Design Product: Bobrick B-270
2. Mounting: Surface Mounted.
3. Door or Cover: Self-closing disposal-opening cover.
4. Receptacle: Removable.
5. Material and Finish: Stainless steel, No. 4 finish (satin).

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H. Seat-Cover Dispenser:

1. Basis-of-Design Product: Bobrick B-4221
2. Mounting: Surface Mounted.
3. Minimum Capacity: 250 seat covers.
4. Exposed Material and Finish: Stainless steel, No. 4 finish (satin)
5. Lockset: Tumbler type.

I. Mirror Unit:

1. Basis-of-Design Product: Bobrick B-165 2436
2. Frame: Stainless-steel channel
3. Hangers: Produce rigid, tamper- and theft-resistant installation.
4. Size: Per Drawings.

J. Other Manufacturers:

1. A & J Washroom Accessories, Inc.
2. American Specialties, Inc.

3. PRIVATE-USE BATHROOM ACCESSORIES

A. Toilet Tissue (Roll) Dispenser:

1. Basis of Design Product: Moen Yorkshire, BP5308SN
2. Mounting: Surface mounted.
3. Finish: Satin Nickel

B. Hand-Towel Ring:

1. Basis of Design Product: Moen Yorkshire, BP5386SN
2. Provide one (1) for each unit restroom
3. Mounting: Surface mounted.
4. Finish: Satin nickel

C. Towel Bar:

1. Basis-of-Design Product: Bobrick B-530x24
2. Description: Heavy duty towel bar used in hotel bathrooms.
3. Length: 24 inches.
4. Diameter: 1 inch outside diameter.
5. Clearance to wall from bar: 1 1/2"
6. Mounting: Concealed mounting with snap flange. Withstands 900 pounds downward pull as installed per manufacturer instructions. Fasten to solid blocking as similar to grab bars with mounting kits by manufacturer.
7. Material: 18-8S type 304, 18 gauge stainless steel tubing with satin finish.

D. Grab Bars: Bobrick, or approved equal, meeting specifications below:

1. Mounting: Flanges with concealed fasteners.
2. Material: Stainless steel, 18-gauge type 304
3. Outside Diameter: 1-1/2 inches.
4. Configuration and Length: As indicated on Drawings, to meet ADA/UFSA requirements.

E. Mirror Units, Fixed, flat mirrors:

1. Frame: Frameless.
2. Edges: Beveled.

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3. Hangers: Produce rigid, tamper-resistant installation, flush to wall.
 4. Size: per drawings.
- F. Mirror Units, w/ Medicine Cabinet:
1. Basis of Design Product: Jensen Styleline 840P34CH Medicine Cabinet
 2. Size: 16"x36" nominal mirror dimensions.
 3. Construction: One piece, steel construction, formed and welded 26 gauge steel body with white powder coat paint finish.
 4. Door back is 26 gauge steel body with white powder coat paint finish.
 5. 2mm thick glass, flat mirror on door with 32" piano hinge and two magnetic catches.
 6. Trim: SS8 polished stainless steel trim
 7. Three adjustable shelves painted white.
 8. Reversible for left or right-hand door opening.
 9. Mounting: recessed with screws to solid wood stud or 2x blocking.
- G. Underlavatory Guard (at all units with removable sink-base cabinets and units with no sink-base cabinets):
1. Description: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping, and allow service access without removing coverings.
 2. Material and Finish: Antimicrobial, molded-plastic, white.
- H. Other Manufacturers:
1. Bobrick Washroom Equipment, Inc.
 2. A & J Washroom Accessories, Inc.
 3. American Specialties, Inc.

3.EXECUTION

1. INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated. Coordinate with all other trades to prevent conflict.
- B. Accessibility: Verify all installation heights, dimensions, and clearances for both ADA and UFAS requirements. Notify architect of any potential conflict immediately.
- C. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of three keys to Owner's representative.

END OF SECTION 102800

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SECTION 104413 - FIRE EXTINGUISHER CABINETS

1.GENERAL

1. SUMMARY

- A. Section includes fire protection cabinets for fire extinguishers.

2. SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For fire protection cabinets. Include plans, elevations, sections, details, and attachments to other work.
- C. Samples: For each exposed product and for each color and texture specified.
- D. Maintenance data.

3. QUALITY ASSURANCE

- A. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Coordinate sizes and locations of fire protection cabinets with wall depths.

2.PRODUCTS

1. MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
- B. Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), 1.5 mm thick, with Finish 1 smooth or polished.

2. FIRE PROTECTION CABINET

- A. Cabinet Type: Suitable for fire extinguisher.
 - 1. Products: Subject to compliance with requirements, provide the following:
 - a. Basis of Design: J. L. Industries, Inc., a division of Activar Construction Products Group; Panorama Series. Verify options with Architect prior to ordering.
- B. Cabinet Construction: Nonrated.
- C. Cabinet Material: Steel sheet.

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- D. Recessed Cabinet: Cabinet box recessed in walls of sufficient depth to suit style of trim indicated.
 - 1. Trimless with Hidden Flange: Flange of same metal and finish as box overlaps surrounding wall finish and is concealed from view by an overlapping door.
- E. Semi-recessed Cabinet: Cabinet box partially recessed in walls of sufficient depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend). Provide where walls are of insufficient depth for recessed cabinets but are of sufficient depth to accommodate semi-recessed cabinet installation.
 - 1. Square-Edge Trim: 1-1/4- to 1-1/2-inch backbend depth.
- F. Cabinet Trim Material: Steel sheet.
- G. Door Material: Acrylic.
- H. Door Style: Fully glazed, frameless, backless, acrylic panel.
- I. Door Glazing: Acrylic sheet.
 - 1. Acrylic Sheet Color: Clear transparent acrylic sheet painted white on unexposed side.
- J. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
- K. Accessories:
 - 1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
 - 2. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate on door.
 - a. Identify fire extinguisher in fire protection cabinet with the words "FIRE EXTINGUISHER".
 - 1) Location: Applied to cabinet glazing.
 - 2) Application Process: Silk-screened.
 - 3) Lettering Color: Black.
 - 4) Orientation: Vertical.
- L. Finishes:
 - 1. Manufacturer's standard baked-enamel paint for the following:
 - a. Exterior of cabinet, door, and trim, except for those surfaces indicated to receive another finish.
 - b. Interior of cabinet.

3. FABRICATION

- A. Fire Protection Cabinets: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Miter and weld joints and grind smooth.

3.EXECUTION

1. INSTALLATION

- A. Examine walls and partitions for suitable framing depth and blocking where recessed and semi-recessed cabinets will be installed and prepare recesses as required by type and size of cabinet and trim style.
- B. Install fire protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.]
- C. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.
- D. Identification: Apply decals at locations indicated.
- E. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- F. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 104413

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SECTION 104416 - FIRE EXTINGUISHERS

1.GENERAL

1. SUMMARY

- A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

2. SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Operation and maintenance data.
- C. Warranty: Sample of special warranty.

3. QUALITY ASSURANCE

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
- C. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure fit and function.

2.PRODUCTS

1. PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each fire protection cabinet and mounting bracket indicated.
 - 1. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.
 - a. Multipurpose Dry-Chemical: UL-rated 5 lb. nominal capacity, with monoammonium phosphate-based dry chemical in manufacturer's standard enameled container.

3.EXECUTION

1. INSTALLATION

- A. Examine fire extinguishers for proper charging and tagging.
 - 1. Remove and replace damaged, defective, or undercharged fire extinguishers.

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- B. Install fire extinguishers in locations indicated and in compliance with requirements of authorities having jurisdiction.
 - 1. Mounting Brackets: 54 inches above finished floor to top of fire extinguisher.

END OF SECTION 104416

SECTION 122113 - HORIZONTAL LOUVER BLINDS

1. GENERAL

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.

2. SUMMARY

- A. Section Includes:
 - 1. Horizontal louver blinds with aluminum slats.

3. SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show fabrication and installation details for horizontal louver blinds.
- C. Samples for Initial Selection: For each type and color of horizontal louver blind.
 - 1. Include similar Samples of accessories involving color selection.

4. CLOSEOUT SUBMITTALS

- A. Maintenance Data: For horizontal louver blinds to include in maintenance manuals.

5. 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. Horizontal Louver Blinds: Full-size units equal to 5 percent of quantity installed for each size, color, texture, pattern, and gloss indicated.

6. QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Provide horizontal louver blinds with the fire-test-response characteristics included, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate marking of applicable testing and inspecting agency.
 - 1. Flame-Resistance Ratings: Passes NFPA 701

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7. DELIVERY, STORAGE, AND HANDLING
 - A. Deliver horizontal louver blinds in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

8. FIELD CONDITIONS
 - A. Environmental Limitations: Do not install horizontal louver blinds until construction and wet and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

 - B. Field Measurements: Where horizontal louver blinds are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

2.PRODUCTS

1. MANUFACTURERS
 - A. Source Limitations: Obtain horizontal louver blinds from single source from single manufacturer.

2. HORIZONTAL LOUVER BLINDS, ALUMINUM SLATS
 - 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:

 - B. Basis-of-Design Product: Subject to compliance with requirements, provide comparable product by one of the following:
 1. Hunter Douglas Contract.
 2. Levolor Contract; a Newell Rubbermaid company.

 - C. Slats: Aluminum; alloy and temper recommended by producer for type of use and finish indicated; with crowned profile and radius corners.
 1. Width: 1 inch (25 mm).
 2. Thickness: Manufacturer's standard.
 3. Spacing: Manufacturer's standard.
 4. Finish: One color
 5. Features:
 - a. Lift-Cord Rout Holes: Minimum size required for lift cord and located near back (outside) edge of slat to maximize slat overlap and minimize light gaps between slats.

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- D. Headrail: Formed steel or extruded aluminum; long edges returned or rolled. Headrails fully enclose operating mechanisms on three sides.
 - 1. Capacity: One blind per headrail unless otherwise indicated.
 - 2. Ends: Manufacturer's standard.
 - 3. Manual Lift Mechanism:
 - a. Lift-Cord Lock: Variable; stops lift cord at user-selected position within blind full operating range.
 - b. Operator: Extension of lift cord(s) through lift-cord lock mechanism to form cord pull.
 - 4. Manual Tilt Mechanism: Enclosed worm-gear mechanism and linkage rod that adjusts ladders.
 - a. Tilt: Full.
 - b. Over-Rotation Protection: Manufacturer's detachable operator or slip clutch to prevent over rotation of gear.
 - 5. Manual Lift-Operator and Tilt-Operator Lengths: Manufacturer's standard.
 - 6. Manual Lift-Operator and Tilt-Operator Locations: Manufacturer's standard unless otherwise indicated.
 - 7. Integrated Headrail/Valance: Curved face.
- E. Bottom Rail: Formed-steel or extruded-aluminum tube that secures and protects ends of ladders and lift cords and has plastic- or metal-capped ends.
 - 1. Type: Top contoured to match crowned shape of slat and Bottom contoured to minimize light gaps.
- F. Lift Cords: Manufacturer's standard braided cord.
- G. Ladders: Evenly spaced across headrail at spacing that prevents long-term slat sag.
 - 1. Type: Braided cord.
- H. Valance: Manufacturer's standard.
- I. Mounting Brackets: With spacers and shims required for blind placement and alignment indicated.
 - 1. Type: Inside. Verify clearance with casement window cranks.
 - 2. Intermediate Support: Provide intermediate support brackets to produce support spacing recommended by blind manufacturer for weight and size of blind.
- J. Hold-Down Brackets and Hooks or Pins: Manufacturer's standard.
- K. Side Channels and Perimeter Light Gap Seals: Manufacturer's standard.
- L. Colors, Textures, Patterns, and Gloss:
 - 1. Slats: As selected by Architect from manufacturer's full range.
 - 2. Components: Provide rails, cords, ladders, and materials exposed to view matching or coordinating with slat color unless otherwise indicated.

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3. HORIZONTAL LOUVER BLIND FABRICATION

- A. Product Safety Standard: Fabricate horizontal louver blinds to comply with WCMA A 100.1 including requirements for corded, flexible, looped devices; lead content of components; and warning labels.
- B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F (23 deg C):
 - 1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which blind is installed less 1/4 inch (6 mm) per side or 1/2 inch (13 mm) total, plus or minus 1/8 inch (3.1 mm). Length equal to head-to-sill dimension of opening in which blind is installed less 1/4 inch (6 mm), plus or minus 1/8 inch (3.1 mm).
 - 2. Outside of Jamb Installation: Width and length as indicated, with terminations between blinds of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.
- C. Concealed Components: Noncorrodible or corrosion-resistant-coated materials.
 - 1. Lift-and-Tilt Mechanisms: With permanently lubricated moving parts.
- D. Mounting and Intermediate Brackets: Designed for removal and reinstallation of blind without damaging blind and adjacent surfaces, for supporting blind components, and for bracket positions and blind placement indicated.
- E. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to brackets and adjoining construction; type designed for securing to supporting substrate; and supporting blinds and accessories under conditions of normal use.
- F. Color-Coated Finish:
 - 1. Metal: For components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.
 - 2. Wood: Apply [**manufacturer's standard**] <Insert description> factory-applied finish complying with manufacturer's written instructions for surface preparation, application, and minimum dry film thickness.

3.EXECUTION

1. EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances and other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

2. INSTALLATION

- A. Install horizontal louver blinds level and plumb, aligned and centered on openings, and aligned with adjacent units according to manufacturer's written instructions.
 - 1. Locate so exterior slat edges are not closer than 1 inch (25 mm) from interior faces of glass and not closer than 1/2 inch (13 mm) from interior faces of glazing frames through full operating ranges of blinds.
 - 2. Install mounting and intermediate brackets to prevent deflection of headrails.
 - 3. Install with clearances that prevent interference with adjacent blinds, adjacent construction, and operating hardware of glazed openings, other window treatments, and similar building components and furnishings.

3. ADJUSTING

- A. Adjust horizontal louver blinds to operate free of binding or malfunction through full operating ranges.

4. CLEANING AND PROTECTION

- A. Clean horizontal louver blind surfaces after installation according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions in a manner acceptable to manufacturer and Installer and that ensures that horizontal louver blinds are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged horizontal louver blinds that cannot be repaired in a manner approved by Architect before time of Substantial Completion.

5. DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain systems.

END OF SECTION 122113

SECTION 122413 - ROLLER WINDOW SHADES

1.GENERAL

1. SUMMARY

- A. This Section includes roller shades.
- B. See Division 26 Sections for electrical service and connections for motorized shade operation.

2. SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, details of installation, operational clearances, and relationship to adjoining Work.
 - 1. Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings.
- C. Coordination Drawings: Drawn to scale and coordinating penetrations and ceiling-mounted items.
- D. Samples: For each exposed finish and for each color and texture required.
- E. Window Treatment Schedule: Use same designations indicated on Drawings.
- F. Maintenance data.

3. QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.
- B. Fire-Test-Response Characteristics: Provide products passing flame-resistance testing according to NFPA 701 by a testing agency acceptable to authorities having jurisdiction.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. Comply with WCMA A 100.1.
- E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

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2.PRODUCTS

1. ROLLER SHADES

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
- B. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Am-Source International;
 - 2. BTX Window Automation, Inc.;
 - 3. Custom Laminations, Inc.;
 - 4. Draper Inc.;
 - 5. Hunter Douglas, Inc.; Hunter Douglas Window Fashions Division;
 - 6. Levolor; Levolor-Kirsch Window Fashions; a Newell Rubbermaid Company;
 - 7. Lutron Shading Solutions by VIMCO.;
 - 8. MechoShade Systems, Inc.;
 - 9. Nysan Shading Systems Ltd.;
 - 10. Shade Techniques, Inc.;
 - 11. Silent Gliss USA, Inc.;
 - 12. SMAutomatic, Inc.;
 - 13. Sol-R-Veil;
 - 14. Verosol USA, Inc.; OEM Shades Inc.;
- C. Shade Band Material: PVC-coated fiberglass and polyester blends.
 - 1. Colors: As selected by Architect from manufacturer's full range
 - 2. Material Solar-Optical Properties: ~~XXXX~~
 - 3. Material Openness Factor: 40 percent.
 - 4. Material UV Blockage: percent.
- D. Rollers: Electrogalvanized or epoxy primed steel or extruded-aluminum tube of diameter and wall thickness required to support and fit internal components of operating system and the weight and width of shade band material without sagging; designed to be easily removable from support brackets. Provide capacity for **one** roller shade band per roller.
- E. Direction of Roll: Regular, from back of roller
- F. Mounting Brackets: Fascia end caps, fabricated from steel finished to match fascia or headbox.
- G. Fascia: L-shaped, formed-steel sheet or extruded aluminum; long edges returned or rolled; continuous panel concealing front and bottom of shade roller, brackets, and operating hardware and operators; removable design for access.
- H. Top/Back Cover: L-shaped; material and finish to match fascia; combining with fascia and end caps to form a six-sided headbox enclosure sized to fit shade roller and operating hardware inside.
- I. Pocket-Style Headbox: U-shaped, formed-steel sheet or extruded aluminum; long edges returned or rolled; with a bottom cover consisting of slot opening of minimum dimension to

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allow lowering and raising of shade and a removable or an openable, continuous metal access panel concealing shade roller, brackets, and operating hardware and operators within.

- J. Pocket with Ceiling Slot Opening: Six-sided box units for recessed installation; fabricated from formed-steel sheet, extruded aluminum, or wood; with a bottom consisting of slot opening of minimum dimension to allow lowering and raising of shade and a removable or an openable, continuous metal access panel concealing rollers, brackets, and operating hardware and operators within.
 - 1. Corner Section: Factory formed and welded.
- K. Bottom Bar: Steel or extruded aluminum **metal capped ends**. Provide **concealed, by pocket of shade material, internal-type**.
- L. Mounting: **As indicated on Drawings**.
- M. Shade Operation: Manual; with continuous-loop bead-chain, clutch, and cord tensioner and bracket lift operator.
- N. Shade Operation: Motorized operator.

2. ROLLER SHADE FABRICATION

- A. Unit Sizes: Obtain units fabricated in sizes to fill window and other openings as follows, measured at **74 deg F (23 deg C)**:
 - 1. Shade Units Installed between (Inside) Jambs: Edge of shade not more than 1/4 inch (6 mm) from face of jamb. Length equal to head to sill dimension of opening in which each shade is installed.
 - 2. Shade Units Installed Outside Jambs: Width and length as indicated, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.
- B. Installation Brackets: Designed for easy removal and reinstallation of shade, for supporting **[fascia,] [headbox,]** roller, and operating hardware and for hardware position and shade mounting method indicated.
- C. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to shade hardware and adjoining construction; type designed for securing to supporting substrate; and supporting shades and accessories under conditions of normal use.

3.EXECUTION

1. ROLLER SHADE INSTALLATION

- A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions, and located so shade band is not closer than **[2 inches (50 mm)]** to interior face of glass. Allow clearances for window operation hardware.

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- B. Connections: Connect motorized operators to building electrical system.
- C. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.
- D. Clean roller shade surfaces after installation, according to manufacturer's written instructions.

2. DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain roller shades. Refer to Division 01 Section Demonstration and Training."

END OF SECTION 122413

SECTION 123530 - RESIDENTIAL CASEWORK

1.GENERAL

1. SUMMARY

A. This Section includes the following:

1. Kitchen cabinets.
2. Vanity cabinets.
3. Solid-surfacing-material countertops and backsplashes.

2. SUBMITTALS

A. Product Data: For cabinets, Quartz Countertops, and cabinet hardware.

B. Shop Drawings: For cabinets and countertops. Include plans, elevations, details, and attachments to other work. Show materials, finishes, filler panels, hardware, edge and backsplash profiles, methods of joining countertops, and cutouts for plumbing fixtures.

C. Samples: For each type of material exposed to view.

D. LEED Submittals:

1. Credit EQ 4.4: Composite wood and adhesive manufacturer's product data indicating that products contain no urea formaldehyde.
2. Credit MR 7: Certificates of chain-of-custody signed by manufacturers certifying that wood used to produce cabinets[**and countertops**] was obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria."
 - a. Include statement indicating costs for products containing certified wood.

3. QUALITY ASSURANCE

A. Quality Standards: Unless otherwise indicated, comply with the following standards:

1. Cabinets: KCMA A161.1.
 - a. KCMA Certification: Provide cabinets with KCMA's "Certified Cabinet" seal affixed in a semiexposed location.
2. Plastic-Laminate Countertops: KCMA A161.2.

2.PRODUCTS

1. CABINET MATERIALS

A. General:

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1. Certified Wood Materials: Provide cabinets made from wood and wood-based materials that are produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria."
2. Adhesives: Do not use adhesives that contain urea formaldehyde.
3. Hardwood Lumber: Kiln dried to 7 percent moisture content.
4. Softwood Lumber: Kiln dried to 10 percent moisture content.
5. Hardwood Plywood: HPVA HP-1, made without urea formaldehyde.
6. Particleboard: ANSI A208.1, Grade M-2, made without urea formaldehyde.
7. Medium-Density Fiberboard: ANSI A208.2, Grade MD, made without urea formaldehyde.
8. Hardboard: AHA A135.4, Class 1 Tempered.

B. Exposed Materials:

1. Exposed Wood Species: **Manufacturer's standard domestic hardwood species.**
 - a. Do not use two adjacent exposed surfaces that are noticeably dissimilar in color, grain, figure, or natural character markings.
 - b. Staining and Finish: Paint grade - color as indicated on drawings.
2. Solid Wood: Clear hardwood lumber of species indicated, free of defects.
3. Plywood: Hardwood plywood with face veneer of species indicated, with Grade A faces and Grade C backs of same species as faces.
4. Plastic Laminate: Particleboard faced with high-pressure decorative laminate complying with NEMA LD 3, Grade VGS.
 - a. Colors, Textures, and Patterns: **As selected by Architect from cabinet manufacturer's full range.**
5. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.
 - a. Provide PVC or polyester edge banding complying with LMA EDG-1.
 - b. Colors: **As selected by Architect from cabinet manufacturer's full range.**
6. Thermoformed-Vinyl-Faced Panels: Medium-density fiberboard, milled to required shapes, with a thermoformed vinyl overlay applied in a vacuum or membrane press.
 - a. Color: **As selected by Architect from cabinet manufacturer's full range.**
7. PVC Edge Molding: Rigid PVC extrusions, through color with satin finish, 3 mm thick at doors and drawer fronts, and 1 mm thick elsewhere.
 - a. Color: **As selected by Architect from cabinet manufacturer's full range.**

C. Semiexposed Materials: Unless otherwise indicated, provide the following:

1. Solid Wood: Sound hardwood lumber, selected to eliminate appearance defects. Painted as indicated on drawings.
2. Plywood: Hardwood plywood with Grade C faces and not less than Grade 3 backs of same species as faces. Painted as indicated on drawings.
3. Plastic Laminate: Particleboard faced with high-pressure decorative laminate complying with NEMA LD 3, Grade VGS.

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- a. Colors, Textures, and Patterns: **As selected by Architect from cabinet manufacturer's full range.**
 4. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.
 - a. Provide PVC or polyester edge banding complying with LMA EDG-1.
 - b. Colors: **As selected by Architect from cabinet manufacturer's full range.**
 5. Vinyl-Faced Particleboard: Medium-density particleboard with vinyl film adhesively bonded to particleboard.
 - a. Colors, Textures, and Patterns: **As selected by Architect from cabinet manufacturer's full range.**
 - D. Concealed Materials: Solid wood or plywood, of any hardwood or softwood species, with no defects affecting strength or utility; particleboard; medium-density fiberboard; or hardboard.
2. CABINET HARDWARE
- A. General: Manufacturer's standard units complying with BHMA A156.9, of type, size, style, material, and finish **as selected by Architect from manufacturer's full range.**
 - B. Pulls: **Wire pulls**
 - C. Hinges: **Concealed European-style self-closing hinges.**
 - D. Drawer Guides: Epoxy-coated-metal, self-closing drawer guides; designed to prevent rebound when drawers are closed; with nylon-tired, ball-bearing rollers; and complying with BHMA A156.9, Type B05011 or B05091.
3. COUNTERTOP MATERIALS
- A. Certified Wood Materials: Provide countertops made from wood and wood-based materials that are produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria."
 - B. Particleboard: ANSI A208.1, Grade **M-2**.
 - C. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.
 - D. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2.
 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

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- a. Avonite, Inc.
 - b. E. I. du Pont de Nemours and Company.
 - c. Formica Corp.
 - d. Nevamar Company, LLC.
 - e. Swan Corporation (The).
 - f. Wilsonart International.
3. Type: Provide Standard Type, unless Special Purpose Type is indicated.
 4. Integral Sink Bowls: Comply with ISSFA-2 and ANSI Z124.3, Type 5 or Type 6, without a precoated finish.
 5. Colors and Patterns: **As selected by Architect from manufacturer's full range.**
- E. Solid Wood Edges and Trim: Clear lumber, free of defects, selected for compatible grain and color, and kiln dried to 7 percent moisture content.
4. CABINETS
- A. Available Products: Subject to compliance with requirements, cabinets that may be incorporated into the Work include, but are not limited to, the following:
 - B. Face Style: **Flush overlay.**
 - C. Cabinet Style: **Face Frame.**
 - D. Door and Drawer Fronts: Solid-wood stiles and rails, **5/8 inch (16 mm)** thick, with **3/4-inch- (19-mm-)** thick, solid-wood center panels.
 - E. Door and Drawer Fronts: Solid-wood stiles and rails, **3/4 inch (19 mm)** thick, with **1/4-inch- (6.4-mm-)** thick, veneer-faced plywood center panels.
 - F. Door and Drawer Fronts: **1/2-inch- (12.7-mm-)** thick, veneer-faced plywood.
 - G. Door and Drawer Fronts: **1/2-inch- (12.7-mm-)** thick plastic-laminate-faced particleboard[, **with continuous solid-wood pulls on one edge**] [, **with PVC edge banding**].
 - H. Door and Drawer Fronts: **1/2-inch- (12.7-mm-)** thick thermoset decorative panels.
 - I. Door and Drawer Fronts: **1/2-inch- (12.7-mm-)** thick, thermoformed-vinyl-faced panels with vinyl overlay on **faces and edges and with thermoset-decorative-panel backs.**
 - J. Face Frames: **3/4-by-1-5/8-inch (19-by-41-mm)** solid wood.
 - K. Face Frames: **5/8-inch- (16-mm-)** thick particleboard with plastic laminate on exposed and semiexposed surfaces.
 - L. Face Frames: **5/8-inch- (16-mm-)** thick thermoset-decorative-panel material.
 - M. Face Frames: **1/2-inch- (12.7-mm-)** thick, thermoformed-vinyl-faced panels with vinyl overlay on exposed and semiexposed surfaces.
 - N. Exposed Cabinet End Finish: **Wood veneer.**

5. SOLID-SURFACING-MATERIAL COUNTERTOPS

- A. Configuration: Provide countertops with the following front and backsplash style:
 - 1. Front: **Straight, slightly eased at top.**
 - 2. Backsplash: **Straight, slightly eased at corner.**
 - 3. Endsplash: **Matching backsplash.**
- B. Countertops: **3/4-inch- (19-mm-)]** thick, solid-surfacing material **with built-up edges.**
- C. Backsplashes: **3/4-inch- (19-mm-)]** thick, solid-surfacing material.

3.EXECUTION

1. INSTALLATION

- A. Install cabinets with no variations in flushness of adjoining surfaces; use concealed shims. Where cabinets abut other finished work, scribe and cut for accurate fit. Provide filler strips, scribe strips, and moldings in finish to match cabinet face.
- B. Install cabinets without distortion so doors and drawers fit openings and are aligned. Complete installation of hardware and accessories as indicated.
- C. Install casework level and plumb to a tolerance of **1/8 inch in 8 feet (3 mm in 2.4 m).**
- D. Fasten cabinets to adjacent units and to backing.
 - 1. Fasten wall cabinets through back, near top and bottom, at ends and not less than **24 inches (600 mm)** o.c. with No. 10 wafer-head screws sized for **1-inch (25-mm)** penetration into wood framing, blocking, or hanging strips.
 - 2. Fasten wall cabinets through back, near top and bottom, at ends and not less than **24 inches (600 mm)** o.c., with toggle bolts through metal backing behind gypsum board.
- E. Fasten plastic-laminate countertops by screwing through corner blocks of base units into underside of countertop. Form seams using splines to align adjacent surfaces, and secure with glue and concealed clamping devices designed for this purpose.
- F. Fasten solid-surfacing-material countertops by screwing through corner blocks of base units into underside of countertop. Align adjacent surfaces, and form seams to comply with manufacturer's written instructions using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- G. Adjust cabinets and hardware so doors and drawers are centered in openings and operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

END OF SECTION 123530

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SECTION 311000 SITE CLEARING

1.GENERAL

- A. This Section includes:
 - 1. Site Clearing.
 - 2. Temporary erosion and sedimentation control measures.
- B. Related Sections:
 - 1. 01 74 19 – Construction Waste Management & Disposal
 - 2. 32 90 00 (02900) – Planting.

1.2 SUBMITTALS

- A. Photographs, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.
 - 1. Submit on CD. Organize photographs by date and description. Format CD to ISO 9660.
- B. Erosion Control Plan: Not less than 10 days before the Pre-construction meeting, prepare and submit an Erosion Control Plan.
 - 1. Format: At a minimum, address the following elements:
 - a. Identification of Project.
 - b. Details of Plan, specific to the site, that comply with requirements of the EPA Effluent Guidelines, National Pollutant Discharge Elimination System (NPDES), State Pollutant Discharge Elimination System (SPDES).and requirements of authorities having jurisdiction. **[Comply with erosion and sedimentation requirements of EPA Effluent Guidelines and NPDES regardless of size of project site.]**
 - c. Monitoring procedures. **[Comply with erosion and sedimentation monitoring requirements of EPA Effluent Guidelines regardless of size of project site.]**
 - 2. Revise and resubmit Plan as required by Owner.
 - a. Approval of Contractor's Plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations.

PART 2 – PRODUCTS

PART 3 - EXECUTION

3.X SITE ENVIRONMENTAL PROCEDURES

- A. Waste Management: As specified in Section 01 74 19 – Construction Waste Management and as follows:
 - 1. Mulch: Identify organic debris that is free of disease, pest infestation, and chemical contamination and that is suitable for recycling on site. Chip suitable organic debris for use as mulch on site. Stockpile where indicated on Drawings or directed by Owner. Coordinate with requirements of Section 32 90 00 – Planting.
 - 2. Topsoil: Where existing topsoil is scheduled to be removed; carefully strip and stockpile for reuse. Stockpile where indicated on Drawings or directed by Owner. Coordinate with requirements of Section 32 90 00 – Planting.

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3. Compost: Identify organic debris suitable for composting on site. Coordinate with requirements of Sections 01 74 19 – Construction Waste Management and 32 90 00 - Planting.
- B. Solarizing Soil: As specified in Section 32 90 00 - Planting.
- C. Erosion Control: Implement an Erosion Control Plan in accordance with approved submittals. Coordinate with requirements of Section 01 57 19.13 (01354) – Environmental Management.
1. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
 2. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal

END OF SECTION

SECTION 31 00 00

EARTHWORK

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:
 - 1. Furnishing all labor, materials, and equipment necessary for all earthwork as indicated on drawings and specified here-in, or as required for completion of the Contract, as applicable. Includes items such as the following:
 - a. Rough grading
 - b. Filling and backfilling
 - c. Excavation
 - d. On-site utility verification
 - e. Protection of work, people, and existing site elements
 - f. Seasonal limits
 - g. Materials
 - h. Execution of work
- B. Related Sections:
 - 1. Section 01 50 00: Temporary Facilities and Controls
 - 2. Section 31 23 33: Trenching and Backfilling
- C. Reference Standards:
 - 1. 2019 California Building Code (CBC)
 - 2. ASTM D1557: Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft/lbf/ft³ (2,700 kN-m/m³)).
 - 3. ASTM D422: Standard Test Method for Particle-Size Analysis of Soils
 - 4. ASTM D4318: Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
 - 5. CALTRANS Standard Specifications, Current Edition
 - 6. CAL-OSHA, Title 8, Section 1590 (e)
 - 7. Any work within the street, highway or right-of-way shall be performed in accordance with the requirement of the governmental agencies having jurisdiction, and shall not begin until all of those governing authorities have been notified

1.3 SUBMITTALS

- A. Import Materials: Submit information regarding all materials to be imported to the site for use as engineered fill, aggregate base, trench backfill, or other materials required to accomplish the earthwork element of this project.
- B. Project Record Drawings: Accurately record locations of utilities remaining, re-routed utilities, new utilities, and newly discovered utilities by horizontal dimensions, elevations, inverts, and slope gradients.

1.4 QUALITY ASSURANCE

- A. Use only new materials and products unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.
- B. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.
- C. The representatives of the Owner's testing lab will not act as supervisor of construction, nor will they direct construction operations. Neither the presence of the Owner's testing lab representatives nor the testing by the Owner's testing lab shall excuse the contractors or subcontractors for defects discovered in their work during or following completion of the project. Correcting of inadequate compaction or moisture content is the sole responsibility of the contractor.
- D. Tests: See Part 3 for Compaction Testing.
- E. Contractor shall be solely responsible for all subgrades built. Failures resulting from inadequate compaction or moisture content are the responsibility of the contractor. Contractor shall be solely responsible for any and all repairs.

1.5 PROTECTION

- A. Protect all existing structures, fences, roads, sidewalks, paving, curbs, and other items as necessary from earthwork activity.
- B. Protect above or below grade utilities which are to remain.
- C. Repair damage to any existing site features which are to remain.
- D. Repair and restoration shall be equal to quality and appearance of prior condition and to the satisfaction of the Owner's Representative.

1.6 GRADE STAKES AND LINES

- A. All grading and subgrading shall be controlled by Contractor-installed intermediate grade stakes and lines necessary to obtain the finished grade elevations shown or implied in the Drawings. Subgrade and finish grade surfaces shall conform to the control planes established by these grade stakes and lines.

- B. Protect and maintain all existing benchmarks, monuments, and other reference points. If disturbed or destroyed, they shall be replaced at the Contractor's expense.
- C. Contractor shall set temporary benchmarks as necessary to properly complete construction operations.

1.7 SURVEYING

- A. Contractor shall be responsible for hiring a licensed professional surveyor to perform all surveying, layout, and staking.

1.8 WARRANTY

- A. Refer to General Conditions.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Transport, store, and handle in strict accord with the local jurisdiction.
- B. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle, and protect such materials and work.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Engineered Fill Materials: All fill shall be of approved local materials supplemented by imported fill if necessary. "Approved" local materials are defined as local soils tested and approved by Geotechnical Engineer.
- B. Aggregate Base: Provide ¾-inch Class 2 Aggregate Base conforming to standard gradation and material requirements specified in Caltrans Standard Specifications, Section 26. For Class 2 Aggregate Base below asphalt concrete paving or concrete flatwork, the aggregate shall have at least 50% crushed course particles with at least one fractured face using Caltrans Test Method 205. Aggregate for Class 2 aggregate base shall be free from organic matter and other deleterious substances and shall be of such nature that it can be compacted readily under watering and rolling to form a firm, stable base.
- C. Imported fill shall be free of contaminants and have corrosion characteristics within the acceptable limits. **All import fill material shall be tested and approved by the Engineer prior to transportation to the site.** Proposed fill material shall comply with DTSC guidelines to include Phase 1 environmental site assessment and related tests. Refer to the October 2001 DTSC Information Advisory for clean imported fill material:
 - 1. DTSC Testing: Site work contractor is to coordinate testing with an analytical lab, hired by the owner, licensed by the State of California for the DTSC

- testing. The costs associated with the testing will be paid by the contractor.
2. DTSC testing shall include documentation as to the previous land use, location, and history. Soils shall be analyzed for all compounds of concern to ensure the imported soil is uncontaminated and acceptable. Testing shall be performed per the recommendations included in DTSC Imported Fill Advisory Soils shall be tested prior to import to the project site.
 3. Lab shall determine geographically which tests and analysis comparison will be appropriate for the testing. (CAM 17 / Title 22); (RWQCB) Regional Water Quality Control Board; or (OEHHA) Office of Environmental Health Hazard Assessment.
 4. Frequency of testing shall be conducted in accordance with DTSC's Imported Fill Advisory as follows:

Fill Material Sampling Schedule

Area of Individual Borrow Area	Sampling Requirements
2 Acres or less	Minimum of 4 samples
2 to 4 Acres	Minimum of 1 sample every ½ Acre
4 to 10 Acres	Minimum of 8 Samples
Greater than 10 Acres	Minimum of 8 locations with 4 subsamples per location

Volume of Borrow Area Stockpile

Up to 1,000 Cubic Yards	1 sample per 250 cubic yards
1,000 to 5,000 Cubic Yards	4 samples for the first 1000 cubic Yards + 1 sample per each additional 500 cubic yards
Greater than 5,000 Cubic Yards	12 samples for the first 5,000 cubic yards + 1 sample per each additional 1,000 cubic yards

5. Results of the testing analysis shall be sent to the Owner; Project Inspector, Project Civil Engineer, DTSC.

- D. Permeable Material: Permeable material shall consist of crushed rock conforming to the following gradation requirements, unless otherwise approved by the Engineer:

<u>Sieve Size</u>	<u>Percent Passing</u>
3/4"	90-100
1/2"	30-60
3/8"	0-20
No. 4	0-5

1. The portion of the material that is retained on a 3/8" sieve shall contain at least 50% of particles having 3 or more fractured faces. Not over 5% shall be pieces that show no fractured faces. Rounded rock material (commonly called 'washed rock') that shows little evidence of the crushing process is not

acceptable and will be rejected.

- E. Filter Fabric: Filter fabric shall meet the material requirements specified in Caltrans Standard Specifications, section 96-1.02B.
- F. Water: Contractor shall furnish all required water for construction purposes, including compaction and dust control. Water shall be potable.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

- A. Contractor shall acquaint himself with all site conditions. If unknown active utilities are encountered during work, notify Engineer promptly for instructions. Failure to notify will make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.
- B. Existing conditions are shown on the plans to the extent known. Should the Contractor encounter any deviation between actual conditions and those shown, he is to immediately notify the Owner before continuing work. Unknown buried utility lines may exist. If encountered, notify Owner's Representative immediately for direction and re-direct work to avoid delay. Failure to notify will make Contractor liable for damage to these utilities arising from Contractor's operations subsequent to discovery of such unknown active utilities.
 - 1. Cooperate and coordinate with Owner's Representative and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility district.
 - 2. Do not interrupt existing utilities serving occupied facilities without proper notification to, and written direction from, Owner's Representative.
- C. Excavation dewatering may be necessary. Contractor shall provide any and all tools, equipment and labor necessary for excavation dewatering no matter what the source. Dewatering shall be continuous until all site utilities are installed and backfilled.

3.2 ON SITE UTILITY VERIFICATION AND REPAIR PROCEDURES

- A. Ground-breaking requirements:
 - 1. All underground work performed by a Contractor must be authorized by the Owner's Construction Manager prior to start of construction.
- B. Underground Utility Locating:
 - 1. The contractor shall hire an Underground Utility Locating Service to locate existing underground utility pathways in areas affected by the scope of work for excavation.
 - 2. The Underground Utility Locator Service must be able to locate existing utilities at a depth of at least 72".

3. The Underground Utility Locator Service must be able to locate but are not limited to locating the following types of utility pathways:
 - a. All conduit pathways containing 110 volt or greater 50-60Hz electrical wire.
 - b. All conduit pathways containing an active cable TV system.
 - c. All conduit pathways containing wire or conductor in which a signal can be attached and generated without damaging or triggering the existing systems.
 - d. All empty conduit pathways or pipe in which a signal probe or sonde (miniature transmitter) can be inserted.
 - e. All conduit pathways containing non-conductive cables or wires in which a signal probe or sonde (miniature transmitter) can be inserted.
 - f. All plastic and other nonconductive water lines in which a transmitter can be applied to create a low frequency pressure wave (signal) without damaging or triggering the existing systems.
 - g. All copper or steel waterlines and plastic or steel gas lines
4. All markings made by the Underground Utility Locator Service or other shall be clear and visible.
5. The contractor shall maintain all markings made by Underground Utility Locator Service or other throughout the entire length of the project.
6. The Underground Utility Locator Service shall provide the contractor with two sets of maps showing the location of utilities and average depth. They will be referenced to permanent buildings. Contractor will deliver one copy to the Owner at no additional charge.
7. Contractor is responsible to contact Underground Service Alert (U.S.A. 800/642-2444) and receive clearance prior to any excavation operations.
8. Contractor shall inform the Owner no later than five (5) days prior to the date scheduled for the utility locator service to be on site.

3.3 PROTECTION

- A. Adequate protection measures shall be provided to protect workmen and passers-by on and off the site. Adjacent property shall be fully protected throughout the operations. Blasting will not be permitted. Prevent damage to adjoining improvements and properties both above and below grade. Restore such improvements to original condition should damage occur. Replace trees and shrubs outside building area disturbed by operations.
- B. In accordance with generally accepted construction practices, the Contractor shall be solely and completely responsible for working conditions at the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal working hours.

- C. Any construction review of the Contractor's performance conducted by the Geotechnical Engineer is not intended to include review of the adequacy of the Contractor's safety measures, in, on, or near the construction site.
- D. Provide shoring, sheeting, sheet piles and or bracing to prevent caving, erosion or gullyng of sides of excavation.
- E. Surface Drainage: Provide for surface drainage during period of construction in manner to avoid creating nuisance to adjacent areas. The contractor shall make a reasonable effort on a daily basis to keep all excavations and the site free from water during entire progress of work, regardless of cause, source, or nature of water.
- F. Adjacent streets and sidewalks shall be kept free of mud, dirt or similar nuisances resulting from earthwork operations.
- G. The site and adjacent influenced areas shall be watered as required to suppress dust nuisance. Dust control measures shall be in accordance with the local jurisdiction.

3.4 SEASONAL LIMITS

- A. No fill material shall be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by rains, fill operations shall not be resumed until field tests indicate that moisture content and density of fill are satisfactory.
- B. Excessively wet fill material shall be bladed and aerated.

3.5 INSPECTION LAYOUT AND PREPARATION

- A. Prior to installation of the work of this Section, carefully inspect and verify by field measurements that installed work of all other trades is complete to the point where this installation may properly commence
- B. Layout all work, establish grades, locate existing underground utilities, set markers and stakes, setup and maintain barricades and protection facilities; all prior to beginning actual earthwork operations. Layout and staking shall be done by a licensed Land Surveyor or Professional Civil Engineer.
- C. Verify that specified items may be installed in accordance with the approved design.
- D. In event of discrepancy, immediately notify Owner. Do not proceed in discrepant areas until discrepancies have been fully resolved.

3.6 PERFORMANCE

- A. General: Do all grading, excavating, and cutting necessary to conform finish grade and contours as shown. All cuts shall be made to true surface of subgrade.
- B. Archaeological Artifacts: Should any artifacts of possible historic interest be

encountered during earthwork operations, halt all work in area of discovery and immediately contact the Owner for notification of appropriate authorities.

- C. Degree of Compaction: Percentage of maximum density, hereinafter specified as degree of compaction required, means density equivalent to that percentage of maximum dry density and such expressed percentage thereof will be minimum acceptable compaction for specified work.
- D. Moisture Content: Moisture content shall be as noted below and as called for on the plans. Moisture content shall be maintained until subgrade is covered by surfacing materials.

3.7 DEMOLITION, DISPOSAL, AND DISPOSITION OF UNDESIRABLE MAN-MADE FEATURES

- A. All other obstructions, such as abandoned utility lines, septic tanks, concrete foundations, and the like shall be removed from site. Excavations resulting from these removal activities shall be cleaned of all loose materials and widened as necessary to permit access for compaction equipment. Areas exposed by any required over-excavation should be scarified to a depth of 12", moisture-conditioned to near optimum moisture content, and recompacted to at least 90% of the maximum dry density.

3.8 TESTING AND OBSERVATION

- A. General: Refer to Section 01 40 00: Quality Requirements.
- B. All grading and earthwork operations shall be observed by the Engineer or his representative, serving as the representative of the Owner.
- C. Field compaction tests shall be made by the Engineer or his representative in accordance with Caltrans 216/231. If moisture content and/or compaction are not satisfactory, Contractor will be required to change equipment or procedure or both, as required to obtain specified moisture or compaction. Notify Engineer at least 48 hours in advance of any filling operation.
- D. Earthwork shall not be performed without the notification or approval of the Engineer or his representative. The Contractor shall notify the Engineer at least two (2) working days prior to commencement of any aspect of the site earthwork.
- E. If the Contractor should fail to meet the compaction or design requirements embodied in this document and on the applicable plans, he shall make the necessary readjustments until all work is deemed satisfactory, as determined by the Engineer.
- F. Costs of the Engineer or his representative will be borne by Owner, except those costs incurred for re-tests or re-inspection will be paid by Owner and back charged to Contractor.
 - 1. If Contractor elects to process or mine onsite materials for use as Suitable Fill, Aggregate Sub Base, Aggregate Base, Rock, Crushed Rock or sand the

- cost of all testing of this material shall be paid for by the Contractor.
2. Testing of import fill for compliance with Department of Toxic Substance Control (DTSC) shall be paid for by the Contractor.

3.9 CLEARING AND GRUBBING

- A. Prior to grading, remove all debris off-site. Remove trees and brush including the root systems. Holes resulting from tree and brush removal should be prepared and backfilled. This may require deepening and/or widening the holes to adequately remove disturbed soil and provide room for compaction equipment. Strip the surface of all organics.

3.10 CUTTING

- A. Building pads that are located within a cut/fill transition area will have to be overexcavated to provide a semi-uniform fill beneath the building pad. The portions of building pads located in cut areas shall be overexcavated to provide no more than 1 foot difference in fill placed in the same building pad.
- B. Do all cutting necessary to bring finish grade to elevations shown on Drawings.
- C. When excavation through roots is necessary, cut roots by hand.
- D. Carefully excavate around existing utilities to avoid unnecessary damage. The contractor shall anticipate and perform hand work near existing utilities, without additional claims or cost.

3.11 SUBGRADE PREPARATION

- A. Grade compact and finish all subgrades within a tolerance of 0.10' of grades as indicated on Drawings and so as not to pool water. Subgrade within building pads and concrete walks shall be within 0.05' of grades indicated.
- B. After clearing, grubbing, and cutting, subsurface shall be plowed or scarified to a depth of at least 6", until surface is free from ruts, hummocks or other uneven features and uniform and free from large clods. Moisture condition to optimum moisture content and recompact to at least 90% of the maximum dry density. If the existing soils are at a water content higher than specified, the contractor shall provide multiple daily aerations by ripping, blading, and/or disking to dry the soils to a moisture content where the specified degree of compaction can be achieved. After seven (7) consecutive working days of daily aerations, and the moisture content of the soil remains higher than specified, the contractor shall notify the Engineer. If the existing soils have a moisture content lower than specified, the contractor shall scarify, rip, water, and blade existing soil to achieve specified moisture content. The contractor shall make proper allowance in schedule and methods to complete this work.
- C. Compacted subgrade should be non-yielding under construction traffic, including a

10-wheel truck, such as a water truck or dump truck, in all pavement areas. Removal and subsequent replacement of some material (such as, areas of excessively wet materials, unstable subgrade, or pumping soils) may be required.

- D. Subgrade preparation for pavement areas shall extend laterally at least 2 feet beyond the edge of pavement.
- E. Where Contractor over-excavates building pads through error, resulting excavation shall be recompacted as engineered fill at Contractor's expense.

3.12 PLACING, SPREADING, AND COMPACTING ENGINEERED FILL MATERIAL

- A. See the "Slope Construction" section of this specification for requirements when constructing in areas with existing slopes.
- B. Filter fabric around permeable material shall be installed in accordance with the provisions of Caltrans Standard Specifications, Section 68-1.03B.
- C. Selected fill material shall be placed in horizontal lifts which, when compacted, shall not exceed 6 inches in compacted thickness. Each layer shall be spread evenly and thoroughly mixed to insure uniformity in moisture content
- D. Selected fill material shall be moisture-conditioned to specified moisture content. Selected fill material shall be unfrozen. When moisture content of fill material is below that specified, add water until proper moisture content is achieved. When moisture content is above that specified, aerate by blading, or other methods noted in this Section, until moisture content is satisfactory.
- E. After each layer has been placed, mixed, and spread evenly, it shall be thoroughly compacted to the levels specified on the project plans. Compact each layer over its entire area until desired density has been obtained.
- F. Compaction of Fill in Trenches: See Specification Section 31 23 33 "Trenching and Backfilling"
- G. Jetting of fill materials will not be allowed.

3.13 SLOPE CONSTRUCTION

- A. Cut slopes shall be constructed to no steeper than 2:1 (horizontal:vertical). Fill slopes shall be constructed to no steeper than 2:1 (horizontal:vertical). Prior to placement of fill on an existing slope the existing slope shall be benched. The benches shall be in a ratio of 1 horizontal to 5 vertical. The face of the fill slopes shall be compacted as the fill is placed, or the slope may be overbuilt and then cut back to the design grade. Compaction by track walking will not be allowed.

3.14 FINISH GRADING

- A. At completion of project, site shall be finished graded, as indicated on Drawings. Finish grades shall be "flat graded" to grades shown on the drawing. Mounding of finish grades will not be allowed unless otherwise directed on the landscape drawings. Tolerances for finish grades in drainage swales shall be $\pm 0.05'$. Tie in new and existing finish grades.
- B. Leave all landscaped areas in finish condition for lawn seeding. Landscaped planters shall be graded uniformly from edge of planter to inlets. If sod is used for turf areas the finish grade on which it is placed shall be lowered to allow for sod thickness. All landscape areas shall be left free of rock or foreign material. All landscape areas shall be approved by Engineer prior to any planting.

3.15 SURPLUS MATERIAL

- A. Excavated material not required for grading or backfill shall be removed from site at contractor's expense.

3.16 CLEANING

- A. Refer to Section 01 74 19: Construction Waste Management and Disposal.
- B. Remove from fill all vegetation, wood, form lumber, casual lumber, and shavings, in contact with ground; buried wood will not be permitted in any fill.

END OF SECTION 31 00 00

PARENTS AND FRIENDS INC.

SECTION 312000 EARTH MOVING

PART 1-GENERAL

1.1 SUMMARY

A. Section includes: 1. Preparing subgrades for slabs-on-grade, walks and pavements.

2. Drainage course for concrete slabs-on-grade.

3. Subbase course for concrete walks and pavements.

4. Subbase course and base course for asphalt paving.

5. Excavating and backfilling for utility trenches.

B. Geotechnical Investigation: A geotechnical investigation has been prepared for the project by SHN Consulting Engineers & Geologist, dated May 3, 2012. All earthwork operations shall be in accordance with the geotechnical investigation.

1.2 DEFINITIONS

A. Backfill: Soil material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.

2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

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F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Engineer. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

I. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

J. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

K. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.3 QUALITY ASSURANCE

A. Pre-excavation Conference: Conduct conference at each project site. Conference meeting time and exact location at the project site to be determined by Owner.

1.4 PROJECT CONDITIONS

A. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth moving operations.

B. Do not commence earth moving operations until plant-protection measures are in place.

PART 2 - PRODUCTS

PARENTS AND FRIENDS INC.

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487, or a combination of these groups; free of rock or gravel larger than 1 1/2 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Subbase Material: Imported, clean 1-1/2 - 0 inch crushed rock or crushed gravel, free of foreign material and meeting the requirements of the Oregon Standard Specifications for Construction, APWA and ODOT.

E. Base Course: Imported, clean 3/4 - 0 inch crushed rock or crushed gravel, free of foreign material and meeting the requirements of the Oregon Standard Specifications for Construction, APWA and ODOT.

F. Structural Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; with a maximum aggregate size of 1 1/2-inch and not more than 5 percent passing a No. 200 sieve (washed analysis).

G. Bedding Course: Imported, clean 3/4 - 0 inch crushed rock or crushed gravel, free of foreign material and meeting the requirements of the Oregon Standard Specifications for Construction, APWA and ODOT.

2.2 ACCESSORIES - TRENCHING

A. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored to comply with local practice or requirements of authorities having jurisdiction.

PART 3 - EXECUTION

3.1 PREPARATION

PARENTS AND FRIENDS INC.

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.

B. Protect and maintain erosion and sedimentation controls during earth moving operations.

C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.3 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

B. Excavations at Edges of Tree- and Plant-Protection Zones:

1. Excavate by hand to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.

3.4 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.5 EXCAVATION FOR UTILITY TRENCHES

PARENTS AND FRIENDS INC.

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 6 inches higher than top of pipe or conduit unless otherwise indicated.

1. Clearance: As indicated on plans.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material, 3 inches deeper elsewhere, to allow for bedding course.

D. Trenches in Tree- and Plant-Protection Zones:

1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.

2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.

3. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.6 SUBGRADE INSPECTION

A. Subgrade shall be inspected and approved by a geotechnical engineer.

B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer, without additional compensation.

3.7 UNAUTHORIZED EXCAVATION

A. Unauthorized Excavation: Consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Engineer.

1. Fill unauthorized excavations as directed by Engineer.

3.8 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.9 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Place and compact initial backfill of subbase material, free of particles larger than 1 inch in any dimension, to a height of 6 inches over the pipe or conduit.

1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

D. Place and compact final backfill of satisfactory soil to final subgrade elevation.

E. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.10 FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers as outlined in the geotechnical investigation.

3.11 COMPACTION OF BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 12 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

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B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry density according to ASTM D 689:

1. Under pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.

2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 95 percent.

3. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.

4. For utility trenches, compact each layer of initial and final backfill soil material at 95 percent under paved areas and 85 percent under unpaved areas.

3.12 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Turf or Unpaved Areas: Plus or minus 1 inch.

2. Walks: Plus or minus 1/2 inch.

3. Pavements: Plus or minus 1/2 inch.

3.13 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place subbase course and base course under pavements and walks as follows:

1. Shape subbase course and base course to required crown elevations and cross-slope grades.

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2. Place subbase course and base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.

3. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry density according to ASTM D 689.

3.14 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

A. Place drainage course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:

1. Place drainage course that exceeds 8 inches in compacted thickness in layers of equal thickness.

2. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.15 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer as required for testing. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

C. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.16 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

PARENTS AND FRIENDS INC.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.17 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION

SECTION 31 23 33 TRENCHING AND BACKFILLING

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: Trench excavation, shoring, dewatering, unsuitable subgrade removal and replacement, trench backfill and compaction, and all other associated work involved in trench excavations.
- B. Reference Standards:
 - 1. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop.
 - 2. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ [2,700 kN m/m³]).
 - 3. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.3 SUBMITTALS

- A. See Section 01 33 00: Submittal Procedures.
- B. Material information for all backfill material.
- C. Mix design for slurry cement being used for trench backfilling.
- D. Load slips for all material delivery trucks shall be delivered to the job site with the truck. The Contractor shall retain all load slips and shall make them available to the Engineer upon request.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. When necessary, store materials on site in advance of need.
- B. Prevent contamination.
- C. Protect stockpiles from erosion and deterioration of materials.

PART 2 PRODUCTS

2.1 FILL MATERIALS

- A. General: Material specifications listed on the Plans, where applicable, shall supersede those listed in this Section.
- B. Aggregate Base: Aggregate base shall be Class 2 aggregate base (3/4-inch maximum) and shall conform to Section 26, "Aggregate Bases" of the Caltrans Standard Specifications.
- C. Permeable Material: Permeable material shall consist of crushed rock conforming to the following gradation requirements, unless otherwise approved by the Engineer:

<u>Sieve Size</u>	<u>Percent Passing</u>
3/4"	90-100
1/2"	30-60
3/8"	0-20
No. 4	0-5

- 1. The portion of the material that is retained on a 3/8" sieve shall contain at least 50% of particles having 3 or more fractured faces. Not over 5% shall be pieces that show no fractured faces. Rounded rock material (commonly called 'washed rock') that shows little evidence of the crushing process is not acceptable and will be rejected.
- D. Filter Fabric: Filter fabric shall meet the material requirements specified in Caltrans Standard Specifications, section 96-1.02B.
- E. Slurry Cement Backfill: Slurry cement backfill shall conform to Section 19-3.02E, "Slurry Cement Backfill" of the Caltrans Standard Specifications and shall consist of a fluid, workable mixture of aggregate, cement, and water. Slurry cement backfill shall be either 1-sack, 1-1/2-sack, or 2-sack mix, depending on the application. 1-sack mix shall contain 94 pounds of Portland cement per cubic yard of material; 1-1/2 sack shall contain 141 pounds of Portland cement per cubic yard; 2-sack mix shall contain 188 pounds of Portland cement per cubic yard of material. Mix type used for each specific application shall be as indicated on the plans or as directed by the Engineer.
- F. Native Backfill: Native backfill shall consist of material excavated during the course of the project, shall be free of organic and other deleterious material, and shall have a Sand Equivalent (SE) greater than 15.
- G. Imported Topsoil: Imported topsoil shall be sandy loam, shall be friable, shall have a high degree of fertility, and shall be free of weeds, clods, roots, rocks, gravel, sticks, brush, and other deleterious material. An imported topsoil analysis shall be submitted to the Engineer for approval prior to delivery of any imported topsoil to the project site. Should the Engineer reject any portion of the delivered soil for any

reason, it shall be removed immediately at no cost to the City. The Contractor shall be responsible for maintaining all placed topsoil until the project has been accepted.

- H. Native Topsoil: Native topsoil shall consist of material excavated from the upper soil layer (from the surface to a depth of approximately six inches) during the course of the project. Native topsoil shall be stockpiled separately from native subsoil.
- I. Provide soil material free from Organic matter and deleterious substances, containing no rocks or lumps over 2 inches in greatest dimensions.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Utilities on the Plans may be shown incorrectly or not at all. The Contractor shall contact Underground Service Alert (USA) at 1-800-227-2600 at least forty-eight (48) hours, but not less than two (2) working days, prior to any demolition or excavation and request field markings of all underground utilities.
- B. Verify that survey benchmarks and intended elevations for the work are as indicated.

3.2 PREPARATION

- A. Take necessary steps to assure that service is not interrupted. If water or sewer service to any residents, buildings, or facilities within the work area will be interrupted during portions of the work, the Contractor shall notify all affected residents at least 2 (two) full working days in advance of anticipated water or sewer shutdowns. Unless otherwise noted on the Plans, the maximum duration for water shutdown is 8 hours.
- B. Identify required lines, levels, contours, and datum locations.
- C. Grade top perimeter of trenching area to prevent surface water from draining into trench. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by the Engineer.

3.3 TRENCHING

- A. Trench Excavation
 - 1. The Contractor shall perform all excavation required to accomplish the construction, regardless of the type, nature, or condition of material encountered. Excavations within 24" of marked underground utilities shall be dug with hand tools.
 - 2. The Contractor shall excavate the trench to the elevations, lines, and grades shown on the Plans. Allowance shall be made within the excavation for shoring, forms, working space, bedding, and backfill. Overexcavation below the grade lines shown on the Plans or established by the Engineer shall be

backfilled at the Contractor's sole expense with trench backfill material approved by the Engineer and compacted to specified densities (including overexcavation required to remove existing utilities shown on the Plans as to be removed). Overexcavation required due to unsuitable subgrade soils is addressed in this specification.

3. The Contractor shall control excavations through careful backfill and shoring placement that prevents trench wall sloughing and shall remove all material that sloughs into the trench. In addition, all voids or cavities that result from sloughing trench walls shall be backfilled and compacted with the same material at the same compaction/vibration requirements as shown on the trench detail for that section of trench. If, in the opinion of the Engineer, additional asphalt, concrete, or other surface material must be removed to adequately compact or vibrate the backfill placed in these voids or cavities, the Contractor shall sawcut and remove the surface material to the limits of the voids or cavities as directed by the Engineer. All costs associated with the removal of material that has sloughed into the trench, placement and compaction of the additional backfill material, and the sawcutting, removal, and patching of additional surface material shall be the sole responsibility of the Contractor, and no additional payment will be made to the Contractor for this work.

B. Trench Shoring and Safety

1. All trench excavations requiring shoring shall conform to the requirements of the California Occupational Safety and Health Act (CAL-OSHA). The Contractor shall furnish and install all shoring and bracing required to support the trench walls for the protection of all personnel working in the excavation. Shoring and bracing shall be removed in a manner that protects the workers and prevents sloughing of trench walls.
2. The Contractor is solely responsible for the safety of all workers, the general public, and private and public property within the project site for the duration of the project. This responsibility shall be in effect at all times.
3. For trenches requiring shoring or bracing, the Contractor shall submit to the Engineer a detailed plan showing the proposed design of shoring, bracing, or other provisions to be made to protect the trench from sloughing or collapse. Shoring and bracing plans shall be submitted at least 10 working days before the Contractor intends to begin trenching work.
4. If shoring and bracing plans vary from the shoring system standards established by the Construction Safety Orders of CAL-OSHA, the plans shall be prepared, sealed, and signed by a Civil or Structural Engineer currently registered in California. Signed and sealed copies of calculations necessary to qualify the system shall be included with the plans. If the Contractor proposes to use trench jacks or speed shores, shoring and bracing plans shall show the length and type of shoring, vertical and horizontal spacing, and any vertical or horizontal wales. Trench shields, when proposed or used, shall specify maximum allowed depth for the soils expected to be encountered.

5. It is the sole responsibility of the Contractor to submit shoring and bracing plans that either conform to the Construction Safety Orders of CAL-OSHA, or as approved by a California-licensed Civil or Structural Engineer. No shoring or bracing plans shall be submitted to the Engineer that do not meet either of these requirements.
 6. The Engineer shall review the Contractor's shoring and bracing plans to verify the general scope of the work only. This review is not intended to include approval of the shoring system, or a review of the adequacy of the Contractor's safety supervisor, the safety program, or any safety measures taken in, on, or near the construction site. This review shall not in any way relieve the Contractor from sole responsibility for the design, construction or installation, proper maintenance, and safety of shoring and bracing systems.
- C. Trench Dewatering
1. The Contractor shall dewater all excavations for pipelines, sewer laterals, water main fittings and valves, and other underground items to keep groundwater out of the excavation. Water and residual sewage will not be allowed in excavations during bedding, concrete pours, or backfill and compaction. If excessive groundwater is present and cannot be adequately controlled, the Engineer may deem the bottom of the trench unsuitable for placement of bedding material.
 2. The Contractor shall have pumps on hand of sufficient capacity and horsepower to pump all residual water and sewage from sewer mains, laterals, and services that may be anticipated entering the trench, from existing water mains and services as they drain, and from existing sewer laterals downstream from the bypass point.
 3. The Contractor shall provide/construct sedimentation measures to contain sediment from dewatering operations from migrating into the storm drain system of waterways.
- D. Unsuitable Subgrade and Backfill
1. Unsuitable subgrade is native trench material at subgrade that, in the opinion of the Engineer, is unsuitable to use as a pipe bed and must be removed to provide a solid construction surface. Examples of this type of subgrade are plant material, logs, trash, wood chips and debris, mud, soft or spongy soil, and the like. It DOES NOT refer to material that sloughs into the trench from the sidewalls due to insufficient trench shoring and must be dug out. If unsuitable material is encountered under the pipe, the Engineer shall direct the Contractor as to the total volume of unsuitable material to be removed PRIOR to its removal from the trench.
 2. Once the unsuitable material has been excavated to the satisfaction of the Engineer, the Contractor shall backfill the overexcavation up to the elevations, lines, and grades shown on the Plans or as shown on survey staking cut sheets provided by the Engineer or Project Surveyor. Backfill material for unsuitable overexcavations shall be Class 2 Aggregate Base, as approved by the Engineer, compacted to 95% relative compaction, unless otherwise directed by the Engineer or indicated on the plans.

3. If, upon overexcavation, the resulting subgrade, in the opinion of the Engineer, is still unsuitable to use as a compaction bed, the Contractor shall backfill the overexcavation up to the elevations, lines, and grades shown on the Plans Class 1 permeable material (3/4" maximum). If the length of the Permeable Material placement exceeds 20 feet as measured along the trench, the Contractor shall construct slurry cement waterstops that extend from 12" above the top of the pipe to the bottom of the overexcavation every 20 feet measured along the trench. Slurry cement waterstops placed under these conditions shall be considered as trench backfill, and no additional payment shall be made to the Contractor for their inclusion in the trench backfill.
4. If, in the opinion of the Engineer, an excessive amount of groundwater is flowing (not seeping) in the trench and cannot be removed from the trench by pumping, the Engineer may deem the trench subgrade unsuitable - however, this condition will not require removal of the unsuitable subgrade. Instead, the Engineer may opt to require the Contractor to place Permeable Material for pipe bedding in the section of trench that the groundwater is flowing into. If the length of the Permeable Material placement exceeds 20 feet measured along the trench, the Contractor shall construct slurry cement waterstops that extend from 12" above the top of the pipe to the bottom of the trench every 20 feet. Slurry cement waterstops placed under these conditions shall be considered as trench backfill, and no additional payment shall be made to the Contractor for their inclusion in the trench backfill.

E. Incompatible Areas

1. When pipelines cross through areas where compaction cannot occur (underneath large conduits or other obstacles), the Contractor shall bed and backfill the pipe (up to 12" above the top of the pipe or to the bottom of the obstacle, whichever is less) with Permeable Material. If the length of the Permeable Material placement exceeds 20 feet measured along the trench, the Contractor shall construct slurry cement waterstops that extend from 12" above the top of the pipe to the bottom of the bedding material every 20 feet. Slurry cement waterstops placed under these conditions shall be considered as trench backfill, and no additional payment shall be made to the Contractor for their inclusion in the trench backfill.

F. Bedding and Backfill

1. In general, 6" of pipe bedding shall be laid on firm, undisturbed native material true to line and grade. Bedding material shall be placed into the trench prior to pipe placement, shall be compacted to a minimum of 95% relative compaction, and shall be of the thickness specified on the trench detail on the Plans. Bedding material under the coupling bells shall be hand-excavated so that there is a minimum clearance under the bell of 1 inch.
2. Backfill material in the pipe haunching zone between the bottom of the pipe and the springline of the pipe shall be "shovel-sliced" underneath the pipe overhang, then hand-tamped with 'J' bars or pneumatic "pogo stick" to a relative compaction of 90% along the entire length of the pipe. Tamping with

- a shovel is not sufficient, and does not meet this requirement.
3. Backfill material from the springline of the pipe to the bottom of the trench patch shall be of the material, thickness, and compaction shown in the trench detail on the Plans.
 4. Slurry cement backfill shall be consolidated using motor-driven vibrators to remove all voids and shall be placed in the work within one hour after mixing. The vibrator used shall be large enough to vibrate the slurry cement to the satisfaction of the Engineer. In addition, the slurry cement mixture shall contain enough water that it "flows" into the hole left when the vibrator is removed. Slurry material that does not "flow" into the hole left by the vibrator shall have water added to it in the truck in an amount sufficient to attain a "flowing" behavior. Slurry cement shall not be covered with other material for at least 4 hours after placement.
 5. Class 2 aggregate base backfill shall be placed in lifts as directed by the Engineer. The maximum lift thickness will be determined by the Engineer based upon the compaction method being employed; however, the maximum lift thickness when hand-operated compaction devices are used shall not exceed one (1) foot
 6. In non-paved areas where native material backfill is specified, the backfill shall be placed in lifts as directed by the Engineer. The maximum lift thickness will be determined by the Engineer based upon the compaction method being employed; however, the maximum lift thickness when hand-operated compaction devices are used shall not exceed one foot. All loose soil within the excavation shall be removed prior to fill placement.

G. Trench Bedding and Backfill Compaction

1. Trench bedding and backfill shall be compacted to the densities shown on the trench detail on the Plans, and as specified in this Section.
2. Compaction testing shall be performed by the Engineer to determine whether or not the Contractor's compaction efforts are meeting the minimum compaction requirements. Trench bedding and backfill that fails compaction tests shall be re-compacted as necessary to meet the minimum compaction requirements at the sole expense of the Contractor.

H. Workmanship Guarantee

1. The Contractor shall guarantee his trench work against settlement for a period of one year after the Notice of Completion has been filed. During this time, the Contractor shall repair, at his own expense and to the satisfaction of the Engineer, all failed trench backfill and resurfacing. For the purpose of this contract, failure shall be deemed to have occurred if any of the following conditions exists:
 - a. On paved streets, a depression in a pavement patch of 1/8" (0.01') below the sides of the uncut portion of pavement (includes trench lines and pavement widening).
 - b. Along shoulder areas, behind sidewalks, and in other unpaved portions of the right-of-way, a depression of 3/4" (0.06') below the average of the sides of the uncut portion.

- c. Across all fields, pastures, or areas untraveled by automotive equipment, a depression causing the ponding of water between the sides of the uncut portion.
- d. Any other settlement that causes drainage problems or concentrations of water to run along the excavation line.

3.4 TOLERANCES

- A. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

3.5 FIELD QUALITY CONTROL

- A. See Section 01 40 00: Quality Requirements, for general requirements for field inspection and testing.
- B. Perform compaction density testing on compacted fill in accordance with ASTM D1556, ASTM D2167, or ASTM D6938.
- C. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D1557 ("modified Proctor"), AASHTO T 180, or ASTM D698 ("Standard Proctor").
- D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

3.6 CLEANING

- A. Leave unused materials in a neat, compact stockpile.

END OF SECTION

SECTION 32 12 16 ASPHALT PAVING

PART 1 GENERAL

1.1 SUMMARY

- A. Furnish all material, equipment and labor required to construct hot mix asphalt pavement, including, but not limited to, placement of hot mix asphalt paving, tack coat, and adjustment to grade of all traffic boxes and manhole frames and grates.
- B. Related Sections:
 - 1. Section 31 00 00: Earthwork.
- C. Reference Standards:
 - 1. ASTM D1557: Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft/lbf/ft³ (2,700 kN-m/m³)).
 - 2. CALTRANS Standard Specifications, Current Edition.
 - 3. CAL-OSHA, Title 8, Section 1590 (e).
 - 4. Any work within the street, highway or right-of-way shall be performed in accordance with the requirement of the governmental agencies having jurisdiction, and shall not begin until all of those governing authorities have been notified.

1.2 SUBMITTALS

- A. Refer to Section 01 33 00: Submittal Procedures.
- B. Job mix formula per Caltrans Standard Specifications for all hot mix asphalt material being used on the project.
- C. Load slips for all material delivery trucks shall be delivered to the job site with the truck. The Contractor shall retain all load slips, and shall make them available to the Engineer upon request.

1.3 QUALITY ASSURANCE

- A. All materials shall conform to the applicable sections of the Caltrans Standard Specifications unless otherwise specified in these Specifications or on the Plans.
- B. Use only new materials and products, unless existing materials or products are specifically shown otherwise on the Drawings to be salvaged and re-used.
- C. All materials, components, assemblies, workmanship and installation are to be observed by the Owner's Inspector of Record. Work not so inspected is subject to uncovering and replacement.
- D. The representatives of the Owner's testing lab will not act as supervisor of

construction, nor will they direct construction operations. Neither the presence of the Owner's testing lab representatives nor the testing by the Owner's testing lab shall excuse the contractors or subcontractors for defects discovered in their work during or following completion of the project. Correcting inadequate compaction is the sole responsibility of the contractor.

- E. Contractor shall provide verification that asphalt mix temperature meets the requirements of this specification at time of application.
- F. Contractor shall be solely responsible for all subgrades built. Any repairs resulting from inadequate compaction are the responsibility of the contractor.
- G. Sieve analysis from testing laboratories identifying rock/sand percentages within the asphalt mix shall have a testing date within 90 days of contract signing.
- H. Sieve analysis from a testing laboratory identifying rock/sand percentages within the class 2 aggregate base rock shall have a testing date within 90 days of contract signing.

1.4 WARRANTY

- A. Refer to General Conditions.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Transport, store and handle in strict accord with the local jurisdiction.
- B. Make delivery to job when notified by Contractor verifying that the job is ready to receive the work of this Section and that arrangements have been made to properly store, handle and protect such materials and work.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Aggregate Base: See Specifications Section 31 00 00 "Earthwork."
- B. Hot Mix Asphalt: Shall be Type "A" Hot Mix Asphalt, and shall conform to the requirements for Type "A" hot mix asphalt with 1/2-inch HMA Type A grading as specified in Section 39-2.02, of the Caltrans Standard Specifications.
- C. Asphalt Binder: Asphalt Binder for Type "A" hot mix asphalt shall be PG 64-16, as specified in Section 92 of the Caltrans Standard Specifications.
- D. Prime Coat: Prime coat on aggregate base will not be required.
- E. Tack Coat: Tack coat shall conform with, and be applied in conformance with Section 94, "Asphaltic Emulsions" of the Caltrans Standard Specifications. Tack Coat shall be type SS1 or RS1, and shall be applied to all vertical surfaces of existing pavement,

curbs, gutters and construction joints.

- F. Seal Coat: No seal coat will be required.
- G. Pavement Reinforcing Fabric: If pavement reinforcing fabric is required, it shall conform to Section 96-1.02J, "Paving Fabric" of the Caltrans Standard Specifications.
- H. Crack Treatment:
 - 1. Crack Seal, if required, shall conform to Section 37-6, "Crack Treatment," and Section 41-5, "Joint Seals" of the Caltrans Standard Specifications.
 - 2. Crack seal treatment shall be "hot-applied" type.
 - 3. The Contractor shall provide the Engineer with a Certificate of Compliance for each shipment of crack sealant. The certificate shall certify that the sealant conforms to the specifications and shall be accompanied with storage and heating instructions and calculations for the material.
- I. Wood Headers and Stakes: Pressure treated.
- J. Traffic Paint: Traffic Paint shall conform with Section 84.202G "Paint" of the Caltrans Standard Specifications.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Base Course: Do not lay base course on muddy subgrade, during wet weather, or when atmospheric temperature is below 40 degrees F.
 - 2. Asphalt Surfacing: Do not apply asphaltic surfacing on wet base, during wet weather, or when atmospheric temperature is below 50 degrees F.

3.2 PROTECTION OF WORK

- A. Curbs and other work shall be covered with suitable material and protected from staining or damage by equipment or contact with oil, emulsion, and asphalt. All manholes, catch basins, and gratings shall be covered with suitable material so that no asphalt or emulsion will come in contact with the inside walls or floors of the structures.

3.3 PAVEMENT GRINDING

- A. Pavement grinding, when required, shall be performed in accordance with the requirements of Section 39-3.04 and Section 42-3, of the Caltrans Standard Specifications, as specified in these specifications, and as directed by the Engineer.
- B. The Contractor shall exercise care to avoid damaging existing concrete curbs and drainage facilities during all grinding operations. Damage to existing improvements shall be repaired at the Engineer's direction, and at the sole expense of the

Contractor.

- C. Prior to conducting grinding operations, the Contractor shall remove all weeds and dirt in the gutters and in cracks in the existing pavement surface to the satisfaction of the Engineer. The Contractor will not be permitted to use herbicides, and the method of weed removal shall be subject to the approval of the Engineer.
- D. The Contractor shall completely remove all existing raised reflective markers from the areas being ground.
- E. The grinded areas shall be swept throughout the course of the grinding operations and shall be left thoroughly clean and clear of all grindings at the end of each working day. The Contractor shall exercise care to avoid spilling grindings into drainage inlets and culverts, and shall promptly clean out any grindings that do spill into inlets or culverts.
- F. Prior to initiation of grinding operations, the Contractor shall lower all traffic boxes and manhole lids and frames within the limits of the work.
- G. Abrupt edges shall not be left in place when traffic is allowed back into the grinding area. Where abrupt edges exist (mid-block or on cross streets or alleys), or where directed by the Engineer, the Contractor shall build a transition ramp no shorter than 25 feet long that spans the entire length or width of the abrupt edge, lifting traffic out of the ground area and onto the surrounding pavement.

3.4 PAVEMENT SAWCUTTING

- A. Pavement sawcutting shall be performed with a wheel roller, pneumatic pavement cutter, or other sawcutting equipment approved by the Engineer.
- B. All pavement sawcutting shall be to the full depth of the pavement, regardless of depth. All pavement material inside the sawcut limits shall be completely removed. Sawcuts shall be straight and shall provide clean, solid, vertical faces free from loose or cracked material. All damaged or disturbed adjoining pavement shall be sawcut and removed.
- C. When sawcutting is necessary for utility, storm drain, or culvert installation, sawcutting shall be made 6 inches wider on all sides than the width of the excavation.
- D. When possible, sawcuts shall be either parallel or perpendicular to the roadway centerline.
- E. The number of jogs in the sawcut lines shall be held to minimum and shall be subject to approval by the Engineer. The Contractor may be required to remove additional undisturbed pavement if, in the opinion of the Engineer, the lines are too erratic or contain too many jogs.

3.5 INSTALLATION

- A. Headers:
 - 1. General: Install as edging to asphalt paving, except where adjoining existing pavement, concrete curbs, walks or building.
 - 2. Existing Headers: Remove existing headers where new paving will join existing. Saw cut existing asphalt to provide clean edge.
 - 3. Lines and Levels: Install true to line and grade. Cut off tops of stakes 2-inches below top of header so they will not be visible on completion of job.

- B. Subgrade shall be prepared in accordance with Section 31 00 00, "Earthwork" of these project specifications. Compaction and moisture content shall be verified immediately prior to placement of aggregate base.

- C. Cleaning: Existing surfaces and new surface shall be clean of all dirt, sand, oil or grease. All cracks shall be cleaned and free of all debris and vegetation.

- D. Roadway Base Placement
 - 1. Install in accord with Caltrans Standard Specifications, Section 26. Compact to relative compaction of not less than 95%, Caltrans 216/231. The material shall be deposited on the subgrade in such a manner as to provide a uniform section of material within five percent tolerance of the predetermined required depth. Deposition will be by spreader box or bottom dump truck to prevent segregation of the material. The material so deposited on the subgrade shall have sufficient moisture which, in the opinion of the Engineer is adequate to prevent excessive segregation. It shall then be immediately spread to its planned grade and cross section. Undue segregation of material, excessive drifting or spotting of material will not be permitted. If in the opinion of the site geotechnical engineer, the material is unsuitably segregated, it shall be removed or completely reworked to provide the desired uniformity of the material.
 - 2. Moisture content and compaction of base material shall be tested immediately prior to placement of asphalt paving.

- E. Liquid Asphalt Tack Coat: Apply as "tack coat" to all vertical surfaces of existing paving, curbs, walks, and construction joints in surfacing against which paving is to be placed. When being applied for paving fabric installation, tack coat shall extend 3 inches beyond the width of the paving fabric on all sides. Tack coat shall be applied in one application at a rate of from 0.02-gallon to 0.10-gallon per square yard of surface covered.

- F. Pavement reinforcing fabric, when specified, shall be installed immediately after the tack coat is applied, in accordance with Section 39-2.01C(3)(g), "Geosynthetic Pavement Interlayer" of the Caltrans Standard Specifications, and in accordance with the manufacturer's instructions.

- G. Hot Mix Asphalt Construction
 - 1. All hot mix asphalt shall be installed in accordance with Section 39-2.01C,

“Construction” of the Caltrans Standard Specifications. Type “A” hot mix asphalt shall be placed only when the atmospheric temperature is above 50°F. Failure to meet temperature restrictions is grounds for rejection of the work by the Engineer.

2. Compaction shall conform to Section 39-2.01A(4) of the Caltrans Standard Specifications. Method compaction shall not be used. When approved by the Engineer, density cores may not be required, and may be replaced with additional nuclear gauge tests.
3. The completed surface shall be thoroughly compacted, smooth, and free from ruts, humps, depressions, or irregularities. Any ridges, indentations or other objectionable marks left in the surface of the hot mix asphalt by rollers, rakes, or other equipment shall be eliminated immediately.
4. Contractor shall schedule and attend a pre-paving meeting at least 2 hours in advance of the paving operation.
5. Placement and adjustment of Frames, Covers, Boxes and Grates: The Contractor shall set and adjust to finish grade all proposed and existing frames, covers, boxes, and grates of all manholes, drop inlets, drain boxes, valves, cleanouts, electrical boxes and other appurtenant structures prior to placement of asphaltic concrete.

H. Hot Mix Asphalt Acceptance

1. Acceptance of Hot Mix Asphalt shall be as specified in Section 39-2.02A94)(b), 39-2.02A(4)(e) ASPHALT CONCRETE, under subsection “Quality Assurance” except as modified below:
2. Final gradation shall be smooth, uniform and free of ruts, humps, depressions or irregularities.
 - a. Maximum variation in slopes shall be 0.5%.
 - b. Water Testing: All paved areas shall be water tested, to check drainage, in the presence of the project inspector.
 - c. The surface elevations of asphalt paving shall not vary more than 1/8 inch above or below the elevations established on the plans.
 - d. In no case shall grades in accessible areas, including accessible parking stalls and accessible path of travel, exceed the maximum allowable grades for accessibility.
 - e. Pavement thickness shall be within ¼ inch of the specified thickness.
 - f. Suitable corrective actions must be agreed upon by the Owner and the Engineer and may consist of full-depth removal and replacement, or overlaying.

3.6 DEFECTIVE ASPHALT

- A. Contractor is responsible for replacing or modifying defective asphalt, using method approved by the Engineer. Contractor is responsible for costs associated with replacing or modifying defective asphalt
- B. Defective asphalt is as described below:
 1. Exposed rock pockets on the finished surface.
 2. Asphalt not placed to the design grades or elevations.

3. Asphalt that ponds water.
4. Asphalt that was compacted below the minimum required temperatures.
5. Asphalt that fails to meet the minimum compaction requirements.
6. Asphalt that lacks the minimum thickness required per plan.
7. New asphalt contaminated by a petroleum product, or spilled paint.
8. Asphalt that has depressions, cracks, raveling, segregation, slippage, bleeding, or potholes.
9. Asphalt placed on pumping, unstable sub-grades.

3.7 CLEANING

- A. Upon completion of work of this Section promptly remove from the working area all scraps, debris and surplus material of this Section.
- B. Clean excess material from surface of all concrete walks and utility structures.

END OF SECTION

SECTION 32 16 00 CURBS, GUTTERS, SIDEWALKS, AND DRIVEWAYS

PART 1 GENERAL

1.1 SUMMARY

- A. Related Sections include the following:
 - 1. Section 31 00 00: Earthwork.

1.2 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

1.3 SUBMITTALS

- A. Product Data: For each type of manufactured material and product indicated.
- B. Design Mixtures: For each concrete pavement mixture. Include alternate mixture designs when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications - Manufacturer of ready-mixed concrete products who complies with ASTM C94/C94M requirements for production facilities and equipment:
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by requirements in the Contract Documents.

PART 2 PRODUCTS

2.1 FORMS

- A. Form Materials - Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces:
 - 1. Use flexible or curved forms for curves with a radius 100 feet (30.5 m) or less.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

- A. Reinforcement to meet requirements and products specified in Caltrans Standard Specifications Section 52.

2.3 CONCRETE MATERIALS

- A. Cementitious Material: Shall be as defined in Caltrans Standard Specifications Section 40.
- B. Normal-Weight Aggregates: Shall be 3/4" maximum size aggregate in mixes for Curb and Gutter.
- C. Water: ASTM C94/C94M.
- D. Air-Entraining Admixture: ASTM C260.
- E. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

2.4 CURING MATERIALS

- A. Curing materials to meet requirements and products specified in Caltrans Standard Specifications.

2.5 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber.
- B. Bonding Agent: ASTM C1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

2.6 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience:
 - 1. Use a qualified independent testing agency for preparing and reporting proposed concrete mixture designs for the trial batch method.
- B. Proportion mixtures to provide normal-weight concrete with the following properties:
 - 1. Compressive Strength (28 Days):
 - a. Sidewalks, walkways, curbs and other areas not exposed to vehicle traffic: 3000 psi.

- b. Driveways, crosswalks, parking stalls, and other areas exposed to vehicle traffic: 4000 psi.
 - 2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45.
 - 3. Slump Limit: 3 inches, plus or minus 1 inch.
- C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
 - 1. Air Content: 6-1/2 percent plus or minus 1.5 percent for curb and gutter.
 - 2. Air Content: 6 1/2 percent plus or minus 1.5 percent for sidewalks and driveways.
- D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
- F. Cementitious Materials - Limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements as follows:
 - 1. Fly Ash or Pozzolan: 20 percent.

2.7 CONCRETE MIXING

- A. Ready-Mixed Concrete - Measure, batch, and mix concrete materials and concrete according to ASTM C94/C94M. Furnish batch certificates for each batch discharged and used in the Work:
 - 1. When air temperature is between 85 deg F and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities and general public access.

3.2 EXAMINATION

- A. Examine exposed sub-grades and sub-base surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared base surface below concrete pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding.
 - 1. Completely proof-roll base in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph.
 - 2. Proof-roll with a loaded 10-wheel tandem-axle dump truck weighing not less

- than 15 tons.
 - 3. Base with soft spots and areas of pumping or rutting exceeding depth of 1 inch or as determined by the Engineer require correction according to requirements in Division 31.
 - 4. In areas that rut less than 1 inch the ruts shall be filled with base material, compacted and brought to grade.
- C. Proceed with concrete pavement operations only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

3.3 PREPARATION

- A. Remove loose material from compacted sub-base surface immediately before placing concrete.

3.4 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.5 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

3.6 JOINTS

- A. General - Form construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated:
 - 1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.
- B. Construction Joints - Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints:

1. Continue steel reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
- C. Isolation Joints - Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated:
1. Locate expansion joints at intervals of 50 feet (15.25 m), unless otherwise indicated.
 2. Extend joint fillers full width and depth of joint.
 3. Terminate joint filler not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished surface if joint sealant is indicated.
 4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
 5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
 6. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Contraction Joints - Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows to match jointing of existing adjacent concrete pavement:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch (6mm) radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.
 2. Sawed Joints: Form contraction joints with saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
- E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 1/4-inch (6- mm) radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

3.7 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast in. Notify other trades to permit installation of their work.
- B. Remove snow, ice, ponded water, or frost from sub-base surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten sub-base to provide a uniform dampened condition at time concrete is

placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

- D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery or at Project site.
- F. Do not add water to fresh concrete after testing.
- G. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- H. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping:
 - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.
- I. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay welded wire fabric or fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed:
 - 1. Remove and replace concrete that has been placed for more than 15 minutes without being covered by top layer, or use bonding agent if approved by Engineer.
- J. Screed pavement surfaces with a straightedge and strike off.
- K. Commence initial floating using bull floats or darbies to impart an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- L. Curbs and Gutters: When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not approved, remove and replace with formed concrete.
- M. Cold-Weather Placement - Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures:
 - 1. When air temperature has fallen to or is expected to fall below 40 deg F (4.4 deg C), uniformly heat water and aggregates before mixing to obtain a

concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.

2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mix designs.

N. Hot-Weather Placement - Comply with ACI 301 and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.8 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish - Begin the second floating operation when bleed-water sheen has disappeared, and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture:
 1. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

3.9 CONCRETE PROTECTION AND CURING

- A. Refer to Caltrans Standard Specifications for Concrete Protection and Curing.

3.10 ACCESSIBLE. CURB RAMP CONSTRUCTION

- A. Sidewalk curb approach ramps shall be constructed to current A.D.A. standards as detailed in the plans.
- B. Surface Texture: Accessible surface texture requirements shall be met with the installation of the accessible compliant detectable warning panels inserted in the sidewalk approach ramps as indicated in the details.

- C. Slope:
 - 1. New construction:
 - a. Maximum slope shall be 1 foot vertical to 12 feet horizontal. Maximum rise for any run shall be thirty (30) inches or less.
 - b. Side slope:
 - 1) When curb ramps are located where pedestrians must walk across the ramp, the ramp shall have flared sides with a maximum slope of 1-foot vertical to 10 feet horizontal.

3.11 PAVEMENT TOLERANCES

- A. Comply with tolerances of ACI 117 and as follows:
 - 1. Elevation: 1/4 inch (6 mm).
 - 2. Thickness: Plus 3/8 inch (10 mm), minus 1/4 inch (6 mm).
 - 3. Surface: Gap below 10-foot- (3-m-) long, unlevelled straightedge not to exceed 1/4 inch (6 mm).
 - 4. Joint Spacing: 3 inches (75 mm).
 - 5. Contraction Joint Depth: Plus 1/4 inch (6 mm), no minus.
 - 6. Joint Width: Plus 1/8 inch (3 mm), no minus.

3.12 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing Services - Testing of composite samples of fresh concrete obtained according to ASTM C172 shall be performed according to the following requirements:
 - 1. Testing Frequency - Obtain at least 1 composite sample for each 100-cu. yd. (76 cu. m) or fraction thereof of each concrete mix placed each day:
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - 2. Slump: ASTM C143/C143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
 - 3. Air Content: ASTM C231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
 - 4. Concrete Temperature: ASTM C1064; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
 - 5. Compression Test Specimens: ASTM C31/C31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
 - 6. Compressive-Strength Tests - ASTM C39/C39M; test 1 specimen at 7 days and 2 specimens at 28 days:

- a. A compressive-strength test shall be the average compressive strength from 2 specimens obtained from same composite sample and tested at 28 days.
- C. Strength of each concrete mix will be satisfactory if average of any 3 consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
- D. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Engineer but will not be used as sole basis for approval or rejection of concrete.
- F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Engineer.
- G. Remove and replace concrete pavement where test results indicate that it does not comply with specified requirements.
- H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.13 REPAIRS AND PROTECTION

- A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section.
- B. Drill test cores, where directed by Engineer, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.
- C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION

PARENTS AND FRIENDS INC.

SECTION 32900 - PLANTING

1. GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Topsoil and soil amendments.
 - 2. Fertilizers and mulches.
 - 3. Plant materials
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 31 Section "Site Clearing" for protection of existing trees and planting and topsoil.
 - 2. Division 31 Section "Earthwork" for excavation, filling, rough grading, and subsurface aggregate drainage and drainage backfill.
 - 3. Division 32 Section "Turfs and Grasses" for general turfs and grass planted around the building, that is not part of the planting / landscaping area.
 - 4. Division 33 Section "sub-drainage" for drainage coordination.

1.3 SUBMITTALS

- A. Submittals:
 - 1. Product Data for each of the following located in the designated landscape area:
 - a. Plants & Trees
 - b. Base Materials
 - c. Drainage Mat
 - d. pine Bark Mulch
- B. General:
 - 1. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience.

1.4 QUALITY ASSURANCE

- C. Installer Qualifications: Engage an experienced Installer who has completed landscaping work similar in material, design, and extent to that indicated for this Project and with a record of successful landscape establishment.

1.5 COORDINATION AND SCHEDULING

- D. Coordinate installation of planting materials during normal planting seasons for each type of plant material required.

PART 2 - PRODUCTS

2.0 WEED MAT MATERIALS

- A. Provide fine sieve opening weed mat mesh suitable for a project of this type.

2.1 TOPSOIL

PARENTS AND FRIENDS INC.

A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, 4 percent organic material minimum, free of stones 1 inch (25 mm) or larger in any dimension, and other extraneous materials harmful to plant growth.

1. Topsoil Source: Amend existing surface soil to produce topsoil. Supplement with imported topsoil when required.

2.2 EROSION-CONTROL MATERIALS

A. Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include biodegradable anchors, minimum 6 inches (150 mm) long.
B. Fiber Mesh: Biodegradable twisted jute or spun-coir mesh, 0.92 lb per sq. yd. (0.5 kg per sq. m) minimum, with 50 to 65 percent open area. Include biodegradable anchors, minimum 6 inches (150 mm) long.

2.3 PLANT MATERIALS

A. Deciduous Trees: Provide trees of height and caliper scheduled or shown and with branching configuration recommended by ANSI Z60.1 for type and species required. Provide single stem trees.

B. Provide balled and burlaped (B&B) deciduous trees.

1. Container grown deciduous trees will be accepted in lieu of balled and burlaped deciduous trees subject to specified limitations of ANSI Z60.1 for container stock.

2.4 MISCELLANEOUS LANDSCAPE MATERIALS

A. Anti-Erosion Mulch: Provide clean, seed-free salt hay or threshed straw of wheat, rye, oats or barley.

B. Anti-Dessicant: Emulsion type, film-forming agent designed to permit transpiration but retard excessive loss of moisture from plants. Deliver in manufacturer's fully identified containers and mix in accordance with manufacturer's instructions.

C. Wrapping: Tree-wrap tape not less than 4 inches wide, designed to prevent borer damage and freezing.

D. Stakes and Guys: Provide stakes and deadmen of sound new hardwood, treated softwood, or redwood, free of knot holes and other defects. Provide wire ties and guys of 2-strand, twisted, pliable galvanized iron wire, not lighter than 12 ga. with zinc-coated turnbuckles. Provide not less than 1/2 inch diameter rubber or plastic hose, cut to required lengths and of uniform color, material and size to protect tree trunks from damage by wires.

E. Decorative Mulch: Organic mulch free from deleterious materials and suitable for top dressing of trees, shrubs or plants and consisting of one of the following:

1. Shredded hardwood
2. Ground or shredded bark
3. Wood chips
4. Pine-bark Mulch

2.5 PLANT MATERIALS

1. Provide plant material as listed in the Landscape Legend on the Architectural Site Plan.

3 EXECUTION

A. Restore prepared areas if eroded or otherwise disturbed after fine grading and before planting.

B. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of it off the Owner's property.

C. Till stripped, bare, and compacted areas thoroughly to a depth of 6 inches (150 mm).

D. Apply required soil amendments and initial fertilizers and mix thoroughly into top 4 inches (100 mm) of soil. Provide new planting soil as required to fill low spots and meet new finish grades.

E. Water newly planted areas and keep moist until established.

3.1 CLEANUP AND PROTECTION

- A. During landscaping, keep pavements clean and work area in an orderly condition.
- B. Protect landscaping from damage due to landscape operations, operations by other contractors and trades, and trespassers. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work as directed.

3.2 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of it off the Owner's property.

3.3 TREE AND SHRUB PLANTING

- A. Set balled and burlapped stock plumb and in center of pit or trench with top of root ball 1 inch (25 mm) above adjacent finish grades.
- B. Remove burlap and wire baskets from tops of root balls and partially from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation. Place planting soil mix around root ball in layers, tamping to settle mix and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Water again after placing and tamping final layer of planting soil mix.
- C. Set stock plumb and in center of pit or trench with top of root ball flush with adjacent finish grades.
- D. Carefully remove root ball from container without damaging root ball or plant. Place planting soil mix around root ball in layers, tamping to settle mix and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Water again after placing and tamping final layer of planting soil mix.
- E. Set fabric bag-grown stock plumb and in center of pit or trench with top of root ball flush with adjacent finish grades.
- F. Carefully remove root ball from fabric bag without damaging root ball or plant. Do not use planting stock if root ball is cracked or broken before or during planting operation. Place planting soil mix around root ball in layers, tamping to settle mix and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Water again after placing and tamping final layer of planting soil mix.
- G. Set and support bare-root stock in center of pit or trench with root collar or trunk flare flush with adjacent finish grade. Spread roots without tangling or turning toward surface, and carefully work backfill around roots by hand. Puddle with water until backfill layers are completely saturated. Plumb before backfilling, and maintain plumb while working backfill around roots and placing layers above roots. Tamp final layer of backfill. Remove injured roots by cutting cleanly; do not break.
- H. Organic Mulching: Apply 4-inch average thickness of organic mulch extending 12 inches (300 mm) beyond edge of planting pit or trench. Do not place mulch within 3 inches (75 mm) of trunks or stems.
- I. Wrap trees of 2-inch (50-mm) caliper and larger with trunk-wrap tape. Start at base of trunk and spiral cover trunk to height of first branches. Overlap wrap, exposing half the width, and securely attach without causing girdling. Inspect tree trunks for injury, improper pruning, and insect infestation; take corrective measures required before wrapping.

END OF SECTION 329000

SECTION 33 42 11 STORMWATER GRAVITY PIPING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Storm drainage piping, fittings, and accessories.
 - 2. Connection of drainage system to municipal sewers.
 - 3. Catch basins, Plant area drains, Trench Drains, Paved area drainage, Site surface drainage, and swales.

- B. Related Requirements:
 - 1. Section 31 23 33: Trenching and Backfilling.

- C. Reference Standards:
 - 1. AASHTO M252 - Standard Specification for Corrugated Polyethylene Drainage Pipe.
 - 2. AASHTO M294 - Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500 MM (12- to 60-in.) Diameter.
 - 3. ASTM D2680 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly (Vinyl Chloride) (PVC) Composite Sewer Piping.
 - 4. ASTM F667 - Corrugated polyethylene tubing and fittings.
 - 5. ASTM D1056 - Specification for Flexible Cellular Materials - Sponge or Expanded Rubber.
 - 6. ASTM D1248 - Specification for Polyethylene Plastics Molding and Extrusion Material.
 - 7. ASTM D3350 - Specification for Polyethylene Plastics Pipe and Fittings Materials.
 - 8. ASTM D2321 - Standard practice for underground installation.

1.2 SUBMITTALS

- A. See Section 01 33 00: Submittal Procedures.

- B. Product Data: Provide data indicating pipe, pipe accessories, and area drains.

- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

PART 2 PRODUCTS

2.1 STORM WATER DRAINAGE PIPE MATERIALS

- A. Provide pipe and associated materials of the size indicated on the Drawings and meeting the following requirements:
 - 1. High Density Polyethylene Pipe (HDPE):

- a. Acceptable products:
 - 1) "N-12" High Density Polyethylene storm drain and fittings, manufactured by Advanced Drainage Systems, 4640 Trueman Boulevard, Hillard, OH 43026. Phone: (800) 821-6710, Fax: (614) 658-0204.
 - 2) Approved equivalent.
 - b. High Density Polyethylene material shall comply with:
 - 1) AASHTO M252 for material from 3" – 10" in size.
 - 2) AASHTO M294 for material 12" – 36" in size.
 - 3) ASTM D1248 for standard specifications for Polyethylene Plastics Molding and Extrusion Materials.
 - 4) ASTM D3350 for pipe and fittings.
 - 5) ASTM D2321 standard practice for underground installation.
 - c. Joints and Fittings:
 - 1) Pipe joints and fitting shall conform to AASHTO M252 and AASHTO M294, or be approved by the engineer.
 - 2) Coupling bands shall cover at least one full corrugation on each section of pipe. When gasketed couple bands are required, the gasket shall be made of closed-cell synthetic expanded rubber meeting the requirements of ASTM D1056, Grade RE42. All coupling bands shall meet or exceed the soils-tightness requirements of the AASHTO Standard Specifications for Highway Bridges, Section 23, paragraph 23.3.2.5.4.(e).
 - 3) All fittings shall conform to AASHTO M294.
2. Polyvinyl Chloride Pipe (PVC)
- a. Polyvinyl Chloride material shall comply with:
 - 1) ASTM D1785 for drain pipe and fittings 3" or less in size.
 - 2) AASHTO M278 for drain pipe and fittings 4" or greater in size.

2.2 CATCH BASIN, TRENCH DRAIN, CLEANOUT, AND AREA DRAIN COMPONENTS

A. General:

- 1. Construct manholes, inlets, and junction structures of reinforced concrete or precast reinforce concrete, complete with metal frames and covers or gratings, and with fixed ladder rungs where indicated on the Drawings or required by codes. Prefabricated structures may be used when shown on the plans and approved by the engineer.
- 2. Rungs shall be individual wall-mounted aluminum, plastic-covered steel, or galvanized steel rungs are acceptable.

B. Materials:

- 1. Mortar for pipe joints and connections to other drainage structures, and manhole construction:
 - a. Comply with requirements of ASTM C270, type M, except the maximum placement time shall be one hour.

- b. Hydrated lime complying with ASTM C141, type B, may be added to the mixture of sand and cement in an amount equal to 25% of the volume of cement used.
 - c. Provide a quantity of water in the mixture sufficient to produce a stiff workable mortar, which shall be clean and free from harmful acids, alkalis, and organic impurities. Use the mortar within 30 minutes after water is added to the mix.
 - 2. Precast reinforced concrete manholes:
 - a. Comply with ASTM C478, precast rings and cone sections.
 - b. Fully bed the joints between precast concrete risers and tops in mortar, and smooth both interior and exterior surfaces uniformly.
 - 3. Reinforcement: Provide intermediate grade billet steel complying with ASTM A615, grade 40.
 - 4. Frames and covers or gratings:
 - a. Provide all gratings or covers from the same manufacturer.
 - b. Provide standard black finish, supplied as a total unit, sized as shown on the Drawings or larger sizes except where in a pavement area, and with the wording "STORM DRAIN" cast into the cover.
 - c. Acceptable products:
 - 1) Manufactured by Alhambra Foundry, Alhambra, California.
 - 2) Approved equivalent.
 - 5. Precast concrete catch basins:
 - a. Provide reinforced and bottom open for field pouring to ensure slope through the structure.
 - b. Contractor may select this option in lieu of cast-in-place concrete catch basins

2.3 BEDDING AND COVER MATERIALS

- A. See Section 31 23 33: Trenching and Backfilling, and project plans.

PART 3 EXECUTION

3.1 PRODUCT HANDLING

- A. Comply with pertinent provisions product requirements.

3.2 SURFACE CONDITIONS

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

3.3 TRENCHING

- A. See Section 31 23 33: Trenching and Backfilling.

3.4 INSTALLATION - PIPE

- A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on layout drawings.
- B. General:
 - 1. Carefully examine each pipe prior to placing:
 - a. Promptly set aside defective pipe and damaged pipe.
 - b. Clearly identify defects.
 - c. Do not install defective pipe or damaged pipe.
 - 2. Place pipe to the grades and alignment indicated, with a tolerance of one in 1000 vertical and one in 500 horizontal, unless otherwise directed by the Engineer.
 - 3. Provide adequate facilities for lowering pipe safely into the trenches.
 - 4. Do not place pipe in water, nor place pipe when trench or weather is unsuitable for such work.
- C. Polyvinyl chloride pipe joints: Install with the specified materials and in accordance with the manufacturer's recommendations as approved by the Engineer, applying solvent cement to pipe and fitting.
- D. High Density Polyethylene: Installation shall be in accordance with ASTM D2321 and as recommended by the pipe manufacturer. Backfill shall be ASTM D2321 Class I, II, or III soils, or USCS material corresponding to these ASTM designations. Backfill material shall be placed in 6-inch lifts and compacted to 90 percent minimum density per AASHTO T99.
- E. Joining pipes of different materials: Provide fittings or couplings made for the pipe material jointing, or provide a concrete collar as approved by the Engineer.
- F. Joining pipe of different sizes:
 - 1. Provide reducer fittings to the larger pipe.
 - 2. Where pipes are different materials as well as different sizes, use the same material for reducer fittings as in the larger pipe.
 - 3. Use saddle connection when branch lines join a main or collector main.
 - 4. Use eccentric collar joint when the slope of the pipe is less than 1%.
- G. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true slope of 1/8 inch in 10 feet.
- H. Connect to building storm drainage system, foundation drainage system, and utility/municipal sewer system.

3.5 INSTALLATION - CLEANOUTS

- A. Form bottom of excavation clean and smooth to correct elevation.

- B. Form and place cast-in-place concrete base pad, with provision for sanitary sewer pipe end sections.
- C. Establish elevations and pipe inverts for inlets and outlets as indicated.
- D. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

3.6 FIELD QUALITY CONTROL

- A. Perform field inspection in accordance with Division 01: General Requirements.
- B. Visually inspect the pipe for deflection:
 - 1. Deflection is limited to 7.5% of the base diameter.
 - 2. If the visual inspection determines the pipe may have deflection problems, the engineer can direct a mandrel test be performed.
 - 3. Such test will be performed at the contractor's expense.
- C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

3.7 PROTECTION

- A. Protect pipe and bedding cover from damage or displacement until backfilling operation is in progress.

END OF SECTION

NOTE: All works indicated herein shall be done in accordance to the latest edition of the electrical code being practiced in the State of California, and all the local codes and ordinances being enforced by the local authorities having jurisdiction over the area and according to the latest edition of the IRC as summarized below and as applied.

2018 INTERNATIONAL RESIDENTIAL CODE - ELECTRICAL

CHAPTER 34 - GENERAL REQUIREMENTS

SECTION E3401

GENERAL

E3401.1 Applicability.

The provisions of Chapters 34 through 43 shall establish the general scope of the electrical system and equipment requirements of this code. Chapters 34 through 43 cover those wiring methods and materials most commonly encountered in the construction of one- and two-family dwellings and structures regulated by this code. ***Other wiring methods, materials and subject matter covered in NFPA 70 are also allowed by this code.***

E3401.2 Scope.

Chapters 34 through 43 shall cover the installation of electrical systems, equipment and components indoors and outdoors that are within the scope of this code, including services, power distribution systems, fixtures, appliances, devices and appurtenances. Services within the scope of this code shall be limited to 120/240-volt, 0- to 400-ampere, single-phase systems. These chapters specifically cover the equipment, fixtures, appliances, wiring methods and materials that are most commonly used in the construction or alteration of one- and two-family dwellings and accessory structures regulated by this code. The omission from these chapters of any material or method of construction provided for in the referenced standard NFPA 70 shall not be construed as prohibiting the use of such material or method of construction. ***Electrical systems, equipment or components not specifically covered in these chapters shall comply with the applicable provisions of NFPA 70.***

SECTION E3402

BUILDING STRUCTURE PROTECTION

E3402.1 Drilling and notching.

Wood-framed structural members shall not be drilled, notched or altered in any manner except as provided for in this code

E3402.2 Penetrations of fire-resistance-rated assemblies.

Electrical installations in hollow spaces, vertical shafts and ventilation or air-handling ducts shall be made so that the possible spread of fire or products of combustion will not be substantially increased. Electrical penetrations into or through fire-resistance-rated walls, partitions, floors or ceilings shall be

protected by approved methods to maintain the fire-resistance rating of the element penetrated. Penetrations of fire-resistance-rated walls shall be limited as specified in Section R302.4. (300.21)

E3402.3 Penetrations of firestops and draftstops.

Penetrations through fire blocking and draftstopping shall be protected in an approved manner to maintain the integrity of the element penetrated

SECTION E3403

INSPECTION AND APPROVAL

E3403.1 Approval.

Electrical materials, components and equipment shall be approved. (110.2)

E3403.2 Inspection required.

New electrical work and parts of existing systems affected by new work or alterations shall be inspected by the building official to ensure compliance with the requirements of Chapters 34 through 43.

E3403.3 Listing and labeling.

Electrical materials, components, devices, fixtures and equipment shall be listed for the application, shall bear the label of an approved agency and shall be installed, and used, or both, in accordance with any instructions included in the listing and labeling. [110.3(B)]

SECTION E3404

GENERAL EQUIPMENT REQUIREMENTS

E3404.1 Voltages.

Throughout Chapters 34 through 43, the voltage considered shall be that at which the circuit operates. The voltage rating of electrical equipment shall be not less than the nominal voltage of the circuit to which it is connected. (110.4)

E3404.2 Interrupting rating.

Equipment intended to interrupt current at fault levels shall have a minimum interrupting rating of 10,000 amperes at the nominal circuit voltage. Equipment intended to interrupt current at levels other than fault levels shall have an interrupting rating at nominal circuit voltage of not less than the current that must be interrupted. (110.9)

E3404.3 Circuit characteristics.

The overcurrent protective devices, total impedance, equipment short-circuit current ratings and other characteristics of the circuit to be protected shall be so selected and coordinated as to permit the circuit protective devices that are used to clear a fault to do so without extensive damage to the electrical equipment of the circuit. This fault shall be assumed to be either between two or more of the circuit conductors or between any circuit conductor and the equipment grounding conductors permitted in

Section E3908.8. Listed equipment applied in accordance with its listing shall be considered to meet the requirements of this section. (110.10)

E3404.4 Enclosure types.

Enclosures, other than surrounding fences or walls, of panelboards, meter sockets, enclosed switches, transfer switches, circuit breakers, pullout switches and motor controllers, rated not over 600 volts nominal and intended for such locations, shall be marked with an enclosure-type number as shown in Table E3404.4.

Table E3404.4 shall be used for selecting these enclosures for use in specific locations other than hazardous (classified) locations. The enclosures are not intended to protect against conditions such as condensation, icing, corrosion, or contamination that might occur within the enclosure or enter through the conduit or unsealed openings. (110.28)

E3404.5 Protection of equipment.

Equipment not identified for outdoor use and equipment identified only for indoor use, such as “dry locations,” “indoor use only” “damp locations,” or enclosure Type 1, 2, 5, 12, 12K and 13, shall be protected against damage from the weather during construction. (110.11)

E3404.6 Unused openings.

Unused openings, other than those intended for the operation of equipment, those intended for mounting purposes, and those permitted as part of the design for listed equipment, shall be closed to afford protection substantially equivalent to the wall of the equipment. Where metallic plugs or plates are used with nonmetallic enclosures they shall be recessed at least 1/4 inch (6.4 mm) from the outer surface of the enclosure. [110.12(A)]

E3404.7 Integrity of electrical equipment.

Internal parts of electrical equipment, including busbars, wiring terminals, insulators and other surfaces, shall not be damaged or contaminated by foreign materials such as paint, plaster, cleaners or abrasives, and corrosive residues. There shall not be any damaged parts that might adversely affect safe operation or mechanical strength of the equipment such as parts that are broken; bent; cut; deteriorated by corrosion, chemical action, or overheating. Foreign debris shall be removed from equipment. [110.12(B)]

E3404.8 Mounting.

Electrical equipment shall be firmly secured to the surface on which it is mounted. Wooden plugs driven into masonry, concrete, plaster, or similar materials shall not be used. [110.13(A)]

E3404.9 Energized parts guarded against accidental contact.

Approved enclosures shall guard energized parts that are operating at 50 volts or more against accidental contact. [110.27(A)]

E3404.10 Prevent physical damage.

In locations where electrical equipment is likely to be exposed to physical damage, enclosures or guards shall be so arranged and of such strength as to prevent such damage. [110.27(B)]

E3404.11 Equipment identification.

1.The manufacturer's name, trademark or other descriptive marking by which the organization responsible for the product can be identified shall be placed on all electric equipment. Other markings shall be provided that indicate voltage, current, wattage or other ratings as specified elsewhere in Chapters 34 through 43. The marking shall have the durability to withstand the environment involved. [110.21(A)(1)]

2.Reconditioned equipment shall be marked with the names, or trademark, or other descriptive marking by which the organization responsible for reconditioning the electrical equipment can be identified, along with the date of the reconditioning. [110.21(A)(2)]

E3404.12 Field-applied hazard markings.

Where caution, warning, or danger signs or labels are required by this code, the labels shall meet the following requirements:

1.The marking shall warn of the hazard using effective words, colors, symbols or any combination thereof.

2.Labels shall be permanently affixed to the equipment or wiring method.

3.Labels shall not be hand written except for portions of labels or markings that are variable, or that could be subject to changes. Labels shall be legible.

4.Labels shall be of sufficient durability to withstand the environment involved. [110.21(B)]

E3404.13 Identification of disconnecting means.

Each disconnecting means shall be legibly marked to indicate its purpose, except where located and arranged so that the purpose is evident. The marking shall have the durability to withstand the environment involved. [110.22(A)]

E3405.1 Working space and clearances.

Access and working space shall be provided and maintained around all electrical equipment to permit ready and safe operation and maintenance of such equipment in accordance with this section and Figure E3405.1. (110.26)

E3405.2 Working clearances for energized equipment and panelboards.

Except as otherwise specified in Chapters 34 through 43, the dimension of the working space in the direction of access to panelboards and live parts of other equipment likely to require examination, adjustment, servicing or maintenance while energized shall be not less than 36 inches (914 mm) in depth. Distances shall be measured from the energized parts where such parts are exposed or from the enclosure front or opening where such parts are enclosed. In addition to the 36-inch dimension (914 mm), the work space shall not be less than 30 inches (762 mm) wide in front of the electrical equipment and not less than the width of such equipment. The work space shall be clear and shall extend from the floor or platform to a height of 6.5 feet (1981 mm) or the height of the equipment, whichever is greater. In all cases, the work space shall allow at least a 90-degree (1.57 rad) opening of equipment doors or hinged panels. Equipment associated with the electrical installation located above or below the electrical equipment shall be permitted to extend not more than 6 inches (152 mm) beyond the front of the electrical equipment.

Where such equipment is required by installation instruction or function is located in a space with limited access, all of the following shall apply:

1. Where the equipment is installed above a lay-in ceiling, there shall be an opening not smaller than 22 inches by 22 inches (559 mm by 559 mm), or in a crawl space, there shall be an accessible opening not smaller than 22 inches by 30 inches (559 mm by 762 mm).

2. The width of the working space shall be the width of the equipment enclosure or not less than 30 inches (762 mm), whichever is greater.

3. Enclosure doors and hinged panels shall be capable of opening not less than 90 degrees.

4. The space in front of the enclosure shall comply with the depth requirements of Table 110.26(A)(1) of NFPA 70. The maximum height of the working space shall be the height necessary to install the equipment in the limited space. A horizontal ceiling structural member or access panel shall be permitted in this space. [110.26(A) (1), (2), (3), (4)]

Exceptions:

1. In existing dwelling units, service equipment and panelboards that are not rated in excess of 200 amperes shall be permitted in spaces where the height of the working space is less than 6.5 feet (1981 mm). [110.26(A)(3) Exception No. 1]

2. Meters that are installed in meter sockets shall be permitted to extend beyond the other equipment. Meter sockets shall not be exempt from the requirements of this section. [110.26(A)(3) Exception No. 2]

E3405.3 Indoor dedicated panelboard space.

The indoor space equal to the width and depth of the panelboard and extending from the floor to a height of 6 feet (1829 mm) above the panelboard, or to the structural ceiling, whichever is lower, shall be dedicated to the electrical installation. Piping, ducts, leak protection apparatus and other equipment foreign to the electrical installation shall not be installed in such dedicated space. The area above the dedicated space shall be permitted to contain foreign systems, provided that protection is installed to avoid damage to the electrical equipment from condensation, leaks and breaks in such foreign systems (see Figure E3405.1).

Exception: Suspended ceilings with removable panels shall be permitted within the 6-foot (1829 mm) dedicated space.

E3405.4 Outdoor dedicated panelboard space.

The outdoor space equal to the width and depth of the panelboard, and extending from grade to a height of 6 feet (1829 mm) above the panelboard, shall be dedicated to the electrical installation. Piping and other equipment foreign to the electrical installation shall not be located in this zone.

E3405.5 Location of working spaces and equipment.

Required working space shall not be designated for storage. Panelboards and overcurrent protection devices shall not be located in clothes closets, in bathrooms, or over the steps of a stairway. [110.26(B), 240.24(D), (E), (F)]

E3405.6 Access and entrance to working space.

Access shall be provided to the required working space. [110.26(C)(1)]

E3405.7 Illumination.

Artificial illumination shall be provided for all working spaces for service equipment and panelboards installed indoors and shall not be controlled by automatic means only. Additional lighting outlets shall not be required where the work space is illuminated by an adjacent light source or as permitted by Exception 1 of Section E3903.2 for switched receptacles. [110.26(D)]

SECTION E3406

ELECTRICAL CONDUCTORS AND CONNECTIONS

E3406.1 General.

This section provides general requirements for conductors, connections and splices. These requirements do not apply to conductors that form an integral part of equipment, such as motors, appliances and similar equipment, or to conductors specifically provided for elsewhere in Chapters 34 through 43. (310.1)

E3406.2 Conductor material.

Conductors used to conduct current shall be of copper or aluminum except as otherwise provided in Chapters 34 through 43. Where the conductor material is not specified, the material and the sizes given in these chapters shall apply to copper conductors. Where other materials are used, the conductor sizes shall be changed accordingly. (110.5)

E3406.3 Minimum size of conductors.

The minimum size of conductors for feeders and branch circuits shall be 14 AWG copper and 12 AWG aluminum. The minimum size of service conductors shall be as specified in Chapter 36. The minimum size of Class 2 remote control, signaling and power-limited circuits conductors shall be as specified in Chapter 43. [310.106(A)]

E3406.4 Stranded conductors.

Where installed in raceways, conductors 8 AWG and larger shall be stranded. A solid 8 AWG conductor shall be permitted to be installed in a raceway only to meet the requirements of Sections E3610.2 and E4204. [310.106(C)]

E3406.5 Individual conductor insulation.

Except where otherwise permitted in Sections E3605.1 and E3908.9, and E4303, current-carrying conductors shall be insulated. Insulated conductors shall have insulation types identified as RHH, RHW, RHW-2, THHN, THHW, THW, THW-2, THWN, THWN-2, TW, UF, USE, USE-2, XHHW or XHHW-2. Insulation types shall be approved for the application. [310.10(B), (C), 310.104]

E3406.6 Conductors in parallel.

Circuit conductors that are connected in parallel shall be limited to sizes 1/0 AWG and larger. Conductors in parallel shall: be of the same length; consist of the same conductor material; be the same circular mil area and have the same insulation type. Conductors in parallel shall be terminated in the same manner.

Where run in separate raceways or cables, the raceway or cables shall have the same physical characteristics. Where conductors are in separate raceways or cables, the same number of conductors shall be used in each raceway or cable. [310.10(H)]

E3406.7 Conductors of the same circuit.

All conductors of the same circuit and, where used, the grounded conductor and all equipment grounding conductors and bonding conductors shall be contained within the same raceway, cable or cord. [300.3(B)]

E3406.8 Aluminum and copper connections.

Terminals and splicing connectors shall be identified for the material of the conductors joined. Conductors of dissimilar metals shall not be joined in a terminal or splicing connector where physical contact occurs between dissimilar conductors such as copper and aluminum, copper and copper-clad aluminum, or aluminum and copper-clad aluminum, except where the device is listed for the purpose and conditions of application. Materials such as inhibitors and compounds shall be suitable for the application and shall be of a type that will not adversely affect the conductors, installation or equipment. (110.14)

E3406.9 Fine stranded conductors.

Connectors and terminals for conductors that are more finely stranded than Class B and Class C stranding as shown in Table E3406.9, shall be identified for the specific conductor class or classes. (110.14)

E3406.10 Terminals.

Connection of conductors to terminal parts shall be made without damaging the conductors and shall be made by means of pressure connectors, including set-screw type, by means of splices to flexible leads, or for conductor sizes of 10 AWG and smaller, by means of wire binding screws or studs and nuts having upturned lugs or the equivalent. Terminals for more than one conductor and terminals for connecting aluminum conductors shall be identified for the application. [110.14(A)]

E3406.11 Splices.

Conductors shall be spliced or joined with splicing devices listed for the purpose. Splices and joints and the free ends of conductors shall be covered with an insulation equivalent to that of the conductors or with an insulating device listed for the purpose. Wire connectors or splicing means installed on conductors for direct burial shall be listed for such use. [110.14(B)]

E3406.11.1 Continuity.

Conductors in raceways shall be continuous between outlets, boxes, and devices and shall be without splices or taps in the raceway.

Exception: Splices shall be permitted within surface-mounted raceways that have a removable cover. [300.13(A)]

E3406.11.2 Device connections.

The continuity of a grounded conductor in multiwire branch circuits shall not be dependent on connection to devices such as receptacles and lampholders. The arrangement of grounding connections

shall be such that the disconnection or the removal of a receptacle, luminaire or other device fed from the box does not interfere with or interrupt the grounding continuity. [300.13(B)]

E3406.11.3 Length of conductor for splice or termination.

Where conductors are to be spliced, terminated or connected to fixtures or devices, a minimum length of 6 inches (152 mm) of free conductor shall be provided at each outlet, junction or switch point. The required length shall be measured from the point in the box where the conductor emerges from its raceway or cable sheath. Where the opening to an outlet, junction or switch point is less than 8 inches (200 mm) in any dimension, each conductor shall be long enough to extend at least 3 inches (75 mm) outside of such opening. (300.14)

E3406.12 Installation.

Where a tightening torque is indicated as a numeric value on equipment or in installation instructions provided by the manufacturer, a calibrated torque tool shall be used to achieve the indicated torque value, except where the equipment manufacturer has provided installation instructions for an alternative method of achieving the required torque. [110.14 (D)]

E3406.13 Grounded conductor continuity.

The continuity of a grounded conductor shall not depend on connection to a metallic enclosure, raceway or cable armor. [200.2(B)]

E3406.14 Connection of grounding and bonding equipment.

The connection of equipment grounding conductors, grounding electrode conductors and bonding jumpers shall be in accordance with Sections E3406.14.1 and E3406.14.2.

E3406.14.1 Permitted methods.

Equipment grounding conductors, grounding electrode conductors, and bonding jumpers shall be connected by one or more of the following means:

1. Listed pressure connectors.
2. Terminal bars.
3. Pressure connectors listed as grounding and bonding equipment.
4. Exothermic welding process.
5. Machine screw-type fasteners that engage not less than two threads or are secured with a nut.
6. Thread-forming machine screws that engage not less than two threads in the enclosure.
7. Connections that are part of a listed assembly.
8. Other listed means. [250.8 (A)]

E3406.14.2 Methods not permitted.

Connection devices or fittings that depend solely on solder shall not be used. [250.8 (B)]

SECTION E3407

CONDUCTOR AND TERMINAL IDENTIFICATION

E3407.1 Grounded conductors.

Insulated grounded conductors of sizes 6 AWG or smaller shall be identified by a continuous white or gray outer finish or by three continuous white or gray stripes on other than green insulation along the entire length of the conductors. Conductors of sizes 4 AWG or larger shall be identified either by a continuous white or gray outer finish or by three continuous white or gray stripes on other than green insulation along its entire length or at the time of installation by a distinctive white or gray marking at its terminations. This marking shall encircle the conductor or insulation. [200.6(A) & (B)]

E3407.2 Equipment grounding conductors.

Equipment grounding conductors of sizes 6 AWG and smaller shall be identified by a continuous green color or a continuous green color with one or more yellow stripes on the insulation or covering, except where bare. Conductors with insulation or individual covering that is green, green with one or more yellow stripes, or otherwise identified as permitted by this section shall not be used for ungrounded or grounded circuit conductors. (250.119)

Equipment grounding conductors 4 AWG and larger AWG that are not identified as required for conductors of sizes 6 AWG and smaller shall, at the time of installation, be permanently identified as an equipment grounding conductor at each end and at every point where the conductor is accessible, except where such conductors are bare.

The required identification for conductors 4 AWG and larger shall encircle the conductor and shall be accomplished by one of the following:

- 1.Stripping the insulation or covering from the entire exposed length.
- 2.Coloring the exposed insulation or covering green at the termination.
- 3.Marking the exposed insulation or covering with green tape or green adhesive labels at the termination. [250.119(A)]

Exceptions:

- 1.Conductors 4 AWG and larger shall not be required to be identified in conduit bodies that do not contain splices or unused hubs. [250.119(A)(1) Exception]
- 2.Power-limited, Class 2 or Class 3 circuit cables containing only circuits operating at less than 50 volts shall be permitted to use a conductor with green insulation for other than equipment grounding purposes. [250.119 Exception No. 1]

E3407.3 Ungrounded conductors.

Insulation on the ungrounded conductors shall be a continuous color other than white, gray and green. [310.110(C)]

Exception:

An insulated conductor that is part of a cable or flexible cord assembly and that has a white or gray finish or a finish marking with three continuous white or gray stripes shall be permitted to be used as an ungrounded conductor where it is permanently reidentified to indicate its use as an ungrounded conductor by marking tape, painting, or other effective means at all terminations and at each location where the conductor is visible and accessible. Identification shall encircle the insulation and shall be a color other than white, gray, and green. [200.7(C)(1)]

Where used for single-pole, 3-way or 4-way switch loops, the reidentified conductor with white or gray insulation or three continuous white or gray stripes shall be used only for the supply to the switch, not as a return conductor from the switch to the outlet. [200.7(C)(2)]

E3407.4 Identification of terminals.

Terminals for attachment to conductors shall be identified in accordance with Sections E3407.4.1 and E3407.4.2.

E3407.4.1 Device terminals.

All devices excluding panelboards, provided with terminals for the attachment of conductors and intended for connection to more than one side of the circuit shall have terminals properly marked for identification, except where the terminal intended to be connected to the grounded conductor is clearly evident. [200.10(A)]

Exception: Terminal identification shall not be required for devices that have a normal current rating of over 30 amperes, other than polarized attachment caps and polarized receptacles for attachment caps as required in Section E3407.4.2. [200.10(A) Exception]

E3407.4.2 Receptacles, plugs and connectors.

Receptacles, polarized attachment plugs and cord connectors for plugs and polarized plugs shall have the terminal intended for connection to the grounded (white) conductor identified. Identification shall be by a metal or metal coating substantially white in color or by the word "white" or the letter "W" located adjacent to the identified terminal. Where the terminal is not visible, the conductor entrance hole for the connection shall be colored white or marked with the word "white" or the letter "W." [200.10(B)]

SECTION E3601

GENERAL SERVICES

E3601.1 Scope.

This chapter covers service conductors and equipment for the control and protection of services and their installation requirements. (230.1)

E3601.2 Number of services.

One- and two-family dwellings shall be supplied by only one service. (230.2)

E3601.3 One building or other structure not to be supplied through another.

Service conductors supplying a building or other structure shall not pass through the interior of another building or other structure. (230.3)

E3601.4 Other conductors in raceway or cable.

Conductors other than service conductors shall not be installed in the same service raceway or service cable in which the service conductors are installed. (230.7)

Exceptions:

1. Grounding electrode conductors or supply side bonding jumpers or conductors shall be permitted within service raceways.
2. Load management control conductors having overcurrent protection shall be permitted within service raceways.

E3601.5 Raceway seal.

Where a service raceway enters from an underground distribution system, it shall be sealed in accordance with Section E3803.6. (230.8)

E3601.6 Service disconnect required.

Means shall be provided to disconnect all conductors in a building or other structure from the service entrance conductors. (230.70)

E3601.6.1 Marking of service equipment and disconnects.

Service disconnects shall be permanently marked as a service disconnect. [230.70(B)]

E3601.6.2 Service disconnect location.

The service disconnecting means shall be installed at a readily accessible location either outside of a building or inside nearest the point of entrance of the service conductors. Service disconnecting means shall not be installed in bathrooms. Each occupant shall have access to the disconnect serving the dwelling unit in which they reside. [230.70(A)(1)(2), 230.72(C)]

E3601.7 Maximum number of disconnects.

The service disconnecting means shall consist of not more than six switches or six sets of circuit breakers mounted in a single enclosure or in a group of separate enclosures. [230.71(A)]

SECTION E3602

SERVICE SIZE AND RATING

E3602.1 Ampacity of ungrounded conductors.

Ungrounded service conductors shall have an ampacity of not less than the load served. For one-family dwellings, the ampacity of the ungrounded conductors shall be not less than 100 amperes, 3 wire. For all other installations, the ampacity of the ungrounded conductors shall be not less than 60 amperes. [230.42(B), 230.79(C) & (D)]

E3602.2 Service load.

The minimum load for ungrounded service conductors and service devices that serve 100 percent of the dwelling unit load shall be computed in accordance with Table E3602.2. Ungrounded service conductors

and service devices that serve less than 100 percent of the dwelling unit load shall be computed as required for feeders in accordance with Chapter 37. [220.82(A)]

E3602.2.1 Services under 100 amperes.

Services that are not required to be 100 amperes shall be sized in accordance with Chapter 37. [230.42(A), (B), and (C)].

E3602.3 Rating of service disconnect.

The combined rating of all individual service disconnects serving a single dwelling unit shall be not less than the load determined from Table E3602.2 and shall be not less than as specified in Section E3602.1. (230.79 & 230.80)

E3602.4 Voltage rating.

Systems shall be three-wire, 120/240-volt, single-phase with a grounded neutral. [220.82(A)]

SECTION E3603

SERVICE, FEEDER AND GROUNDING

ELECTRODE CONDUCTOR SIZING

E3603.1 Grounded and ungrounded service conductor size.

Service and feeder conductors supplied by a single-phase, 120/240-volt system shall be sized in accordance with Sections E3603.1.1 through E3603.1.4 and Table 3705.1.

E3603.1.1 Ungrounded service conductors.

For a service rated at 100 through 400 amperes, the service conductors supplying the entire load associated with a one-family dwelling, or the service conductors supplying the entire load associated with an individual dwelling unit in a two-family dwelling, shall have an ampacity of not less than 83 percent of the service rating. The service rating is based on the standard ampere ratings in Section E3705.6.

E3603.1.2 Ungrounded feeder conductors.

For a feeder rated at 100 through 400 amperes, the feeder conductors supplying the entire load associated with a one-family dwelling, or the feeder conductors supplying the entire load associated with an individual dwelling unit in a two-family dwelling, shall have an ampacity of not less than 83 percent of the feeder rating. The feeder rating is based on the standard ampere ratings in Section E3705.6.

E3603.1.3 Feeder size relative to service size.

A feeder for an individual dwelling unit shall not be required to have an ampacity greater than that specified in Sections E3603.1.1 and E3603.1.2.

E3603.1.4 Grounded conductors.

The grounded conductor ampacity shall be not less than the maximum unbalance of the load and the size of the grounded conductor shall be not smaller than the required minimum grounding electrode conductor size specified in [Table E3603.4](#). [310.15(B)(7)]

E3603.1.5 Adjustment/correction factors.

Where correction or adjustment factors are required by Section E3705.2 or E3705.3, they shall be permitted to be applied to the ampacity associated with the temperature rating of the conductor.

E3603.2 Ungrounded service conductors for accessory buildings and structures.

Ungrounded conductors for other than dwelling units shall have an ampacity of not less than 60 amperes and shall be sized as required for feeders in Chapter 37. [230.79(D)]

Exceptions:

1. For limited loads of a single branch circuit, the service conductors shall have an ampacity of not less than 15 amperes. [230.79(A)]

2. For loads consisting of not more than two two-wire branch circuits, the service conductors shall have an ampacity of not less than 30 amperes. [230.79(B)]

E3603.3 Overload protection.

Each ungrounded service conductor shall have overload protection. (230.90)

E3603.3.1 Ungrounded conductor.

Overload protection shall be provided by an overcurrent device installed in series with each ungrounded service conductor. The overcurrent device shall have a rating or setting not higher than the allowable service or feeder rating specified in Section E3603.1. A set of fuses shall be considered to be all of the fuses required to protect all of the ungrounded conductors of a circuit. Single pole circuit breakers, grouped in accordance with Section E3601.7, shall be considered as one protective device. [230.90(A)]

Exception: Two to six circuit breakers or sets of fuses shall be permitted as the overcurrent device to provide the overload protection. The sum of the ratings of the circuit breakers or fuses shall be permitted to exceed the ampacity of the service conductors, provided that the calculated load does not exceed the ampacity of the service conductors. [230.90(A) Exception No. 3]

E3603.3.2 Not in grounded conductor.

Overcurrent devices shall not be connected in series with a grounded service conductor except where a circuit breaker is used that simultaneously opens all conductors of the circuit. [230.90(B)]

E3603.3.3 Location.

The service overcurrent device shall be an integral part of the service disconnecting means or shall be located immediately adjacent thereto. Where fuses are used as the service overcurrent device, the disconnecting means shall be located on the supply side of the fuses. (230.91)

E3603.4 Grounding electrode conductor size.

The grounding electrode conductors shall be sized based on the size of the service entrance conductors as required in Table E3603.4. (250.66)

E3603.5 Temperature limitations.

Except where the equipment is marked otherwise, conductor ampacities used in determining equipment termination provisions shall be based on Table E3705.1. [110.14(C)(1)]

SECTION 3605

SERVICE-ENTRANCE CONDUCTORS

E3605.1 Insulation of service-entrance conductors.

Service-entrance conductors entering or on the exterior of buildings or other structures shall be insulated in accordance with Section E3406.5. (230.41)

Exceptions:

1. A copper grounded conductor shall not be required to be insulated where it is:
 - 1.1. In a raceway or part of a service cable assembly,
 - 1.2. Directly buried in soil of suitable condition, or
 - 1.3. Part of a cable assembly listed for direct burial without regard to soil conditions.
2. An aluminum or copper-clad aluminum grounded conductor shall not be required to be insulated where part of a cable or where identified for direct burial or utilization in underground raceways. (230.41 Exception)

E3605.2 Wiring methods for services.

Service-entrance wiring methods shall be installed in accordance with the applicable requirements in Chapter 38. (230.43)

E3605.3 Spliced conductors.

Service-entrance conductors shall be permitted to be spliced or tapped. Splices shall be made in enclosures or, if directly buried, with listed underground splice kits. Conductor splices shall be made in accordance with Chapters 34, 37, 38 and 39. (230.33, 230.46)

E3605.4 Protection of underground service entrance conductors.

Underground service-entrance conductors shall be protected against physical damage in accordance with Chapter 38. (230.32)

E3605.5 Protection of all other service cables.

Above-ground service-entrance cables, where subject to physical damage, shall be protected by one or more of the following: rigid metal conduit, intermediate metal conduit, Schedule 80 PVC conduit, electrical metallic tubing, reinforced thermosetting resin conduit or other approved means. [230.50(1)]

E3605.6 Locations exposed to direct sunlight.

Insulated conductors and cables used where exposed to direct rays of the sun shall comply with one of the following:

- 1.The conductors and cables shall be listed, or listed and marked, as being sunlight resistant.
- 2.The conductors and cables are covered with insulating material, such as tape or sleeving, that is listed, or listed and marked, as being sunlight resistant. [310.10(D)]

E3605.7 Mounting supports.

Service-entrance cables shall be supported by straps or other approved means within 12 inches (305 mm) of every service head, gooseneck or connection to a raceway or enclosure and at intervals not exceeding 30 inches (762 mm). [230.51(A)]

E3605.8 Raceways to drain.

Where exposed to the weather, raceways enclosing service-entrance conductors shall be listed or approved for use in wet locations and arranged to drain. Where embedded in masonry, raceways shall be arranged to drain. (230.53)

E3605.9 Overhead service locations.

Connections at service heads shall be in accordance with Sections E3605.9.1 through E3605.9.7. (230.54)

E3605.9.1 Rain-tight service head.

Service raceways shall be equipped with a service head at the point of connection to service-drop or overhead conductors. The service head shall be listed for use in wet locations. [230.54(A)]

E3605.9.2 Service cable, service head or gooseneck.

Service-entrance cable shall be equipped with a service head or shall be formed into a gooseneck in an approved manner. The service head shall be listed for use in wet locations. [230.54(B)]

E3605.9.3 Service-head location.

Service heads on raceways or service-entrance cables, and goosenecks in service-entrance cables, shall be located above the point of attachment of the service-drop or overhead service conductors to the building or other structure. [230.54(C)]

Exception: Where it is impracticable to locate the service head or gooseneck above the point of attachment, the service head or gooseneck location shall be not more than 24 inches (610 mm) from the point of attachment. [230.54(C) Exception]

E3605.9.4 Separately bushed openings.

Service heads shall have conductors of different potential brought out through separately bushed openings. [230.54(E)]

E3605.9.5 Drip loops.

Drip loops shall be formed on individual conductors. To prevent the entrance of moisture, service-entrance conductors shall be connected to the service-drop or overhead conductors either below the level of the service head or below the level of the termination of the service-entrance cable sheath. [230.54(F)]

E3605.9.6 Conductor arrangement.

Service-entrance and overhead service conductors shall be arranged so that water will not enter service raceways or equipment. [230.54(G)]

E3605.9.7 Secured.

Service-entrance cables shall be held securely in place. [230.54(D)]

SECTION E3606

SERVICE EQUIPMENT—GENERAL

E3606.1 Service equipment enclosures.

Energized parts of service equipment shall be enclosed. (230.62)

E3606.2 Working space.

The working space in the vicinity of service equipment shall be not less than that specified in Chapter 34. (110.26)

E3606.3 Available short-circuit current.

Service equipment shall be suitable for the maximum fault current available at its supply terminals, but not less than 10,000 amperes. (110.9)

E3606.4 Marking.

Service equipment shall be marked to identify it as being suitable for use as service equipment. Service equipment shall be listed or field labeled. Individual meter socket enclosures shall not be considered as service equipment but shall be listed and rated for the voltage and ampacity of the service. (230.66)

Exception: Meter sockets supplied by and under the exclusive control of an electric utility shall not be required to be listed. (230.66 Exception)

SECTION E3607

SYSTEM GROUNDING

E3607.1 System service ground.

The premises wiring system shall be grounded at the service with a grounding electrode conductor connected to a grounding electrode system as required by this code. Grounding electrode conductors shall be sized in accordance with Table E3603.4. [250.20(B)(1) and 250.24(A)]

E3607.2 Location of grounding electrode conductor connection.

The grounding electrode conductor shall be connected to the grounded service conductor at any accessible point from the load end of the overhead service conductors, service drop, underground service conductors, or service lateral to and including the terminal or bus to which the grounded service conductor is connected at the service disconnecting means. A grounding connection shall not be made

to any grounded circuit conductor on the load side of the service disconnecting means, except as provided in Section E3607.3.2. [250.24(A)(1) and (A)(5)]

E3607.3 Buildings or structures supplied by feeder(s) or branch circuit(s).

Buildings or structures supplied by feeder(s) or branch circuit(s) shall have a grounding electrode or grounding electrode system installed in accordance with Section E3608. The grounding electrode conductor(s) shall be connected in a manner specified in Section E3607.3.1 or, for existing premises wiring systems only, Section E3607.3.2. Where there is no existing grounding electrode, the grounding electrode(s) required in Section E3608 shall be installed. [250.32(A)]

Exception: A grounding electrode shall not be required where only one branch circuit, including a multiwire branch circuit, supplies the building or structure and the branch circuit includes an equipment grounding conductor for grounding the noncurrent-carrying parts of all equipment. For the purposes of this section, a multiwire branch circuit shall be considered as a single branch circuit. [250.32(A) Exception]

E3607.3.1 Equipment grounding conductor.

An equipment grounding conductor as described in Section E3908 shall be run with the supply conductors and connected to the building or structure disconnecting means and to the grounding electrode(s). The equipment grounding conductor shall be used for grounding or bonding of equipment, structures or frames required to be grounded or bonded. The equipment grounding conductor shall be sized in accordance with Section E3908.12. Any installed grounded conductor shall not be connected to the equipment grounding conductor or to the grounding electrode(s). [250.32(B) and Table 250.122]

E3607.3.2 Grounded conductor, existing premises.

For installations made in compliance with previous editions of this code that permitted such connection and where an equipment grounding conductor is not run with the supply conductors to the building or structure, there are no continuous metallic paths bonded to the grounding system in both buildings or structures involved, and ground-fault protection of equipment has not been installed on the supply side of the feeder(s), the grounded conductor run with the supply to the buildings or structure shall be connected to the building or structure disconnecting means and to the grounding electrode(s) and shall be used for grounding or bonding of equipment, structures, or frames required to be grounded or bonded. Where used for grounding in accordance with this provision, the grounded conductor shall be not smaller than the larger of:

1. That required by Section E3704.3.
2. That required by Section E3908.12. [250.32(B)(1) Exception]

E3607.4 Grounding electrode conductor.

A grounding electrode conductor shall be used to connect the equipment grounding conductors, the service equipment enclosures, and the grounded service conductor to the grounding electrode(s). This conductor shall be sized in accordance with Table E3603.4. [250.24(D)]

E3607.5 Main bonding jumper.

An un-spliced main bonding jumper shall be used to connect the equipment grounding conductor(s) and the service-disconnect enclosure to the grounded conductor of the system within the enclosure for each service disconnect. [250.24(B)]

E3607.6 Common grounding electrode.

Where an AC system is connected to a grounding electrode in or at a building or structure, the same electrode shall be used to ground conductor enclosures and equipment in or on that building or structure. Where separate services, feeders or branch circuits supply a building and are required to be connected to a grounding electrode(s), the same grounding electrode(s) shall be used. Two or more grounding electrodes that are effectively bonded together shall be considered as a single grounding electrode system. (250.58)

SECTION E3608

GROUNDING ELECTRODE SYSTEM

E3608.1 Grounding electrode system.

All electrodes specified in Sections E3608.1.1, E3608.1.2, E3608.1.3, E3608.1.4 E3608.1.5 and E3608.1.6 that are present at each building or structure served shall be bonded together to form the grounding electrode system. Where none of these electrodes are present, one or more of the electrodes specified in Sections E3608.1.3, E3608.1.4, E3608.1.5 and E3608.1.6 shall be installed and used. (250.50)

Exception: Concrete-encased electrodes of existing buildings or structures shall not be required to be part of the grounding electrode system where the steel reinforcing bars or rods are not accessible for use without disturbing the concrete. (250.50 Exception)

E3608.1.1 Metal underground water pipe.

A metal underground water pipe that is in direct contact with the earth for 10 feet (3048 mm) or more, including any well casing effectively bonded to the pipe and that is electrically continuous, or made electrically continuous by bonding around insulating joints or insulating pipe to the points of connection of the grounding electrode conductor and the bonding conductors, shall be considered as a grounding electrode (see Section E3608.1). [250.52(A)(1)]

E3608.1.1.1 Interior metal water piping.

Interior metal water piping located more than 5 feet (1524 mm) from the point of entrance into the building shall not be used as a conductor to interconnect electrodes of the grounding electrode system. [250.68(C)(1)]

E3608.1.1.2 Installation.

Continuity of the grounding path or the bonding connection to interior piping shall not rely on water meters, filtering devices and similar equipment. A metal underground water pipe shall be supplemented by an additional electrode of a type specified in Sections E3608.1.2 through E3608.1.6. The supplemental electrode shall be bonded to the grounding electrode conductor, the grounded service-entrance conductor, a nonflexible grounded service raceway, any grounded service enclosure or to the equipment grounding conductor provided in accordance with Section E3607.3.1. Where the

supplemental electrode is a rod, pipe or plate electrode in accordance with Section E3608.1.4 or E3608.1.5, it shall comply with Section E3608.4.

Where the supplemental electrode is a rod, pipe or plate electrode in accordance with Section E3608.1.4 or E3608.1.5, that portion of the bonding jumper that is the sole connection to the supplemental grounding electrode shall not be required to be larger than 6 AWG copper or 4 AWG aluminum wire. [250.53(D) and (E)]

E3608.1.2 Concrete-encased electrode.

A concrete-encased electrode consisting of not less than 20 feet (6096 mm) of either of the following shall be considered as a grounding electrode:

1. One or more bare or zinc-galvanized or other electrically conductive coated steel reinforcing bars or rods not less than 1/2 inch (13 mm) in diameter, installed in one continuous 20-foot (6096 mm) length, or if in multiple pieces connected together by the usual steel tie wires, exothermic welding, welding, or other effective means to create a 20-foot (6096 mm) or greater length.

2. A bare copper conductor not smaller than 4 AWG.

Metallic components shall be encased by at least 2 inches (51 mm) of concrete and shall be located horizontally within that portion of a concrete foundation or footing that is in direct contact with the earth or within vertical foundations or structural components or members that are in direct contact with the earth.

Where multiple concrete-encased electrodes are present at a building or structure, only one shall be required to be bonded into the grounding electrode system. [250.52(A)(3)]

E3608.1.3 Ground rings.

A ground ring encircling the building or structure, in direct contact with the earth at a depth below the earth's surface of not less than 30 inches (762 mm), consisting of at least 20 feet (6096 mm) of bare copper conductor not smaller than 2 AWG shall be considered as a grounding electrode. [250.52(A)(4)]

E3608.1.4 Rod and pipe electrodes.

Rod and pipe electrodes not less than 8 feet (2438 mm) in length and consisting of the following materials shall be considered as a grounding electrode:

1. Grounding electrodes of pipe or conduit shall not be smaller than trade size 3/4 (metric designator 21) and, where of iron or steel, shall have the outer surface galvanized or otherwise metal-coated for corrosion protection.

2. Rod-type grounding electrodes of stainless steel and copper or zinc-coated steel shall be at least 5/8 inch (15.9 mm) in diameter unless listed. [250.52(A)(5)]

E3608.1.4.1 Installation.

The rod and pipe electrodes shall be installed such that at least 8 feet (2438 mm) of length is in contact with the soil. They shall be driven to a depth of not less than 8 feet (2438 mm) except that, where rock bottom is encountered, electrodes shall be driven at an oblique angle not to exceed 45 degrees (0.79 rad) from the vertical or shall be buried in a trench that is at least 30 inches (762 mm) deep. The upper

end of the electrodes shall be flush with or below ground level except where the above-ground end and the grounding electrode conductor attachment are protected against physical damage. (250.53(G))

E3608.1.5 Plate electrodes.

A plate electrode that exposes not less than 2 square feet (0.186 m²) of surface to exterior soil shall be considered as a grounding electrode. Electrodes of bare or electrically conductive coated iron or steel plates shall be not less than 1/4 inch (6.4 mm) in thickness. Solid, uncoated electrodes of nonferrous metal shall be not less than 0.06 inch (1.5 mm) in thickness. Plate electrodes shall be installed not less than 30 inches (762 mm) below the surface of the earth. [250.52(A)(7)]

E3608.1.6 Other electrodes.

In addition to the grounding electrodes specified in Sections E3608.1.1 through E3608.1.5, other listed grounding electrodes shall be permitted. [250.52(A)(6)]

E3608.2 Bonding jumper.

The bonding jumper(s) used to connect the grounding electrodes together to form the grounding electrode system shall be installed in accordance with Sections E3610.2, and E3610.3, shall be sized in accordance with Section E3603.4, and shall be connected in the manner specified in Section E3611.1. [250.53(C)]

E3608.3 Rod, pipe and plate electrode requirements.

Where practicable, rod, pipe and plate electrodes shall be embedded below permanent moisture level. Such electrodes shall be free from nonconductive coatings such as paint or enamel. Where more than one such electrode is used, each electrode of one grounding system shall be not less than 6 feet (1829 mm) from any other electrode of another grounding system. Two or more grounding electrodes that are effectively bonded together shall be considered as a single grounding electrode system. That portion of a bonding jumper that is the sole connection to a rod, pipe or plate electrode shall not be required to be larger than 6 AWG copper or 4 AWG aluminum wire. [250.53(A)(1), 250.53(B), 250.53(E)]

E3608.4 Supplemental electrode required.

A single rod, pipe, or plate electrode shall be supplemented by an additional electrode of a type specified in Sections E3608.1.2 through E3608.1.6. The supplemental electrode shall be bonded to one of the following:

1. A rod, pipe, or plate electrode.
2. A grounding electrode conductor.
3. A grounded service-entrance conductor.
4. A nonflexible grounded service raceway.
5. A grounded service enclosure.

Where multiple rod, pipe, or plate electrodes are installed to meet the requirements of this section, they shall not be less than 6 feet (1829 mm) apart. [250.53(A)(2) and (A)(3)]

Exception: Where a single rod, pipe, or plate grounding electrode has a resistance to earth of 25 ohms or less, the supplemental electrode shall not be required. [250.53(A)(2) Exception]

E3608.6 Metal underground gas piping system.

A metal underground gas piping system shall not be used as a grounding electrode. [250.52(B)(1)]

SECTION E3609

BONDING

E3609.1 General.

Bonding shall be provided where necessary to ensure electrical continuity and the capacity to conduct safely any fault current likely to be imposed. (250.90)

E3609.2 Bonding of equipment for services.

The noncurrent-carrying metal parts of the following equipment shall be effectively bonded together:

- 1.Raceways or service cable armor or sheath that enclose, contain, or support service conductors.
- 2.Service enclosures containing service conductors, including meter fittings, and boxes, interposed in the service raceway or armor. [250.92(A)]

E3609.3 Bonding for communications systems.

Communications system bonding terminations shall be connected in accordance with Section E3609.3.1 or E3609.3.2. (250.94)

E3609.3.1 Intersystem bonding termination device.

An intersystem bonding termination (IBT) for connecting intersystem bonding conductors shall be provided external to enclosures at the service equipment or metering equipment enclosure and at the disconnecting means for any additional buildings or structures. An IBT shall comply with all of the following:

- 1.It shall be accessible for connection and inspection.
- 2.It shall consist of a set of terminals with the capacity for connection of not less than three intersystem bonding conductors.
- 3.It shall not interfere with opening of the enclosure for a service, building or structure disconnecting means, or metering equipment.
- 4.Where located at the service equipment, it shall be securely mounted and electrically connected to an enclosure for the service equipment, to the meter enclosure, or to an exposed nonflexible metallic service raceway, or shall be mounted at one of these enclosures and connected to the enclosure or to the grounding electrode conductor with a 6 AWG or larger copper conductor.
- 5.Where located at the disconnecting means for a building or structure, it shall be securely mounted and electrically connected to the metallic enclosure for the building or structure disconnecting means, or shall be mounted at the disconnecting means and connected to the metallic enclosure or to the grounding electrode conductor with a 6 AWG or larger copper conductor.

6.It shall be listed as grounding and bonding equipment. [250.94(A)]

Exception: Means for connecting intersystem bonding conductors are not required where communications systems are not likely to be used.

E3609.4 Method of bonding at the service.

Bonding jumpers meeting the requirements of this chapter shall be used around impaired connections, such as reducing washers or oversized, concentric, or eccentric knockouts. Standard locknuts or bushings shall not be the only means for the bonding required by this section but shall be permitted to be installed to make mechanical connections of raceways. Electrical continuity at service equipment, service raceways and service conductor enclosures shall be ensured by one or more of the methods specified in Sections E3609.4.1 through E3609.4.4.

E3609.4.1 Grounded service conductor.

Equipment shall be bonded to the grounded service conductor in a manner provided in this code.

E3609.4.2 Threaded connections.

Equipment shall be bonded by connections using threaded couplings or threaded hubs on enclosures. Such connections shall be made wrench tight.

E3609.4.3 Threadless couplings and connectors.

Equipment shall be bonded by threadless couplings and connectors for metal raceways and metal-clad cables. Such couplings and connectors shall be made wrench tight. Standard locknuts or bushings shall not be used for the bonding required by this section.

E3609.4.4 Other devices.

Equipment shall be bonded by other listed devices, such as bonding-type locknuts, bushings and bushings with bonding jumpers. [250.92(B)]

E3609.5 Sizing supply-side bonding jumper and main bonding jumper.

The bonding jumper shall not be smaller than the sizes shown in Table E3603.4 for grounding electrode conductors. Where the service-entrance conductors are paralleled in two or more raceways or cables, and an individual supply-side bonding jumper is used for bonding these raceways or cables, the supply-side bonding jumper for each raceway or cable shall be selected from Table E3603.4 based on the size of the ungrounded supply conductors in each raceway or cable. A single supply-side bonding jumper installed for bonding two or more raceways or cables shall be sized in accordance with Table E3603.4 based on the largest set of parallel ungrounded supply conductors. [250.102(C)]

E3609.6 Metal water piping bonding.

The metal water piping system shall be bonded to the service equipment enclosure, the grounded conductor at the service, the grounding electrode conductor where of sufficient size, or to the one or more grounding electrodes used. The bonding jumper shall be sized in accordance with Table E3603.4. The points of attachment of the bonding jumper(s) shall be accessible. [250.104(A) and 250.104(A)(1)]

E3609.7 Bonding other metal piping.

Where installed in or attached to a building or structure, metal piping systems, including gas piping, capable of becoming energized shall be bonded to the service equipment enclosure, the grounded conductor at the service, the grounding electrode conductor where of sufficient size, or to the one or more grounding electrodes used. The bonding conductor(s) or jumper(s) shall be sized in accordance with Table E3908.12 and equipment grounding conductors shall be sized in accordance with Table E3908.12 using the rating of the circuit capable of energizing the piping. The equipment grounding conductor for the circuit that is capable of energizing the piping shall be permitted to serve as the bonding means. The points of attachment of the bonding jumper(s) shall be accessible. [250.104(B)]

SECTION E3610

GROUNDING ELECTRODE CONDUCTORS

E3610.1 Continuous.

The grounding electrode conductor shall be installed in one continuous length without splices or joints and shall run to any convenient grounding electrode available in the grounding electrode system where the other electrode(s), if any, are connected by bonding jumpers in accordance with Section E3608.2, or to one or more grounding electrode(s) individually. The grounding electrode conductor shall be sized for the largest grounding electrode conductor required among all of the electrodes connected to it. [250.64(C)]

Exception: Splicing of the grounding electrode conductor by irreversible compression-type connectors listed as grounding and bonding equipment or by the exothermic welding process shall not be prohibited. [250.64(C)(1)]

E3610.2 Securing and protection against physical damage.

Where exposed, a grounding electrode conductor or its enclosure shall be securely fastened to the surface on which it is carried. Grounding electrode conductors shall be permitted to be installed on or through framing members. A 6 AWG or larger copper or aluminum grounding electrode conductor not exposed to physical damage shall be permitted to be run along the surface of the building construction without metal covering or protection. A 6 AWG or larger copper or aluminum grounding electrode exposed to physical damage shall be in rigid metal conduit, intermediate metal conduit, rigid polyvinyl chloride (PVC), nonmetallic conduit, reinforced thermosetting resin (RTRC-XW) nonmetallic conduit, electrical metallic tubing or cable armor. Grounding electrode conductors smaller than 6 AWG shall be in rigid metal conduit, intermediate metal conduit, rigid polyvinyl chloride (PVC) nonmetallic conduit, reinforced thermosetting resin (RTRC-XW) nonmetallic conduit, electrical metallic tubing or cable armor. Grounding electrode conductors and grounding electrode bonding jumpers in contact with the earth shall not be required to comply with Section E3803, but shall be buried or otherwise protected if subject to physical damage. [250.64(B)]

Bare aluminum or copper-clad aluminum grounding electrode conductors shall not be used where in direct contact with masonry or the earth or where subject to corrosive conditions. Where used outside, aluminum or copper-clad aluminum grounding electrode conductors shall not be installed within 18 inches (457 mm) of the earth. [250.64(A)]

E3610.3 Raceways and enclosures for grounding electrode conductors.

Ferrous metal raceways and enclosures for grounding electrode conductors shall be electrically continuous from the point of attachment to cabinets or equipment to the grounding electrode, and shall be securely fastened to the ground clamp or fitting. Ferrous metal raceways and enclosures shall be bonded at each end of the raceway or enclosure to the grounding electrode or to the grounding electrode conductor to create an electrically parallel path. Nonferrous metal raceways and enclosures shall not be required to be electrically continuous. Bonding methods in compliance with Section E3609.4 for installations at service equipment locations and with Sections E3609.4.2 through E3609.4.4 for other than service equipment locations shall apply at each end and to all intervening ferrous raceways, boxes, and enclosures between the cabinets or equipment and the grounding electrode. The bonding jumper for a grounding electrode conductor raceway shall be the same size or larger than the required enclosed grounding electrode conductor.

Where a raceway is used as protection for a grounding conductor, the installation shall comply with the requirements of Chapter 38. [250.64(E)(1), (2), (3), (4)]

E3610.4 Prohibited use.

An equipment grounding conductor shall not be used as a grounding electrode conductor. (250.121)

Exception: A wire-type equipment grounding conductor shall be permitted to serve as both an equipment grounding conductor and a grounding electrode conductor where installed in accordance with the applicable requirements for both the equipment grounding conductor and the grounding electrode conductor in Chapters 36 and 39. Where used as a grounding electrode conductor, the wire-type equipment grounding conductor shall be installed and arranged in a manner that will prevent objectionable current. [250.121 Exception, 250.6(A)]

SECTION E3611

GROUNDING ELECTRODE CONDUCTOR

CONNECTION TO THE GROUNDING ELECTRODES

E3611.1 Methods of grounding conductor connection to electrodes.

The grounding or bonding conductor shall be connected to the grounding electrode by exothermic welding, listed lugs, listed pressure connectors, listed clamps or other listed means. Connections depending on solder shall not be used. Ground clamps shall be listed for the materials of the grounding electrode and the grounding electrode conductor and, where used on pipe, rod or other buried electrodes, shall also be listed for direct soil burial or concrete encasement. Not more than one conductor shall be connected to the grounding electrode by a single clamp or fitting unless the clamp or fitting is listed for multiple conductors. One of the methods indicated in the following items shall be used:

1. A pipe fitting, pipe plug or approved device screwed into a pipe or pipe fitting.
2. A listed bolted clamp of cast bronze or brass, or plain or malleable iron.
3. For indoor communications purposes only, a listed sheet metal strap-type ground clamp having a rigid metal base that seats on the electrode and having a strap of such material and dimensions that it is not likely to stretch during or after installation.

4. Other equally substantial approved means. (250.70)

E3611.2 Accessibility.

All mechanical elements used to terminate a grounding electrode conductor or bonding jumper to the grounding electrodes that are not buried or concrete encased shall be accessible. [250.68(A) and 250.68(A) Exception]

E3611.3 Effective grounding path.

The connection of the grounding electrode conductor or bonding jumper shall be made in a manner that will ensure a permanent and effective grounding path. Where necessary to ensure effective grounding for a metal piping system used as a grounding electrode, effective bonding shall be provided around insulated joints and sections and around any equipment that is likely to be disconnected for repairs or replacement. Bonding jumpers shall be of sufficient length to permit removal of such equipment while retaining the integrity of the grounding path. [250.68(B)]

E3611.4 Interior metal water piping.

Where grounding electrode conductors and bonding jumpers are connected to interior metal water piping as a means to extend the grounding electrode conductor connection to an electrode(s), such piping shall be located not more than 5 feet (1524 mm) from the point of entry into the building.

Where interior metal water piping is used as a conductor to interconnect electrodes that are part of the grounding electrode system, such piping shall be located not more than 5 feet (1524 mm) from the point of entry into the building. [250.68(C)(1)]

E3611.5 Rebar type concrete-encased electrode.

Where a grounding electrode conductor or bonding jumper is connected to a rebar extended from the location of a rebar-type concrete-encased electrode installed in accordance with Section E3608.1.2, the point of connection to the rebar extension shall be in an accessible location that is not subject to corrosion of the rebar. The rebar extension shall not be exposed to contact with the earth without corrosion protection. [250.68 (C) (3)]

E3611.6 Protection of ground clamps and fittings.

Ground clamps or other fittings shall be approved for applications without protection or shall be protected from physical damage by installing them where they are not likely to be damaged or by enclosing them in metal, wood, or equivalent protective coverings. (250.10)

E3611.7 Clean surfaces.

Nonconductive coatings (such as paint, enamel, and lacquer) on equipment to be grounded shall be removed from threads and other contact surfaces to ensure good electrical continuity or shall be connected by fittings that make such removal unnecessary. (250.12)

CHAPTER 37

BRANCH CIRCUIT AND FEEDER REQUIREMENTS

SECTION E3701

GENERAL

E3701.2 Branch-circuit and feeder ampacity.

Branch-circuit and feeder conductors shall have ampacities not less than the maximum load to be served. Where a branch circuit or a feeder supplies continuous loads or any combination of continuous and noncontinuous loads, the minimum branch-circuit or feeder conductor size, before the application of any adjustment or correction factors, shall have an allowable ampacity equal to or greater than the noncontinuous load plus 125 percent of the continuous load. [210.19(A)(1)(a) and 215.2(A)(1)(a)]

Exception: The grounded conductors of feeders that are not connected to an overcurrent device shall be permitted to be sized at 100 percent of the continuous and noncontinuous load. [215.1(A)(1) Exception No. 2]

E3701.3 Selection of ampacity.

Where more than one calculated or tabulated ampacity could apply for a given circuit length, the lowest value shall be used. [310.15(A)(2)]

Exception: Where different ampacities apply to portions of a circuit, the higher ampacity shall be permitted to be used where the total portion(s) of the circuit with the lower ampacity does not exceed the lesser of 10 feet (3048 mm) or 10 percent of the total circuit. [310.15(A)(2) Exception]

E3701.4 Branch circuits with more than one receptacle.

Conductors of branch circuits supplying more than one receptacle for cord-and-plug-connected portable loads shall have ampacities of not less than the rating of the branch circuit. [210.19(A)(2)]

E3701.5 Multiwire branch circuits.

All conductors for multiwire branch circuits shall originate from the same panelboard or similar distribution equipment. Except where all ungrounded conductors are opened simultaneously by the branch-circuit overcurrent device, multiwire branch circuits shall supply only line-to-neutral loads or only one appliance. [210.4(A) and 210.4(C)]

E3701.5.1 Disconnecting means.

Each multiwire branch circuit shall be provided with a means that will simultaneously disconnect all ungrounded conductors at the point where the branch circuit originates. [210.4(B)]

E3701.5.2 Grouping.

The ungrounded and grounded circuit conductors of each multiwire branch circuit shall be grouped by wire markers, cable ties or similar means in at least one location within the panelboard or other point of origination. [200.4(B)]

Exception: Grouping shall not be required where the circuit conductors enter from a cable or raceway unique to the circuit, thereby making the grouping obvious, or where the conductors pass through a box or conduit body without a loop as described in Section E3905.12.2.1 or without a splice or termination. [200.4(B) Exception 1 and 2].

SECTION E3702

BRANCH CIRCUIT RATINGS

E3702.1 Branch-circuit voltage limitations.

The voltage ratings of branch circuits that supply luminaires or receptacles for cord-and-plug-connected loads of up to 1,400 volt-amperes or of less than 1/4 horsepower (0.186 kW) shall be limited to a maximum rating of 120 volts, nominal, between conductors.

Branch circuits that supply cord-and-plug-connected or permanently connected utilization equipment and appliances rated at over 1,440 volt-amperes or 1/4 horsepower (0.186 kW) and greater shall be rated at 120 volts or 240 volts, nominal. [210.6(A), (B), and (C)]

E3702.2 Branch-circuit ampere rating.

Branch circuits shall be rated in accordance with the maximum allowable ampere rating or setting of the overcurrent protection device. The rating for other than individual branch circuits shall be 15, 20, 30, 40 and 50 amperes. Where conductors of higher ampacity are used, the ampere rating or setting of the specified over-current device shall determine the circuit rating. (210.18)

E3702.3 Fifteen- and 20-ampere branch circuits.

A 15- or 20-ampere branch circuit shall be permitted to supply lighting units, or other utilization equipment, or a combination of both. The rating of any one cord-and-plug-connected utilization equipment not fastened in place shall not exceed 80 percent of the branch-circuit ampere rating. The total rating of utilization equipment fastened in place, other than luminaires, shall not exceed 50 percent of the branch-circuit ampere rating where lighting units, cord-and-plug-connected utilization equipment not fastened in place, or both, are also supplied. [210.23(A)(1) and (2)]

E3702.4 Thirty-ampere branch circuits.

A 30-ampere branch circuit shall be permitted to supply fixed utilization equipment. A rating of any one cord-and-plug-connected utilization equipment shall not exceed 80 percent of the branch-circuit ampere rating. [210.23(B)]

E3702.5 Branch circuits serving multiple loads or outlets.

General-purpose branch circuits shall supply lighting outlets, appliances, equipment or receptacle outlets, and combinations of such. Multioutlet branch circuits serving lighting or receptacles shall be limited to a maximum branch-circuit rating of 20 amperes. [210.23(A), (B), and (C)]

E3702.6 Branch circuits serving a single motor.

Branch-circuit conductors supplying a single motor shall have an ampacity not less than 125 percent of the motor full-load current rating. [430.22(A)]

E3702.7 Branch circuits serving motor-operated and combination loads.

For circuits supplying loads consisting of motor-operated utilization equipment that is fastened in place and that has a motor larger than 1/8 horsepower (0.093 kW) in combination with other loads, the total

calculated load shall be based on 125 percent of the largest motor load plus the sum of the other loads. [220.18(A)]

E3702.8 Branch-circuit inductive and LED lighting loads.

For circuits supplying luminaires having ballasts or LED drivers, the calculated load shall be based on the total ampere ratings of such units and not on the total watts of the lamps. [220.18(B)]

E3702.9 Branch-circuit load for ranges and cooking appliances.

It shall be permissible to calculate the branch-circuit load for one range in accordance with Table E3704.2(2). The branch-circuit load for one wall-mounted oven or one counter-mounted cooking unit shall be the nameplate rating of the appliance. The branch-circuit load for a counter-mounted cooking unit and not more than two wall-mounted ovens all supplied from a single branch circuit and located in the same room shall be calculated by adding the nameplate ratings of the individual appliances and treating the total as equivalent to one range. (220.55 Note 4)

E3702.9.1 Minimum branch circuit for ranges.

Ranges with a rating of 8.75 kVA or more shall be supplied by a branch circuit having a minimum rating of 40 amperes. [210.19(A)(3)]

E3702.10 Branch circuits serving heating loads.

Electric space-heating and water-heating appliances shall be considered continuous loads. Branch circuits supplying two or more outlets for fixed electric space-heating equipment shall be rated not over 30 amperes. [424.3(A)]

E3702.11 Branch circuits for air-conditioning and heat pump equipment.

The ampacity of the conductors supplying multi motor and combination load equipment shall be not less than the minimum circuit ampacity marked on the equipment. The branch-circuit overcurrent device rating shall be the size and type marked on the appliance. [440.4(B), 440.35]

E3702.12 Branch circuits serving room air conditioners.

A room air conditioner shall be considered as a single motor unit in determining its branch-circuit requirements where all the following conditions are met:

- 1.It is cord- and attachment plug-connected.
- 2.The rating is not more than 40 amperes and 250 volts; single phase.
- 3.Total rated-load current is shown on the room air-conditioner nameplate rather than individual motor currents.
- 4.The rating of the branch-circuit short-circuit and ground-fault protective device does not exceed the ampacity of the branch-circuit conductors, or the rating of the branch-circuit conductors, or the rating of the receptacle, whichever is less. [440.62(A)]

E3702.12.1 Where no other loads are supplied.

The total marked rating of a cord- and attachment plug-connected room air conditioner shall not exceed 80 percent of the rating of a branch circuit where no other appliances are also supplied. [440.62(B)]

E3702.12.2 Where lighting units or other appliances are also supplied.

The total marked rating of a cord- and attachment plug-connected room air conditioner shall not exceed 50 percent of the rating of a branch circuit where lighting or other appliances are also supplied. Where the circuitry is interlocked to prevent simultaneous operation of the room air conditioner and energization of other outlets on the same branch circuit, a cord- and attachment plug-connected room air conditioner shall not exceed 80 percent of the branch-circuit rating. [440.62(C)]

E3702.13 Electric vehicle branch circuit.

Outlets installed for the purpose of charging electric vehicles shall be supplied by an individual branch circuit. Each circuit shall not supply other outlets. (625.40)

E3702.14 Branch-circuit requirement—summary.

The requirements for circuits having two or more outlets, or receptacles, other than the receptacle circuits of Sections E3703.2, E3703.3 and E3703.4, are summarized in Table E3702.14. Branch circuits in dwelling units shall supply only loads within that dwelling unit or loads associated only with that dwelling unit. Branch circuits installed for the purpose of lighting, central alarm, signal, communication or other purposes for public or common areas of a two-family dwelling shall not be supplied from equipment that supplies an individual dwelling unit. (210.24 and 210.25)

SECTION E3703

REQUIRED BRANCH CIRCUITS

E3703.1 Branch circuits for heating.

Central heating equipment other than fixed electric space heating shall be supplied by an individual branch circuit. Permanently connected air-conditioning equipment, and auxiliary equipment directly associated with the central heating equipment such as pumps, motorized valves, humidifier and electrostatic air cleaners, shall not be prohibited from connecting to the same branch circuit as the central heating equipment. (422.12 and 422.12 Exceptions No. 1 and No. 2)

E3703.2 Kitchen and dining area receptacles.

A minimum of two 20-ampere-rated branch circuits shall be provided to serve all wall and floor receptacle outlets located in the kitchen, pantry, breakfast area, dining area or similar area of a dwelling. The kitchen countertop receptacles shall be served by a minimum of two 20-ampere-rated branch circuits, either or both of which shall also be permitted to supply other receptacle outlets in the same kitchen, pantry, breakfast and dining area including receptacle outlets for refrigeration appliances. [210.11(C)(1) and 210.52(B)(1) and (B)(2)]

Exception: The receptacle outlet for refrigeration appliances shall be permitted to be supplied from an individual branch circuit rated 15 amperes or greater. [210.52(B)(1) Exception No. 2]

E3703.3 Laundry circuit.

A minimum of one 20-ampere-rated branch circuit shall be provided for receptacles located in the laundry area and shall serve only receptacle outlets located in the laundry area. [210.11(C)(2)]

E3703.4 Bathroom branch circuits.

A minimum of one 20-ampere branch circuit shall be provided to supply bathroom receptacle outlet(s). Such circuits shall have no other outlets. [210.11(C)(3)]

Exception: Where the 20-ampere circuit supplies a single bathroom, outlets for other equipment within the same bathroom shall be permitted to be supplied in accordance with Section E3702. [210.11(C)(3) Exception]

E3703.5 Garage branch circuits.

In addition to the number of branch circuits required by other parts of this section, not less than one 120-volt, 20-ampere branch circuit shall be installed to supply receptacle outlets in attached garages and in detached garages with electric power. This circuit shall not have other outlets.

Exception: This circuit shall be permitted to supply readily accessible outdoor receptacle outlets.

E3703.6 Number of branch circuits.

The minimum number of branch circuits shall be determined from the total calculated load and the size or rating of the circuits used. The number of circuits shall be sufficient to supply the load served. In no case shall the load on any circuit exceed the maximum specified by Section E3702. [210.11(A)]

E3703.7 Branch-circuit load proportioning.

Where the branch-circuit load is calculated on a volt-amperes-per-square-foot (m²) basis, the wiring system, up to and including the branch-circuit panelboard(s), shall have the capacity to serve not less than the calculated load. This load shall be evenly proportioned among multioutlet branch circuits within the panelboard(s). Branch-circuit overcurrent devices and circuits shall only be required to be installed to serve the connected load. [210.11(B)]

SECTION E3704

FEEDER REQUIREMENTS

E3704.1 Conductor size.

Feeder conductors that do not serve 100 percent of the dwelling unit load and branch-circuit conductors shall be of a size sufficient to carry the load as determined by this chapter. Feeder conductors shall not be required to be larger than the service-entrance conductors that supply the dwelling unit. The load for feeder conductors that serve as the main power feeder to a dwelling unit shall be determined as specified in Chapter 36 for services. [310.15(B)(7)(2) and (3)]

E3704.2 Feeder loads.

The minimum load in volt-amperes shall be calculated in accordance with the load calculation procedure prescribed in Table E3704.2(1). The associated table demand factors shall be applied to the actual load to determine the minimum load for feeders. (220.40)

E3704.3 Feeder neutral load.

The feeder neutral load shall be the maximum unbalance of the load determined in accordance with this chapter. The maximum unbalanced load shall be the maximum net calculated load between the neutral and any one ungrounded conductor. For a feeder or service supplying electric ranges, wall-mounted

ovens, counter-mounted cooking units and electric dryers, the maximum unbalanced load shall be considered as 70 percent of the load on the ungrounded conductors. [220.61(A) and (B)]

E3704.4 Lighting and general use receptacle load.

A unit load of not less than 3 volt-amperes shall constitute the minimum lighting and general use receptacle load for each square foot of floor area (33 VA for each square meter of floor area). The floor area for each floor shall be calculated from the outside dimensions of the building. The calculated floor area shall not include open porches, garages, or unused or unfinished spaces not adaptable for future use. [220.12, Table 220.12, and 220.14(J)]

E3705.4 Temperature limitations.

The temperature rating associated with the ampacity of a conductor shall be so selected and coordinated to not exceed the lowest temperature rating of any connected termination, conductor or device. Conductors with temperature ratings higher than specified for terminations shall be permitted to be used for ampacity adjustment, correction, or both. Except where the equipment is marked otherwise, conductor ampacities used in determining equipment termination provisions shall be based on Table E3705.1. [110.14(C)]

E3705.4.1 Conductors rated 60°C.

Except where the equipment is marked otherwise, termination provisions of equipment for circuits rated 100 amperes or less, or marked for 14 AWG through 1 AWG conductors, shall be used only for one of the following:

1. Conductors rated 60°C (140°F);
2. Conductors with higher temperature ratings, provided that the ampacity of such conductors is determined based on the 60°C (140°F) ampacity of the conductor size used;
3. Conductors with higher temperature ratings where the equipment is listed and identified for use with such conductors; or
4. For motors marked with design letters B, C, or D conductors having an insulation rating of 75°C (167°F) or higher shall be permitted to be used provided that the ampacity of such conductors does not exceed the 75°C (167°F) ampacity. [110.14(C)(1)(a)]

E3705.4.2 Conductors rated 75°C.

Termination provisions of equipment for circuits rated over 100 amperes, or marked for conductors larger than 1 AWG, shall be used only for:

1. Conductors rated 75°C (167°F).
2. Conductors with higher temperature ratings provided that the ampacity of such conductors does not exceed the 75°C (167°F) ampacity of the conductor size used, or provided that the equipment is listed and identified for use with such conductors. [110.14(C)(1)(b)]

E3705.4.3 Separately installed pressure connectors.

Separately installed pressure connectors shall be used with conductors at the ampacities not exceeding the ampacity at the listed and identified temperature rating of the connector. [110.14(C)(2)]

E3705.4.4 Conductors of Type NM cable.

Conductors in NM cable assemblies shall be rated at 90°C (194°F). Types NM, NMC, and NMS cable identified by the markings NM-B, NMC-B, and NMS-B meet this requirement. The allowable ampacity of Types NM, NMC, and NMS cable shall not exceed that of 60°C (140°F) rated conductors and shall comply with Section E3705.1 and Table E3705.5.3. The 90°C (194°F) rating shall be permitted to be used for ampacity adjustment and calculations provided that the final corrected or adjusted ampacity does not exceed that for a 60°C (140°F) rated conductor. Where more than two NM cables containing two or more current-carrying conductors are installed, without maintaining spacing between the cables, through the same opening in wood framing that is to be sealed with thermal insulation, caulk or sealing foam, the allowable ampacity of each conductor shall be adjusted in accordance with Table E3705.3. Where more than two NM cables containing two or more current-carrying conductors are installed in contact with thermal insulation without maintaining spacing between cables, the allowable ampacity of each conductor shall be adjusted in accordance with Table E3705.3. (334.80 and 334.112)

E3705.4.5 Conductors of Type SE cable.

Where used as a branch circuit or feeder wiring method within the interior of a building and installed in thermal insulation, the ampacity of the conductors in Type SE cable assemblies with ungrounded conductor sizes 10 AWG and smaller shall be in accordance with the 60°C (140°F) conductor temperature rating. The maximum conductor temperature rating shall be permitted to be used for ampacity adjustment and correction purposes, provided that the final derated ampacity does not exceed that for a 60°C (140°F) rated conductor. [338.10(B)(4)(a)]

E3705.5 Overcurrent protection required.

All ungrounded branch-circuit and feeder conductors shall be protected against overcurrent by an overcurrent device installed at the point where the conductors receive their supply. Overcurrent devices shall not be connected in series with a grounded conductor. Overcurrent protection and allowable loads for branch circuits and for feeders that do not supply the entire load associated with a one-family dwelling or the entire load associated with an individual dwelling unit in a two-family dwelling shall be in accordance with this chapter.

Branch-circuit conductors and equipment shall be protected by overcurrent protective devices having a rating or setting not exceeding the allowable ampacity specified in Table E3705.1 and Sections E3705.2, E3705.3 and E3705.4 except where otherwise permitted or required in Sections E3705.5.1 through E3705.5.3. [240.4, 240.21, and 310.15(B)(7)(2)]

E3705.5.2 Overcurrent devices of the next higher rating.

The next higher standard overcurrent device rating, above the ampacity of the conductors being protected, shall be permitted to be used, provided that all of the following conditions are met:

- 1.The conductors being protected are not part of a branch circuit supplying more than one receptacle for cord- and plug-connected portable loads.

2.The ampacity of conductors does not correspond with the standard ampere rating of a fuse or a circuit breaker without overload trip adjustments above its rating (but that shall be permitted to have other trip or rating adjustments).

3.The next higher standard device rating does not exceed 400 amperes. [240.4(B)]

E3705.7 Location of overcurrent devices in or on premises.

Circuit breakers and switches containing fuses shall:

1.Be readily accessible. [240.24(A)]

2.Not be located where they will be exposed to physical damage. [240.24(C)]

3.Not be located where they will be in the vicinity of easily ignitable material such as in clothes closets. [240.24(D)]

4.Not be located in bathrooms. [240.24(E)]

5.Not be located over steps of a stairway.

6.Be installed so that the center of the grip of the operating handle of the switch or circuit breaker, when in its highest position, is not more than 6 feet 7 inches (2007 mm) above the floor or working platform. [240.24(A)]

Exceptions:

1.This section shall not apply to supplementary overcurrent protection that is integral to utilization equipment. [240.24(A)(2)]

2.Overcurrent devices installed adjacent to the utilization equipment that they supply shall be permitted to be accessible by portable means. [240.24(A)(4)]

E3705.8 Ready access for occupants.

Each occupant shall have ready access to all overcurrent devices protecting the conductors supplying that occupancy. [240.24(B)]

E3705.9 Enclosures for overcurrent devices.

Overcurrent devices shall be enclosed in cabinets, cutout boxes, or equipment assemblies. The operating handle of a circuit breaker shall be permitted to be accessible without opening a door or cover. [240.30(A) and (B)]

SECTION E3706

PANELBOARDS

E3706.1 Panelboard rating.

All panelboards shall have a rating not less than that of the minimum service or feeder capacity required for the calculated load. (408.30)

E3706.2 Panelboard circuit identification.

All circuits and circuit modifications shall be legibly identified as to their clear, evident, and specific purpose or use. The identification shall include an approved degree of detail that allows each circuit to be distinguished from all others. Spare positions that contain unused overcurrent devices or switches shall be described accordingly. The identification shall be included in a circuit directory located on the face of the panelboard enclosure or inside the panel door. Circuits shall not be described in a manner that depends on transient conditions of occupancy. [408.4(A)]

E3706.3 Panelboard overcurrent protection.

In addition to the requirement of Section E3706.1, a panelboard shall be protected by an overcurrent protective device having a rating not greater than that of the panelboard. Such overcurrent protective device shall be located within or at any point on the supply side of the panelboard. (408.36)

E3706.4 Grounded conductor terminations.

Each grounded conductor shall terminate within the panelboard on an individual terminal that is not also used for another conductor, except that grounded conductors of circuits with parallel conductors shall be permitted to terminate on a single terminal where the terminal is identified for connection of more than one conductor. (408.41 and 408.41 Exception)

E3706.5 Back-fed devices.

Plug-in-type overcurrent protection devices or plug-in-type main lug assemblies that are back-fed and used to terminate field-installed ungrounded supply conductors shall be secured in place by an additional fastener that requires other than a pull to release the device from the mounting means on the panel. [408.36(D)]

E3706.5 Back-fed devices.

Plug-in-type overcurrent protection devices or plug-in-type main lug assemblies that are back-fed and used to terminate field-installed ungrounded supply conductors shall be secured in place by an additional fastener that requires other than a pull to release the device from the mounting means on the panel. [408.36(D)]

WIRING METHODS

SECTION E3801

GENERAL REQUIREMENTS

E3801.3 Circuit conductors.

All conductors of a circuit, including equipment grounding conductors and bonding conductors, shall be contained in the same raceway, trench, cable or cord. [300.3(B)]

E3802.1 Installation and support requirements.

Wiring methods shall be installed and supported in accordance with Table E3802.1. (Chapter 3 and 300.11)

E3802.2 Cables in accessible attics.

Cables in attics or roof spaces provided with access shall be installed as specified in Sections E3802.2.1 and E3802.2.2. (320.3 and 334.23)

E3802.2.1 Across structural members.

Where run across the top of floor joists, or run within 7 feet (2134 mm) of floor or floor joists across the face of rafters or studding, in attics and roof spaces that are provided with access, the cable shall be protected by substantial guard strips that are at least as high as the cable. Where such spaces are not provided with access by permanent stairs or ladders, protection shall only be required within 6 feet (1829 mm) of the nearest edge of the attic entrance. [320.23(A) and 334.23]

E3802.2.2 Cable installed through or parallel to framing members.

Where cables are installed through or parallel to the sides of rafters, studs or floor joists, guard strips and running boards shall not be required, and the installation shall comply with Table E3802.1. [320.23(B) and 334.23]

E3802.3 Exposed cable.

In exposed work, except as provided for in Sections E3802.2 and E3802.4, cable assemblies shall be installed as specified in Sections E3802.3.1 and E3802.3.2. (320.15, 330.15 and 334.15)

E3802.3.1 Surface installation.

Cables shall closely follow the surface of the building finish or running boards. [334.15(A)]

E3802.3.2 Protection from physical damage.

Where subject to physical damage, cables shall be protected by rigid metal conduit, intermediate metal conduit, electrical metallic tubing, Schedule 80 PVC conduit, RTRC-XW or other approved means. Where passing through a floor, the cable shall be enclosed in rigid metal conduit, intermediate metal conduit, electrical metallic tubing, Schedule 80 PVC conduit RTRC-XW or other approved means extending not less than 6 inches (152 mm) above the floor. [334.15(B)]

E3802.3.3 Locations exposed to direct sunlight.

Insulated conductors and cables used where exposed to direct rays of the sun shall be listed or listed and marked, as being "sunlight resistant," or shall be covered with insulating material, such as tape or sleeving, that is listed or listed and marked as being "sunlight resistant." [310.10(D)]

E3802.4 In unfinished basements and crawl spaces.

Where type NM or SE cable is run at angles with joists in unfinished basements and crawl spaces, cable assemblies containing two or more conductors of sizes 6 AWG and larger and assemblies containing three or more conductors of sizes 8 AWG and larger shall not require additional protection where attached directly to the bottom of the joists. Smaller cables shall be run either through bored holes in joists or on running boards. Type NM or SE cable installed on the wall of an unfinished basement shall be permitted to be installed in a listed conduit or tubing or shall be protected in accordance with Table E3802.1. Conduit or tubing shall be provided with a suitable insulating bushing or adapter at the point where the cable enters the raceway. The sheath of the Type NM or SE cable shall extend through the conduit or tubing and into the outlet or device box not less than 1/4 inch (6.4 mm). The cable shall be secured within 12 inches (305 mm) of the point where the cable enters the conduit or tubing. Metal

conduit, tubing, and metal outlet boxes shall be connected to an equipment grounding conductor complying with Section E3908.13. [334.15(C)]

E3802.5 Bends.

Bends shall be made so as not to damage the wiring method or reduce the internal diameter of raceways.

For types NM and SE cable, bends shall be so made, and other handling shall be such that the cable will not be damaged and the radius of the curve of the inner edge of any bend shall be not less than five times the diameter of the cable. (334.24 and 338.24)

E3802.6 Cable-securing means.

Cables shall be supported and secured by staples; cable ties listed and identified for securement and support; or straps, hangers or similar fittings designed and installed so as not to damage the cable. [320.30 (A), 330.30 (A), 334.30, 338.10 (B) (4), 340.10 (4)]

E3802.7 Raceways exposed to different temperatures.

Where portions of a raceway or sleeve are known to be subjected to different temperatures and where condensation is known to be a problem, as in cold storage areas of buildings or where passing from the interior to the exterior of a building, the raceway or sleeve shall be filled with an approved material to prevent the circulation of warm air to a colder section of the raceway or sleeve. [300.7(A)]

E3802.8 Raceways in wet locations above grade.

Where raceways are installed in wet locations above grade, the interior of such raceways shall be considered to be a wet location. Insulated conductors and cables installed in raceways in wet locations above grade shall be listed for use in wet locations. (300.9)

E3803.2 Warning ribbon.

Underground service conductors that are not encased in concrete and that are buried 18 inches (457 mm) or more below grade shall have their location identified by a warning ribbon that is placed in the trench not less than 12 inches (305 mm) above the underground installation. [300.5(D)(3)]

E3803.3 Protection from damage.

Direct buried conductors and cables emerging from the ground shall be protected by enclosures or raceways extending from the minimum cover distance below grade required by Section E3803.1 to a point at least 8 feet (2438 mm) above finished grade. In no case shall the protection be required to exceed 18 inches (457 mm) below finished grade. Conductors entering a building shall be protected to the point of entrance. Where the enclosure or raceway is subject to physical damage, the conductors shall be installed in electrical metallic tubing, rigid metal conduit, intermediate metal conduit, Schedule 80 PVC conduit, RTRC-XW or the equivalent. [300.5(D)(1)]

E3803.4 Splices and taps.

Direct buried conductors or cables shall be permitted to be spliced or tapped without the use of splice boxes. The splices or taps shall be made by approved methods with materials listed for the application. [300.5(E)]

E3803.5 Backfill.

Backfill containing large rock, paving materials, cinders, large or sharply angular substances, or corrosive material shall not be placed in an excavation where such materials cause damage to raceways, cables or other substructures or prevent adequate compaction of fill or contribute to corrosion of raceways, cables or other substructures. Where necessary to prevent physical damage to the raceway or cable, protection shall be provided in the form of granular or selected material, suitable boards, suitable sleeves or other approved means. [300.5(F)]

E3803.6 Raceway seals.

Conduits or raceways shall be sealed or plugged at either or both ends where moisture will enter and contact live parts. Spare or unused raceways shall also be sealed. Sealants shall be identified for the use with the cable insulation, conductor insulation, bare conductor or other components. [300.5(G)]

E3803.7 Bushing.

A bushing, or terminal fitting, with an integral bushed opening shall be installed on the end of a conduit or other raceway that terminates underground where the conductors or cables emerge as a direct burial wiring method. A seal incorporating the physical protection characteristics of a bushing shall be considered equivalent to a bushing. [300.5(H)]

E3803.8 Single conductors.

All conductors of the same circuit and, where present, the grounded conductor and all equipment grounding conductors shall be installed in the same raceway or shall be installed in close proximity in the same trench. [300.5(I)]

Exception: Conductors shall be permitted to be installed in parallel in raceways, multiconductor cables, and direct-buried single conductor cables. Each raceway or multiconductor cable shall contain all conductors of the same circuit, including equipment grounding conductors. Each direct-buried single conductor cable shall be located in close proximity in the trench to the other single conductor cables in the same parallel set of conductors in the circuit, including equipment grounding conductors. [300.5(I) Exception 1]

E3803.9 Earth movement.

Where direct buried conductors, raceways or cables are subject to movement by settlement or frost, direct buried conductors, raceways or cables shall be arranged to prevent damage to the enclosed conductors or to equipment connected to the raceways. [300.5(J)]

E3803.10 Wet locations.

The interior of enclosures or raceways installed underground shall be considered to be a wet location. Insulated conductors and cables installed in such enclosures or raceways in underground installations shall be listed for use in wet locations. [300.5(B)]

E3803.11 Under buildings.

Underground cable and conductors installed under a building shall be in a raceway. [300.5(C)]

Exception: Type MC Cable shall be permitted under a building without installation in a raceway where the cable is listed and identified for direct burial or concrete encasement and one or more of the following applies:

- 1.The metallic covering is impervious to moisture.
- 2.A moisture-impervious jacket is provided under the metal covering.
- 3.The insulated conductors under the metallic covering are listed for use in wet locations. [300.5(C) Exception 2]

POWER AND LIGHTING DISTRIBUTION

SECTION E3901

RECEPTACLE OUTLETS

E3901.1 General.

Outlets for receptacles rated at 125 volts, 15- and 20-amperes shall be provided in accordance with Sections E3901.2 through E3901.11. Receptacle outlets required by this section shall be in addition to any receptacle that is:

- 1.Part of a luminaire or appliance;
- 2.Located within cabinets or cupboards;
- 3.Controlled by a wall switch in accordance with Section E3903.2, Exception 1; or
- 4.Located over 5.5 feet (1676 mm) above the floor.

Permanently installed electric baseboard heaters equipped with factory-installed receptacle outlets, or outlets provided as a separate assembly by the baseboard manufacturer shall be permitted as the required outlet or outlets for the wall space utilized by such permanently installed heaters. Such receptacle outlets shall not be connected to the heater circuits. (210.52)

E3901.2 General purpose receptacle distribution.

In every kitchen, family room, dining room, living room, parlor, library, den, sun room, bedroom, recreation room, or similar room or area of dwelling units, receptacle outlets shall be installed in accordance with the general provisions specified in Sections E3901.2.1 through E3901.2.3 (see Figure E3901.2).

E3901.2.1 Spacing.

Receptacles shall be installed so that no point measured horizontally along the floor line of any wall space is more than 6 feet (1829 mm), from a receptacle outlet. [210.52(A)(1)]

E3901.2.2 Wall space.

As used in this section, a wall space shall include the following: [210.52(A)(2)]

- 1.Any space that is 2 feet (610 mm) or more in width, including space measured around corners, and that is unbroken along the floor line by doorways and similar openings, fireplaces, and fixed cabinets that do not have countertops or similar work surfaces.
- 2.The space occupied by fixed panels in exterior walls, excluding sliding panels.
- 3.The space created by fixed room dividers such as railings and freestanding bar-type counters.

E3901.2.3 Floor receptacles.

Receptacle outlets in floors shall not be counted as part of the required number of receptacle outlets except where located within 18 inches (457 mm) of the wall. [210.52(A)(3)]

E3901.2.4 Countertop and similar work surface receptacles outlets.

Receptacles installed for countertop and similar work surfaces as specified in Section E3901.4 shall not be considered as the receptacle outlets required by Section E3901.2. [210.52(A)(4)]

E3901.3 Small appliance receptacles.

In the kitchen, pantry, breakfast room, dining room, or similar area of a dwelling unit, the two or more 20-ampere small-appliance branch circuits required by Section E3703.2, shall serve all wall and floor receptacle outlets covered by Sections E3901.2 and E3901.4 and those receptacle outlets provided for refrigeration appliances. [210.52(B)(1)]

Exceptions:

- 1.In addition to the required receptacles specified by Sections E3901.1 and E3901.2, switched receptacles supplied from a general-purpose branch circuit as defined in Section E3903.2, Exception 1 shall be permitted. [210.52(B)(1) Exception No. 1]
- 2.In addition to the required receptacles specified by Section E3901.2, a receptacle outlet to serve a specific appliance shall be permitted to be supplied from an individual branch circuit rated at 15 amperes or greater. [210.52(B)(1) Exception No. 2]

E3901.3.1 Other outlets prohibited.

The two or more small-appliance branch circuits specified in Section E3901.3 shall serve no other outlets. [210.52(B)(2)]

Exceptions:

- 1.A receptacle installed solely for the electrical supply to and support of an electric clock in any of the rooms specified in Section E3901.3. [210.52(B)(2) Exception No.1]
- 2.Receptacles installed to provide power for supplemental equipment and lighting on gas-fired ranges, ovens, and counter-mounted cooking units. [210.52(B)(2) Exception No. 2]

E3901.3.2 Limitations.

Receptacles installed in a kitchen to serve countertop surfaces shall be supplied by not less than two small-appliance branch circuits, either or both of which shall also be permitted to supply receptacle outlets in the same kitchen and in other rooms specified in Section E3901.3. Additional small-appliance branch circuits shall be permitted to supply receptacle outlets in the kitchen and other rooms specified

in Section E3901.3. A small-appliance branch circuit shall not serve more than one kitchen. [210.52(B)(3)]

E3901.4.1 Wall countertop space.

A receptacle outlet shall be installed at each wall countertop and work surface that is 12 inches (305 mm) or wider. Receptacle outlets shall be installed so that no point along the wall line is more than 24 inches (610 mm), measured horizontally, from a receptacle outlet in that space. [210.52(C)(1)]

Exception: Receptacle outlets shall not be required on a wall directly behind a range, counter-mounted cooking unit or sink in the installation described in Figure E3901.4.1. [210.52(C)(1) Exception]

E3901.4.2 Island countertop spaces.

At least one receptacle outlet shall be installed at each island countertop space with a long dimension of 24 inches (610 mm) or greater and a short dimension of 12 inches (305 mm) or greater. [210.52(C)(2)]

E3901.4.3 Peninsular countertop space.

Not less than one receptacle outlet shall be installed at each peninsular countertop long dimension space having a long dimension of 24 inches (610 mm) or greater and a short dimension of 12 inches (305 mm) or greater. A peninsular countertop is measured from the connected perpendicular wall. [210.52(C)(3)]

E3901.4.4 Separate spaces.

Countertop spaces separated by range tops, refrigerators, or sinks shall be considered as separate countertop spaces in applying the requirements of Sections E3901.4.1, E3901.4.2 and E3901.4.3.

Where a range, counter-mounted cooking unit, or sink is installed in an island or peninsular countertop and the depth of the countertop behind the range, counter-mounted cooking unit, or sink is less than 12 inches (305 mm), the range, counter-mounted cooking unit, or sink has divided the countertop space into two separate countertop spaces as defined in Section E3901.4.4. Each separate countertop space shall comply with the applicable requirements of this section. [210.52(C)(4)]

E3901.4.5 Receptacle outlet location.

Receptacle outlets shall be located not more than 20 inches (508 mm) above the countertop or work surface. Receptacle outlet assemblies installed in countertops and work surfaces shall be listed for use in countertops or work surfaces. Receptacle outlets rendered not readily accessible by appliances fastened in place, appliance garages, sinks or range-tops as addressed in the exception to Section E3901.4.1, or appliances occupying dedicated space shall not be considered as these required outlets. [210.52(C)(5)]

Exception: Receptacle outlets shall be permitted to be mounted not more than 12 inches (305 mm) below the countertop or work surface in construction designed for the physically impaired and for island and peninsular countertops or work surface where the surface is flat across its entire surface and there are no means to mount a receptacle within 20 inches (508 mm) above the countertop, such as in an overhead cabinet. Receptacles mounted below the countertop or work surface in accordance with this exception shall not be located where the countertop or work surface extends more than 6 inches (152 mm) beyond its support base. [210.52(C)(5) Exception]

E3901.5 Appliance receptacle outlets.

Appliance receptacle outlets installed for specific appliances, such as laundry equipment, shall be installed within 6 feet (1829 mm) of the intended location of the appliance. (210.50(C))

E3901.6 Bathroom.

At least one receptacle outlet shall be installed in bathrooms and such outlet shall be located within 36 inches (914 mm) of the outside edge of each lavatory basin. The receptacle outlet shall be located on a wall or partition that is adjacent to the lavatory basin location, located on the countertop, or installed on the side or face of the basin cabinet. The receptacle shall be located not more than 12 inches (305 mm) below the top of the basin or basin countertop.

Receptacle outlet assemblies installed in countertops shall be listed for the application. [210.52(D)]

E3901.7 Outdoor outlets.

Not less than one receptacle outlet that is readily accessible from grade level and located not more than 6 feet, 6 inches (1981 mm) above grade, shall be installed outdoors at the front and back of each dwelling unit having direct access to grade level. Balconies, decks, and porches that are accessible from inside of the dwelling unit shall have at least one receptacle outlet installed within the perimeter of the balcony, deck, or porch. The receptacle shall be located not more than 6 feet, 6 inches (1981 mm) above the balcony, deck, or porch surface. [210.52(E)]

E3901.8 Laundry areas.

Not less than one receptacle outlet shall be installed in areas designated for the installation of laundry equipment.

E3901.10 Hallways.

Hallways of 10 feet (3048 mm) or more in length shall have at least one receptacle outlet. The hall length shall be considered the length measured along the centerline of the hall without passing through a doorway. [210.52(H)]

E3901.11 Foyers.

Foyers that are not part of a hallway in accordance with Section E3901.10 and that have an area that is greater than 60 square feet (5.57 m²) shall have a receptacle(s) located in each wall space that is 3 feet (914 mm) or more in width. Doorways, door-side windows that extend to the floor, and similar openings shall not be considered as wall space. [210.52(H)]

E3901.12 HVAC outlet.

A 125-volt, single-phase, 15- or 20-ampere-rated receptacle outlet shall be installed at an accessible location for the servicing of heating, air-conditioning and refrigeration equipment. The receptacle shall be located on the same level and within 25 feet (7620 mm) of the heating, air-conditioning and refrigeration equipment. The receptacle outlet shall not be connected to the load side of the HVAC equipment disconnecting means. (210.63)

Exception: A receptacle outlet shall not be required for the servicing of evaporative coolers. (210.63 Exception)

SECTION E3902

GROUND-FAULT AND ARC-FAULT

CIRCUIT-INTERRUPTER PROTECTION

E3902.1 Bathroom receptacles.

125-volt, single-phase, 15- and 20-ampere receptacles installed in bathrooms shall have ground-fault circuit-interrupter protection for personnel. [210.8(A)(1)]

E3902.2 Garage and accessory building receptacles.

125-volt, single-phase, 15- or 20-ampere receptacles installed in garages and grade-level portions of unfinished accessory buildings used for storage or work areas shall have ground-fault circuit-interrupter protection for personnel. [210.8(A)(2)]

E3902.3 Outdoor receptacles.

125-volt, single-phase, 15- and 20-ampere receptacles installed outdoors shall have ground-fault circuit-interrupter protection for personnel. [210.8(A)(3)]

Exception: Receptacles as covered in Section E4101.7. [210.8(A)(3) Exception]

E3902.4 Crawl space receptacles and lighting outlets.

Where a crawl space is at or below grade level, 125-volt, single-phase, 15- and 20-ampere receptacles installed in such spaces shall have ground-fault circuit-interrupter protection for personnel. Lighting outlets not exceeding 120 volts shall have ground-fault circuit-interrupter protection. [210.8(A)(4), 2108(E)]

E3902.5 Unfinished basement receptacles.

125-volt, single-phase, 15- and 20-ampere receptacles installed in unfinished basements shall have ground-fault circuit-interrupter protection for personnel. For purposes of this section, unfinished basements are defined as portions or areas of the basement not intended as habitable rooms. [210.8(A)(5)]

Exception: A receptacle supplying only a permanently installed fire alarm or burglar alarm system. Receptacles installed in accordance with this exception shall not be considered as meeting the requirement of Section E3901.9. [210.8(A)(5) Exception]

E3902.6 Kitchen receptacles.

125-volt, single-phase, 15- and 20-ampere receptacles that serve countertop surfaces shall have ground-fault circuit-interrupter protection for personnel. [210.8(A)(6)]

E3902.7 Sink receptacles.

125-volt, single-phase, 15- and 20-ampere receptacles that are located within 6 feet (1829 mm) of the top inside edge of the bowl of the sink shall have ground-fault circuit-interrupter protection for personnel. [210.8(A)(7)]

E3902.8 Bathtub or shower stall receptacles.

125-volt, single phase, 15- and 20-ampere receptacles that are located within 6 feet (1829 mm) of the outside edge of a bathtub or shower stall shall have ground-fault circuit-interrupter protection for personnel. [210.8(A)(8)]

E3902.9 Laundry areas.

125-volt, single-phase, 15- and 20-ampere receptacles installed in laundry areas shall have ground-fault circuit-interrupter protection for personnel. [210.8(A)(9)]

E3902.10 Kitchen dishwasher branch circuit.

Ground-fault circuit-interrupter protection shall be provided for outlets that supply dishwashers in dwelling unit locations. [210.8(D)]

E3902.13 Electrically heated floors.

Ground-fault circuit-interrupter protection for personnel shall be provided for electric heating cables embedded in concrete or poured masonry floors in bathrooms, kitchens and in hydromassage bathtub, spa and hot tub locations. Heating cables installed under floor coverings shall be provided with ground-fault circuit-interrupter protection for personnel. [424.44(E), 424.45(E)]

E3902.14 Location of ground-fault circuit-interrupters.

Ground-fault circuit-interrupters shall be installed in a readily accessible location. When determining distance from receptacles, the distance shall be measured as the shortest path the cord of an appliance connected to the receptacle would follow without piercing a floor, wall, ceiling, or fixed barrier, or passing through a door, doorway or window. [210.8(A)]

E3902.15 Location of arc-fault circuit-interrupters.

Arc-fault circuit-interrupters shall be installed in readily accessible locations.

E3902.16 Arc-fault circuit-interrupter protection.

Branch circuits that supply 120-volt, single-phase, 15- and 20-ampere outlets installed in kitchens, family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, laundry areas and similar rooms or areas shall be protected by any of the following: [210.12(A)]

1. A listed combination-type arc-fault circuit-interrupter, installed to provide protection of the entire branch circuit. [210.12(A)(1)]

2. A listed branch/feeder-type AFCI installed at the origin of the branch-circuit in combination with a listed outlet branch-circuit-type arc-fault circuit-interrupter installed at the first outlet box on the branch circuit. The first outlet box in the branch circuit shall be marked to indicate that it is the first outlet of the circuit. [210.12(A)(2)]

3. A listed supplemental arc-protection circuit breaker installed at the origin of the branch circuit in combination with a listed outlet branch-circuit-type arc-fault circuit-interrupter installed at the first outlet box on the branch circuit where all of the following conditions are met:

3.1. The branch-circuit wiring shall be continuous from the branch-circuit overcurrent device to the outlet branch-circuit arc-fault circuit-interrupter.

3.2.The maximum length of the branch-circuit wiring from the branch-circuit overcurrent device to the first outlet shall not exceed 50 feet (15.2 m) for 14 AWG conductors and 70 feet (21.3 m) for 12 AWG conductors.

3.3.The first outlet box on the branch circuit shall be marked to indicate that it is the first outlet on the circuit. [210.12(A)(3)]

4.A listed outlet branch-circuit-type arc-fault circuit-interrupter installed at the first outlet on the branch circuit in combination with a listed branch-circuit overcurrent protective device where all of the following conditions are met:

4.1.The branch-circuit wiring shall be continuous from the branch-circuit overcurrent device to the outlet branch-circuit arc-fault circuit-interrupter.

4.2.The maximum length of the branch-circuit wiring from the branch-circuit overcurrent device to the first outlet shall not exceed 50 feet (15.2 m) for 14 AWG conductors and 70 feet (21.3 m) for 12 AWG conductors.

4.3.The first outlet box on the branch circuit shall be marked to indicate that it is the first outlet on the circuit.

4.4.The combination of the branch-circuit overcurrent device and outlet branch-circuit AFCI shall be identified as meeting the requirements for a system combination-type AFCI and shall be listed as such. [210.12(A)(4)]

5.Where metal outlet boxes and junction boxes and RMC, IMC, EMT, Type MC or steel-armored Type AC cables meeting the requirements of Section E3908.8, metal wireways or metal auxiliary gutters are installed for the portion of the branch circuit between the branch-circuit overcurrent device and the first outlet, a listed outlet branch-circuit type AFCI installed at the first outlet shall be considered as providing protection for the remaining portion of the branch circuit. [210.12(A)(5)]

6.Where a listed metal or nonmetallic conduit or tubing or Type MC cable is encased in not less than 2 inches (50.8 mm) of concrete for the portion of the branch circuit between the branch-circuit overcurrent device and the first outlet, a listed outlet branch-circuit-type AFCI installed at the first outlet shall be considered as providing protection for the remaining portion of the branch circuit. [210.12(A)(6)]

Exception: AFCI protection is not required for an individual branch circuit supplying only a fire alarm system where the branch circuit is wired with metal outlet and junction boxes and RMC, IMC, EMT or steel-sheathed armored cable Type AC or Type MC meeting the requirements of Section E3908.8.

E3902.17 Arc-fault circuit-interrupter protection for branch circuit extensions or modifications.

Where branch-circuit wiring is modified, replaced, or extended in any of the areas specified in Section E3902.16, the branch circuit shall be protected by one of the following:

1.A combination-type AFCI located at the origin of the branch circuit.

2.An outlet branch-circuit type AFCI located at the first receptacle outlet of the existing branch circuit. [210.12(B)]

Exception: AFCI protection shall not be required where the extension of the existing conductors is not more than 6 feet (1.8 m) in length and does not include any additional outlets or devices. [210.12(B) Exception]

SECTION E3903

LIGHTING OUTLETS

E3903.2 Habitable rooms.

At least one wall switch-controlled lighting outlet shall be installed in every habitable room, kitchen and bathroom. [210.70(A)(1)]

Exceptions:

1. In other than kitchens and bathrooms, one or more receptacles controlled by a wall switch shall be considered equivalent to the required lighting outlet. [210.70(A)(1) Exception No. 1]
2. Lighting outlets shall be permitted to be controlled by occupancy sensors that are in addition to wall switches, or that are located at a customary wall switch location and equipped with a manual override that will allow the sensor to function as a wall switch. [210.70(A)(1) Exception No. 2]

E3903.3 Additional locations.

At least one wall-switch-controlled lighting outlet shall be installed in hallways, stairways, attached garages, and detached garages with electric power. At least one wall-switch-controlled lighting outlet shall be installed to provide illumination on the exterior side of each outdoor egress door having grade level access, including outdoor egress doors for attached garages and detached garages with electric power. A vehicle door in a garage shall not be considered as an outdoor egress door.

E3903.3.1 Stairway lighting outlet control.

Where one or more lighting outlets are installed for interior stairways, there shall be a wall switch at each floor level and landing level that includes an entryway to control the lighting outlets where the stairway between floor levels has six or more risers. Lighting outlets installed to meet this requirement shall not be controlled by the use of dimmer switches except where the dimmer switches provide the full range of dimming control at each switch location. [210.70(A)(2)]

Exception: In hallways, stairways, and at outdoor egress doors, remote, central, or automatic control of lighting shall be permitted. [210.70(A)(2) Exception]

E3903.4 Storage or equipment spaces.

In attics, under-floor spaces, utility rooms and basements, at least one lighting outlet shall be installed where these spaces are used for storage or contain equipment requiring servicing. Such lighting outlet shall be controlled by a wall switch or shall have an integral switch. At least one point of control shall be at the usual point of entry to these spaces. The lighting outlet shall be provided at or near the equipment requiring servicing. [210.70(A)(3)]

SECTION E3904

GENERAL INSTALLATION REQUIREMENTS

E3904.1 Electrical continuity of metal raceways and enclosures.

Metal raceways, cable armor and other metal enclosures for conductors shall be mechanically joined together into a continuous electric conductor and shall be connected to all boxes, fittings and cabinets so as to provide effective electrical continuity. Raceways and cable assemblies shall be mechanically secured to boxes, fittings cabinets and other enclosures. (300.10)

Exception: Short sections of raceway used to provide cable assemblies with support or protection against physical damage. (300.10 Exception No. 1)

E3904.3 Securing and supporting.

Raceways, cable assemblies, boxes, cabinets and fittings shall be securely fastened in place. (300.11)

E3904.3.1 Prohibited means of support.

Cable wiring methods shall not be used as a means of support for other cables, raceways and nonelectrical equipment. [300.11(D)]

E3904.4 Raceways as means of support.

Raceways shall be used as a means of support for other raceways, cables or nonelectric equipment only under the following conditions:

1. Where the raceway or means of support is identified as a means of support; or
2. Where the raceway contains power supply conductors for electrically controlled equipment and is used to support Class 2 circuit conductors or cables that are solely for the purpose of connection to the control circuits of the equipment served by such raceway; or
3. Where the raceway is used to support boxes or conduit bodies in accordance with Sections E3906.8.4 and E3906.8.5. [300.11(C)]

E3904.5 Raceway installations.

Raceways shall be installed complete between outlet, junction or splicing points prior to the installation of conductors. (300.18)

Exception: Short sections of raceways used to contain conductors or cable assemblies for protection from physical damage shall not be required to be installed complete between outlet, junction, or splicing points. (300.18 Exception)

E3904.7 Air handling-stud cavity and joist spaces.

Where wiring methods having a nonmetallic covering pass through stud cavities and joist spaces used for air handling, such wiring shall pass through such spaces perpendicular to the long dimension of the spaces. [300.22(C) Exception]

SECTION E3905

BOXES, CONDUIT BODIES AND FITTINGS

E3905.1 Box, conduit body or fitting—where required.

A box or conduit body shall be installed at each conductor splice point, outlet, switch point, junction point and pull point except as otherwise permitted in Sections E3905.1.1 through E3905.1.6.

Fittings and connectors shall be used only with the specific wiring methods for which they are designed and listed. (300.15)

E3905.1.1 Equipment.

An integral junction box or wiring compartment that is part of listed equipment shall be permitted to serve as a box or conduit body. [300.15(B)]

E3905.1.2 Protection.

A box or conduit body shall not be required where cables enter or exit from conduit or tubing that is used to provide cable support or protection against physical damage. A fitting shall be provided on the end(s) of the conduit or tubing to protect the cable from abrasion. [300.15(C)]

E3905.1.3 Integral enclosure.

A wiring device with integral enclosure identified for the use, having brackets that securely fasten the device to walls or ceilings of conventional on-site frame construction, for use with nonmetallic-sheathed cable, shall be permitted in lieu of a box or conduit body. [300.15(E)]

E3905.1.4 Fitting.

A fitting identified for the use shall be permitted in lieu of a box or conduit body where such fitting is accessible after installation and does not contain spliced or terminated conductors. [300.15(F)]

E3905.1.5 Buried conductors.

Splices and taps in buried conductors and cables shall not be required to be enclosed in a box or conduit body where installed in accordance with Section E3803.4.

E3905.1.6 Luminaires.

Where a luminaire is listed to be used as a raceway, a box or conduit body shall not be required for wiring installed therein. [300.15(J)]

E3905.2 Metal boxes.

Metal boxes shall be grounded. (314.4)

E3905.3 Nonmetallic boxes.

Nonmetallic boxes shall be used only with cabled wiring methods with entirely nonmetallic sheaths, flexible cords and nonmetallic raceways. (314.3)

Exceptions:

1. Where internal bonding means are provided between all entries, nonmetallic boxes shall be permitted to be used with metal raceways and metal-armored cables. (314.3 Exception No. 1)

2. Where integral bonding means with a provision for attaching an equipment grounding jumper inside the box are provided between all threaded entries in nonmetallic boxes listed for the purpose, nonmetallic boxes shall be permitted to be used with metal raceways and metal-armored cables. (314.3 Exception No. 2)

E3905.3.1 Nonmetallic-sheathed cable and nonmetallic boxes.

Where nonmetallic-sheathed cable is used, the cable assembly, including the sheath, shall extend into the box not less than 1/4 inch (6.4 mm) through a nonmetallic-sheathed cable knockout opening. (314.7(C))

E3905.3.2 Securing to box.

Wiring methods shall be secured to the boxes. [314.17(C)]

Exception: Where nonmetallic-sheathed cable is used with boxes not larger than a nominal size of 2 1/4 inches by 4 inches (57 mm by 102 mm) mounted in walls or ceilings, and where the cable is fastened within 8 inches (203 mm) of the box measured along the sheath, and where the sheath extends through a cable knockout not less than 1/4 inch (6.4 mm), securing the cable to the box shall not be required. [314.17(C) Exception]

E3905.3.3 Conductor rating.

Nonmetallic boxes shall be suitable for the lowest temperature-rated conductor entering the box. [314.17(C)]

E3905.4 Minimum depth of boxes for outlets, devices, and utilization equipment.

Outlet and device boxes shall have an approved depth to allow equipment installed within them to be mounted properly and without the likelihood of damage to conductors within the box. (314.24)

E3905.4.1 Outlet boxes without enclosed devices or utilization equipment.

Outlet boxes that do not enclose devices or utilization equipment shall have an internal depth of not less than 1/2 inch (12.7 mm). [314.24(A)]

E3905.4.2 Utilization equipment.

Outlet and device boxes that enclose devices or utilization equipment shall have a minimum internal depth that accommodates the rearward projection of the equipment and the size of the conductors that supply the equipment. The internal depth shall include that of any extension boxes, plaster rings, or raised covers. The internal depth shall comply with all of the applicable provisions that follow. [314.24(B)]

Exception: Utilization equipment that is listed to be installed with specified boxes.

1. Large equipment. Boxes that enclose devices or utilization equipment that projects more than 1 7/8 inches (48 mm) rearward from the mounting plane of the box shall have a depth that is not less than the depth of the equipment plus 1/4 inch (6.4 mm). [314.24(B)(1)]

2. Conductors larger than 4 AWG. Boxes that enclose devices or utilization equipment supplied by conductors larger than 4 AWG shall be identified for their specific function. [314.24(B)(2)]

3. Conductors 8, 6, or 4 AWG. Boxes that enclose devices or utilization equipment supplied by 8, 6, or 4 AWG conductors shall have an internal depth that is not less than 21/16 inches (52.4 mm). [314.24(B)(3)]

4. Conductors 12 or 10 AWG. Boxes that enclose devices or utilization equipment supplied by 12 or 10 AWG conductors shall have an internal depth that is not less than 13/16 inches (30.2 mm). Where the equipment projects rearward from the mounting plane of the box by more than 1 inch (25.4 mm), the box shall have a depth that is not less than that of the equipment plus 1/4 inch (6.4 mm). [314.24(B)(4)]

5. Conductors 14 AWG and smaller. Boxes that enclose devices or utilization equipment supplied by 14 AWG or smaller conductors shall have a depth that is not less than 15/16 inch (23.8 mm). [314.24(B)(5)]

E3905.5 Boxes enclosing flush-mounted devices.

Boxes enclosing flush-mounted devices shall be of such design that the devices are completely enclosed at the back and all sides and shall provide support for the devices. Screws for supporting the box shall not be used for attachment of the device contained therein. (314.19)

E3905.6 Boxes at luminaire outlets.

Outlet boxes used at luminaire or lampholder outlets shall be designed for the support of luminaires and lampholders and shall be installed as required by Section E3904.3. [314.27(A)]

E3905.6.1 Vertical surface outlets.

Boxes used at luminaire or lampholder outlets in or on a vertical surface shall be identified and marked on the interior of the box to indicate the maximum weight of the luminaire or lamp holder that is permitted to be supported by the box if other than 50 pounds (22.7 kg). [314.27(A)(1)]

Exception: A vertically mounted luminaire or lampholder weighing not more than 6 pounds (2.7 kg) shall be permitted to be supported on other boxes or plaster rings that are secured to other boxes, provided that the luminaire or its supporting yoke is secured to the box with not fewer than two No. 6 or larger screws. [314.27(A)(1) Exception]

E3905.6.2 Ceiling outlets.

For outlets used exclusively for lighting, the box shall be designed or installed so that a luminaire or lampholder can be attached. Such boxes shall be capable of supporting a luminaire weighing up to 50 pounds (22.7 kg). A luminaire that weighs more than 50 pounds (22.7 kg) shall be supported independently of the outlet box, unless the outlet box is listed for not less than the weight to be supported. The interior of the box shall be marked by the manufacturer to indicate the maximum weight that the box is permitted to support. [314.27(A)(2)]

E3905.7 Floor boxes.

Where outlet boxes for receptacles are installed in the floor, such boxes shall be listed specifically for that application. [314.27(B)]

E3905.8 Boxes at fan outlets.

Outlet boxes and outlet box systems used as the sole support of ceiling-suspended fans (paddle) shall be marked by their manufacturer as suitable for this purpose and shall not support ceiling-suspended fans (paddle) that weigh more than 70 pounds (31.8 kg). For outlet boxes and outlet box systems designed to

support ceiling-suspended fans (paddle) that weigh more than 35 pounds (15.9 kg), the required marking shall include the maximum weight to be supported.

Where spare, separately switched, ungrounded conductors are provided to a ceiling-mounted outlet box and such box is in a location acceptable for a ceiling-suspended (paddle) fan, the outlet box or outlet box system shall be listed for sole support of a ceiling-suspended (paddle) fan. [314.27(C)]

E3905.9 Utilization equipment.

Boxes used for the support of utilization equipment other than ceiling-suspended (paddle) fans shall meet the requirements of Sections E3905.6.1 and E3905.6.2 for the support of a luminaire that is the same size and weight. [314.27(D)]

Exception: Utilization equipment weighing not more than 6 pounds (2.7 kg) shall be permitted to be supported on other boxes or plaster rings that are secured to other boxes, provided that the equipment or its supporting yoke is secured to the box with not fewer than two No. 6 or larger screws. [314.27(D) Exception]

E3905.10 Conduit bodies and junction, pull and outlet boxes to be accessible.

Conduit bodies and junction, pull and outlet boxes shall be installed so that the wiring therein can be accessed without removing any part of the building or structure or, in underground circuits, without excavating sidewalks, paving, earth or other substance used to establish the finished grade. (314.29)

Exception: Boxes covered by gravel, light aggregate or noncohesive granulated soil shall be listed for the application, and the box locations shall be effectively identified and access shall be provided for excavation. (314.29 Exception)

E3905.11 Damp or wet locations.

In damp or wet locations, boxes, conduit bodies and fittings shall be placed or equipped so as to prevent moisture from entering or accumulating within the box, conduit body or fitting. Boxes, conduit bodies and fittings installed in wet locations shall be listed for use in wet locations.

Where drainage openings are installed in the field in boxes or conduit bodies listed for use in damp or wet locations, such openings shall be approved, not smaller than 1/8 inch (3 mm) and not larger than 1/4 inch (6.4 mm). For listed drain fittings, larger openings are permitted where installed in the field in accordance with the manufacturer's instructions. (314.15)

E3905.12 Number of conductors in outlet, device, and junction boxes, and conduit bodies.

Boxes and conduit bodies shall be of an approved size to provide free space for all enclosed conductors. In no case shall the volume of the box, as calculated in Section E3905.12.1, be less than the box fill calculation as calculated in Section E3905.12.2. The minimum volume for conduit bodies shall be as calculated in Section E3905.12.3. The provisions of this section shall not apply to terminal housings supplied with motors or generators. (314.16)

E3905.12.1.2 Other boxes.

Boxes 100 cubic inches (1640 cm³) or less, other than those described in Table E3905.12.1, and nonmetallic boxes shall be durably and legibly marked by the manufacturer with their cubic-inch

capacity. Boxes described in Table E3905.12.1 that have a larger cubic inch capacity than is designated in the table shall be permitted to have their cubic-inch capacity marked as required by this section. [314.16(A)(2)]

E3905.12.2.1 Conductor fill.

Each conductor that originates outside the box and terminates or is spliced within the box shall be counted once, and each conductor that passes through the box without splice or termination shall be counted once. Each loop or coil of unbroken conductor having a length equal to or greater than twice that required for free conductors by Section E3406.11.3, shall be counted twice. The conductor fill, in cubic inches, shall be computed using Table E3905.12.2.1. A conductor, no part of which leaves the box, shall not be counted. [314.16(B)(1)]

Exception: An equipment grounding conductor or not more than four fixture wires smaller than No. 14, or both, shall be permitted to be omitted from the calculations where such conductors enter a box from a domed fixture or similar canopy and terminate within that box. [314.16(B)(1) Exception]

E3905.12.2.2 Clamp fill.

Where one or more internal cable clamps, whether factory or field supplied, are present in the box, a single volume allowance in accordance with Table E3905.12.2.1 shall be made based on the largest conductor present in the box. An allowance shall not be required for a cable connector having its clamping mechanism outside of the box.

A clamp assembly that incorporates a cable termination for the cable conductors shall be listed and marked for use with specific nonmetallic boxes. Conductors that originate within the clamp assembly shall be included in conductor fill calculations provided in Section E3905.12.2.1 as though they entered from outside of the box. The clamp assembly shall not require a fill allowance, but, the volume of the portion of the assembly that remains within the box after installation shall be excluded from the box volume as marked in accordance with Section E3905.12.1.2. [314.16(B)(2)]

E3905.12.2.3 Support fittings fill.

Where one or more fixture studs or hickies are present in the box, a single volume allowance in accordance with Table E3905.12.2.1 shall be made for each type of fitting based on the largest conductor present in the box. [314.16(B)(3)]

E3905.12.2.4 Device or equipment fill.

For each yoke or strap containing one or more devices or equipment, a double volume allowance in accordance with Table E3905.12.2.1 shall be made for each yoke or strap based on the largest conductor connected to a device(s) or equipment supported by that yoke or strap. For a device or utilization equipment that is wider than a single 2-inch (51 mm) device box as described in Table E3905.12.1, a double volume allowance shall be made for each ganged portion required for mounting of the device or equipment. [314.16(B)(4)]

E3905.12.2.5 Equipment grounding conductor fill.

Where one or more equipment grounding conductors or equipment bonding jumpers enters a box, a single volume allowance in accordance with Table E3905.12.2.1 shall be made based on the largest equipment grounding conductor or equipment bonding jumper present in the box. [314.16(B)(5)]

E3905.12.3 Conduit bodies.

Conduit bodies enclosing 6 AWG conductors or smaller, other than short-radius conduit bodies, shall have a cross-sectional area not less than twice the cross-sectional area of the largest conduit or tubing to which they can be attached. The maximum number of conductors permitted shall be the maximum number permitted by Section E3904.6 for the conduit to which it is attached. [314.16(C)(1)]

E3905.12.3.1 Splices, taps or devices.

Only those conduit bodies that are durably and legibly marked by the manufacturer with their cubic inch capacity shall be permitted to contain splices, taps or devices. The maximum number of conductors shall be calculated using the same procedure for similar conductors in other than standard boxes. [314.16(C)(2)]

E3905.12.3.2 Short-radius conduit bodies.

Conduit bodies such as capped elbows and service-entrance elbows that enclose conductors 6 AWG or smaller and that are only intended to enable the installation of the raceway and the contained conductors, shall not contain splices, taps, or devices and shall be of sufficient size to provide free space for all conductors enclosed in the conduit body. [314.16(C)(3)]

SECTION E3906

INSTALLATION OF BOXES, CONDUIT BODIES AND FITTINGS

E3906.1 Conductors entering boxes, conduit bodies or fittings.

Conductors entering boxes, conduit bodies or fittings shall be protected from abrasion. (314.17)

E3906.1.1 Insulated fittings.

Where raceways contain 4 AWG or larger insulated circuit conductors and these conductors enter a cabinet, box enclosure, or raceway, the conductors shall be protected by an identified fitting providing a smoothly rounded insulating surface, unless the conductors are separated from the fitting or raceway by identified insulating material securely fastened in place. [300.4(G)]

Exception: Where threaded hubs or bosses that are an integral part of a cabinet, box enclosure, or raceway provide a smoothly rounded or flared entry for conductors. [300.4(G) Exception]

Conduit bushings constructed wholly of insulating material shall not be used to secure a fitting or raceway. The insulating fitting or insulating material shall have a temperature rating not less than the insulation temperature rating of the installed conductors. [330.4(G)]

E3906.2 Openings.

Openings through which conductors enter shall be closed in an approved manner. [314.17(A)]

E3906.3 Metal boxes and conduit bodies.

Where raceway or cable is installed with metal boxes, or conduit bodies, the raceway or cable shall be secured to such boxes and conduit bodies. Where nonmetallic-sheathed cable or multiconductor Type UF cable is used, the sheath shall extend not less than 1/4 inch (6 mm) inside the box and beyond any cable clamp. [314.17(B)]

E3906.4 Unused openings.

Unused openings other than those intended for the operation of equipment, those intended for mounting purposes, or those permitted as part of the design for listed equipment, shall be closed to afford protection substantially equivalent to that of the wall of the equipment. Metal plugs or plates used with nonmetallic boxes or conduit bodies shall be recessed at least 1/4 inch (6.4 mm) from the outer surface of the box or conduit body. [110.12(A)]

E3906.5 Flush-mounted installations.

Installations within or behind a surface of concrete, tile, gypsum, plaster or other noncombustible material, including boxes employing a flush-type cover or faceplate shall be made so that the front edge of the box, plaster ring, extension ring, or listed extender will be set back from the finished surface not more than 1/4 inch (6.4 mm). Installations within a surface of wood or other combustible material, boxes, plaster rings, extension rings and listed extenders shall extend to the finished surface or project therefrom. (314.20)

E3906.6 Noncombustible surfaces.

Openings in noncombustible surfaces that accommodate boxes employing a flush-type cover or faceplate shall be made so that there are no gaps or open spaces greater than 1/8 inch (3.2 mm) around the edge of the box. (314.21)

E3906.7 Surface extensions.

Surface extensions shall be made by mounting and mechanically securing an extension ring over the box. (314.22)

Exception: A surface extension shall be permitted to be made from the cover of a flush-mounted box where the cover is designed so it is unlikely to fall off, or be removed if its securing means becomes loose. The wiring method shall be flexible for an approved length that permits removal of the cover and provides access to the box interior and shall be arranged so that any bonding or grounding continuity is independent of the connection between the box and cover. (314.22 Exception)

E3906.8 Supports.

Boxes and enclosures shall be supported in accordance with one or more of the provisions in Sections E3906.8.1 through E3906.8.6. (314.23)

E3906.8.1 Surface mounting.

An enclosure mounted on a building or other surface shall be rigidly and securely fastened in place. If the surface does not provide rigid and secure support, additional support in accordance with other provisions of Section E3906.8 shall be provided. [314.23(A)]

E3906.8.2 Structural mounting.

An enclosure supported from a structural member or from grade shall be rigidly supported either directly, or by using a metal, polymeric or wood brace. [314.23(B)]

E3906.8.2.1 Nails and screws.

Nails and screws, where used as a fastening means, shall secure boxes by using brackets on the outside of the enclosure, or by using mounting holes in the back or in a single side of the enclosure, or they shall pass through the interior within 1/4 inch (6.4 mm) of the back or ends of the enclosure. Screws shall not

be permitted to pass through the box except where exposed threads in the box are protected by an approved means to avoid abrasion of conductor insulation. Mounting holes made in the field shall be field approved. [314.23(B)(1)]

E3906.8.2.2 Braces.

Metal braces shall be protected against corrosion and formed from metal that is not less than 0.020 inch (0.508 mm) thick uncoated. Wood braces shall have a cross section not less than nominal 1 inch by 2 inches (25.4 mm by 51 mm). Wood braces in wet locations shall be treated for the conditions. Polymeric braces shall be identified as being suitable for the use. [314.23(B)(2)]

E3906.8.3 Mounting in finished surfaces.

An enclosure mounted in a finished surface shall be rigidly secured there to by clamps, anchors, or fittings identified for the application. [314.23(C)]

E3906.8.4 Raceway supported enclosures without devices or fixtures.

An enclosure that does not contain a device(s), other than splicing devices, or support a luminaire, lampholder or other equipment, and that is supported by entering raceways shall not exceed 100 cubic inches (1640 cm³) in size. The enclosure shall have threaded entries or identified hubs. The enclosure shall be supported by two or more conduits threaded wrenchtight into the enclosure or hubs. Each conduit shall be secured within 3 feet (914 mm) of the enclosure, or within 18 inches (457 mm) of the enclosure if all entries are on the same side of the enclosure. [314.23(E)]

Exception: Rigid metal, intermediate metal, or rigid polyvinyl chloride nonmetallic conduit or electrical metallic tubing shall be permitted to support a conduit body of any size, provided that the conduit body is not larger in trade size than the largest trade size of the supporting conduit or electrical metallic tubing. [314.23(E) Exception]

E3906.8.5 Raceway supported enclosures, with devices or luminaire.

An enclosure that contains a device(s), other than splicing devices, or supports a luminaire, lampholder or other equipment and is supported by entering raceways shall not exceed 100 cubic inches (1640 cm³) in size. The enclosure shall have threaded entries or identified hubs. The enclosure shall be supported by two or more conduits threaded wrench-tight into the enclosure or hubs. Each conduit shall be secured within 18 inches (457 mm) of the enclosure. [314.23(F)]

Exceptions:

1. Rigid metal or intermediate metal conduit shall be permitted to support a conduit body of any size, provided that the conduit bodies are not larger in trade size than the largest trade size of the supporting conduit. [314.23(F) Exception No. 1]

2. An unbroken length(s) of rigid or intermediate metal conduit shall be permitted to support a box used for luminaire or lampholder support, or to support a wiring enclosure that is an integral part of a luminaire and used in lieu of a box in accordance with Section E3905.1.1, where all of the following conditions are met:

2.1. The conduit is securely fastened at a point so that the length of conduit beyond the last point of conduit support does not exceed 3 feet (914 mm).

2.2.The unbroken conduit length before the last point of conduit support is 12 inches (305 mm) or greater, and that portion of the conduit is securely fastened at some point not less than 12 inches (305 mm) from its last point of support.

2.3.Where accessible to unqualified persons, the luminaire or lampholder, measured to its lowest point, is not less than 8 feet (2438 mm) above grade or standing area and at least 3 feet (914 mm) measured horizontally to the 8-foot (2438 mm) elevation from windows, doors, porches, fire escapes, or similar locations.

2.4.A luminaire supported by a single conduit does not exceed 12 inches (305 mm) in any direction from the point of conduit entry.

2.5.The weight supported by any single conduit does not exceed 20 pounds (9.1 kg).

2.6.At the luminaire or lampholder end, the conduit(s) is threaded wrenchtight into the box, conduit body, or integral wiring enclosure, or into hubs identified for the purpose. Where a box or conduit body is used for support, the luminaire shall be secured directly to the box or conduit body, or through a threaded conduit nipple not over 3 inches (76 mm) long. [314.23(F) Exception No. 2]

E3906.8.6 Enclosures in concrete or masonry.

An enclosure supported by embedment shall be identified as being suitably protected from corrosion and shall be securely embedded in concrete or masonry. [314.23(G)]

E3906.9 Covers and canopies.

In completed installations, each box shall have a cover, faceplate, lampholder or luminaire canopy. Screws used for the purpose of attaching covers, or other equipment to the box shall be either machine screws matching the thread gauge or size that is integral to the box or shall be in accordance with the manufacturer's instructions. (314.25)

E3906.10 Covers and plates.

Covers and plates shall be nonmetallic or metal. Metal covers and plates shall be grounded. [314.25(A)]

E3906.11 Exposed combustible finish.

Combustible wall or ceiling finish exposed between the edge of a fixture canopy or pan and the outlet box shall be covered with noncombustible material where required by Section E4004.2. [314.25(B)]

E3906.12 Separable attachment fittings.

Where outlet boxes required in Section E3905.6 support listed locking support and mounting receptacles used in combination with compatible attachment fittings, the combination shall be identified for the support of equipment within the weight and mounting orientation limits of the listing. Where the supporting receptacle is installed within a box, it shall be included in the fill calculation given in Section E3905.12.2.4.

SECTION E3907

CABINETS AND PANELBOARDS

E3907.1 Space within switch and overcurrent device enclosures.

Where the wiring space of enclosures for switches or overcurrent devices contains conductors that are feeding through, spliced, or tapping off to other enclosures, switches, or overcurrent devices, all of the following conditions shall apply:

- 1.The total area of all conductors installed at any cross section of the wiring space shall not exceed 40 percent of the cross-sectional area of that space.
- 2.The total area of all conductors, splices, and taps installed at any cross section of the wiring space shall not exceed 75 percent of the cross-sectional area of that space.
- 3.A warning label shall be applied to the enclosure that identifies the closest disconnecting means for any feed-through conductors. (312.8)

E3907.2 Damp and wet locations.

In damp or wet locations, cabinets and panelboards of the surface type shall be placed or equipped so as to prevent moisture or water from entering and accumulating within the cabinet, and shall be mounted to provide an air-space not less than 1/4 inch (6.4 mm) between the enclosure and the wall or other supporting surface. Cabinets installed in wet locations shall be weatherproof. For enclosures in wet locations, raceways and cables entering above the level of uninsulated live parts shall be installed with fittings listed for wet locations. (312.2)

Exception: Nonmetallic enclosures installed on concrete, masonry, tile, or similar surfaces shall not be required to be installed with an air space between the enclosure and the wall or supporting surface. (312.2 Exception)

E3907.3 Position in wall.

In walls of concrete, tile or other noncombustible material, cabinets and panelboards shall be installed so that the front edge of the cabinet will not set back of the finished surface more than 1/4 inch (6.4 mm). In walls constructed of wood or other combustible material, cabinets shall be flush with the finished surface or shall project therefrom. (312.3)

E3907.4 Repairing noncombustible surfaces.

Noncombustible surfaces that are broken or incomplete shall be repaired so that there will not be gaps or open spaces greater than 1/8 inch (3.2 mm) at the edge of the cabinet or cutout box employing a flush-type cover. (312.4)

E3907.5 Unused openings.

Unused openings, other than those intended for the operation of equipment, those intended for mounting purposes, and those permitted as part of the design for listed equipment, shall be closed to afford protection substantially equivalent to that of the wall of the equipment. Metal plugs and plates used with nonmetallic cabinets shall be recessed at least 1/4 inch (6.4 mm) from the outer surface. Unused openings for circuit breakers and switches shall be closed using identified closures, or other approved means that provide protection substantially equivalent to the wall of the enclosure. (110.12(A))

E3907.6 Conductors entering cabinets.

Conductors entering cabinets and panelboards shall be protected from abrasion and shall comply with Section E3906.1.1. (312.5)

E3907.7 Openings to be closed.

Openings through which conductors enter cabinets, panelboards and meter sockets shall be closed in an approved manner. [312.5(A)]

E3907.8 Cables.

Where cables are used, each cable shall be secured to the cabinet, panelboard, cutout box, or meter socket enclosure. [312.5(C)]

Exception: Cables with entirely nonmetallic sheaths shall be permitted to enter the top of a surface-mounted enclosure through one or more sections of rigid raceway not less than 18 inches (457 mm) nor more than 10 feet (3048 mm) in length, provided all the following conditions are met:

1. Each cable is fastened within 12 inches (305 mm), measured along the sheath, of the outer end of the raceway.
2. The raceway extends directly above the enclosure and does not penetrate a structural ceiling.
3. A fitting is provided on each end of the raceway to protect the cable(s) from abrasion and the fittings remain accessible after installation.
4. The raceway is sealed or plugged at the outer end using approved means so as to prevent access to the enclosure through the raceway.
5. The cable sheath is continuous through the raceway and extends into the enclosure beyond the fitting not less than 1/4 inch (6.4 mm).
6. The raceway is fastened at its outer end and at other points in accordance with Section E3802.1.
7. The allowable cable fill for conduit or tubing shall not exceed that permitted by Table E3907.8 and shall be considered as a complete conduit or tubing system. A multiconductor cable having two or more conductors shall be treated as a single conductor for calculating the percentage of conduit fill area. For cables that have elliptical cross sections, the cross-sectional area calculation shall be based on the major diameter of the ellipse as a circle diameter. [312.5(C) Exception]

E3907.9.1 Top and bottom wire-bending space.

The top and bottom wire-bending space for a panelboard enclosure shall be sized in accordance with Table E3907.9.1(1) based on the largest conductor entering or leaving the enclosure. [408.55 (A)]

Exceptions:

1. For a panelboard rated at 225 amperes or less and designed to contain not more than 42 overcurrent devices, either the top or bottom wire-bending space shall be permitted to be sized in accordance with Table E3907.9.1(2). For the purposes of this exception, a 2-pole or a 3-pole circuit breaker shall be considered as two or three overcurrent devices, respectively. [408.55(A) Exception No. 1]
2. For any panelboard, either the top or bottom wire-bending space shall be permitted to be sized in accordance with Table E3907.9.1(2) where the wire-bending space on at least one side is sized in

accordance with Table E3907.9.1(1) based on the largest conductor to be terminated in any side wire-bending space. [408.55(A) Exception No. 2]

3. Where the panelboard is designed and constructed for wiring using only a single 90-degree bend for each conductor, including the grounded circuit conductor, and the wiring diagram indicates and specifies the method of wiring that must be used, the top and bottom wire-bending space shall be permitted to be sized in accordance with Table E3907.9.1(2). [408.55(A) Exception No. 3]

4. Where there are no conductors terminated in that space, either the top or the bottom wire-bending space, shall be permitted to be sized in accordance with Table E3907.9.1(2). [408.55(A) Exception No. 4]

SECTION E3908

GROUNDING

E3908.1 Metal enclosures.

Metal enclosures of conductors, devices and equipment shall be connected to the equipment grounding conductor. (250.86)

Exceptions:

1. Short sections of metal enclosures or raceways used to provide cable assemblies with support or protection against physical damage. (250.86 Exception No. 2)

2. Metal components that are installed in an underground installation of rigid nonmetallic conduit and are isolated from possible contact by a minimum cover of 18 inches (457 mm) to any part of the metal components or that are isolated from possible contact by encasement in not less than 2 inches (51 mm) of concrete. (250.86 Exception No. 3)

E3908. Equipment fastened in place or connected by permanent wiring methods (fixed).

Exposed, normally noncurrent-carrying metal parts of fixed equipment supplied by or enclosing conductors or components that are likely to become energized shall be connected to the equipment grounding conductor where any of the following conditions apply:

1. Where within 8 feet (2438 mm) vertically or 5 feet (1524 mm) horizontally of earth or grounded metal objects and subject to contact by persons;

2. Where located in a wet or damp location and not isolated; or

3. Where in electrical contact with metal. (250.110)

E3908.3 Specific equipment fastened in place (fixed) or connected by permanent wiring methods.

Exposed, normally noncurrent-carrying metal parts of the following equipment and enclosures shall be connected to an equipment grounding conductor:

1. Luminaires as provided in Chapter 40. [250.112(J)]

2. Motor-operated water pumps, including submersible types. Where a submersible pump is used in a metal well casing, the well casing shall be connected to the pump circuit equipment grounding conductor. [250.]

E3908.4 Effective ground-fault current path.

Electrical equipment and wiring and other electrically conductive material likely to become energized shall be installed in a manner that creates a low-impedance circuit facilitating the operation of the overcurrent device or ground detector for high-impedance grounded systems. Such circuit shall be capable of safely carrying the maximum ground-fault current likely to be imposed on it from any point on the wiring system where a ground fault might occur to the electrical supply source. [250.(A)(5)]

E3908.5 Earth as a ground-fault current path.

The earth shall not be considered as an effective ground-fault current path. [250.4(A)(5)]

E3908.6 Load-side grounded conductor neutral.

A grounded conductor shall not be connected to normally noncurrent-carrying metal parts of equipment, to equipment grounding conductor(s), or be reconnected to ground on the load side of the service disconnecting means. [250.24(A)(5)]

E3908.7 Load-side equipment.

A grounded circuit conductor shall not be used for grounding noncurrent-carrying metal parts of equipment on the load side of the service disconnecting means. [250.142(B)]

E3908.8 Types of equipment grounding conductors.

The equipment grounding conductor run with or enclosing the circuit conductors shall be one or more or a combination of the following:

1. A copper, aluminum or copper-clad conductor. This conductor shall be solid or stranded; insulated, covered or bare; and in the form of a wire or a busbar of any shape. [250.118(1)]

2. Rigid metal conduit. [250.118(2)]

3. Intermediate metal conduit. [250.118(3)]

4. Electrical metallic tubing. [250.118(4)]

5. Armor of Type AC cable in accordance with Section E3908.4. [250.118(8)]

6. Type MC cable that provides an effective ground-fault current path in accordance with one or more of the following:

6.1. It contains an insulated or uninsulated equipment grounding conductor in compliance with Item 1 of this section.

6.2. The combined metallic sheath and uninsulated equipment grounding/bonding conductor of interlocked metal tape-type MC cable that is listed and identified as an equipment grounding conductor.

6.3.The metallic sheath or the combined metallic sheath and equipment grounding conductors of the smooth or corrugated tube-type MC cable that is listed and identified as an equipment grounding conductor. [250.118(10)]

7.Other electrically continuous metal raceways and auxiliary gutters. [250.118(13)]

E3908.8.1 Flexible metal conduit.

Flexible metal conduit shall be permitted as an equipment grounding conductor where all of the following conditions are met:

- 1.The conduit is terminated in listed fittings.
- 2.The circuit conductors contained in the conduit are protected by overcurrent devices rated at 20 amperes or less.
- 3.The size of the conduit does not exceed trade size 1 1/4.
- 4.The combined length of flexible metal conduit and flexible metallic tubing and liquid-tight flexible metal conduit in the same ground return path does not exceed 6 feet (1829 mm).

If used to connect equipment where flexibility is necessary to minimize the transmission of vibration from equipment or to provide flexibility for equipment that requires movement after installation, an equipment grounding conductor shall be installed. [250.118(5)]

E3908.8.2 Liquid-tight flexible metal conduit.

Liquid-tight flexible metal conduit shall be permitted as an equipment grounding conductor where all of the following conditions are met:

- 1.The conduit is terminated in listed fittings.
- 2.For trade sizes 3/8 through 1/2 (metric designator 12 through 16), the circuit conductors contained in the conduit are protected by overcurrent devices rated at 20 amperes or less.
- 3.For trade sizes 3/4 through 1 1/4 (metric designator 21 through 35), the circuit conductors contained in the conduit are protected by overcurrent devices rated at not more than 60 amperes and there is no flexible metal conduit, flexible metallic tubing, or liquid-tight flexible metal conduit in trade sizes 3/8 inch or 1/2 inch (9.5 mm through 12.7 mm) in the ground fault current path.
- 4.The combined length of flexible metal conduit and flexible metallic tubing and liquid-tight flexible metal conduit in the same ground return path does not exceed 6 feet (1829 mm).

If used to connect equipment where flexibility is necessary to minimize the transmission of vibration from equipment or to provide flexibility for equipment that requires movement after installation, an equipment grounding conductor shall be installed. [250.118(6)]

E3908.8.3 Nonmetallic sheathed cable (Type NM).

In addition to the insulated conductors, the cable shall have an insulated, covered, or bare equipment grounding conductor. Equipment grounding conductors shall be sized in accordance with Table E3908.12. (334.108)

E3908.9 Equipment fastened in place or connected by permanent wiring methods.

Noncurrent-carrying metal parts of equipment, raceways and other enclosures, where required to be grounded, shall be grounded by one of the following methods: (250.134)

1. By any of the equipment grounding conductors permitted by Sections E3908.8 through E3908.8.3. [250.134(A)]

2. By an equipment grounding conductor contained within the same raceway, cable or cord, or otherwise run with the circuit conductors. Equipment grounding conductors shall be identified in accordance with Section E3407.2. [250.134(B)]

E3908.10 Methods of equipment grounding.

Fixtures and equipment shall be considered grounded where mechanically connected to an equipment grounding conductor as specified in Sections E3908.8 through E3908.8.3. Wire type equipment grounding conductors shall be sized in accordance with Section E3908.12. (250 Part VII)

E3908.11 Equipment grounding conductor installation.

Where an equipment grounding conductor consists of a raceway, cable armor or cable sheath or where such conductor is a wire within a raceway or cable, it shall be installed in accordance with the provisions of this chapter and Chapters 34 and 38 using fittings for joints and terminations approved for installation with the type of raceway or cable used. All connections, joints and fittings shall be made tight using suitable tools. (250.120)

E3908.12 Equipment grounding conductor size.

Copper, aluminum and copper-clad aluminum equipment grounding conductors of the wire type shall be not smaller than shown in Table E3908.12, but they shall not be required to be larger than the circuit conductors supplying the equipment. Where a raceway or a cable armor or sheath is used as the equipment grounding conductor, as provided in Section E3908.8, it shall comply with Section E3908.4. Where ungrounded conductors are increased in size from the minimum size that has sufficient ampacity for the intended installation, wire type equipment grounding conductors shall be increased proportionally according to the circular mil area of the ungrounded conductors. [250.122(A) and (B)]

E3908.13 Continuity and attachment of equipment grounding conductors to boxes.

Where circuit conductors are spliced within a box or terminated on equipment within or supported by a box, all equipment grounding conductors associated with any of those circuit conductors shall be connected within the box or to the box with devices suitable for the use in accordance with Section E3406.13.1. Connections depending solely on solder shall not be used. Splices shall be made in accordance with Section E3406.10 except that insulation shall not be required. The arrangement of grounding connections shall be such that the disconnection or removal of a receptacle, luminaire or other device fed from the box will not interfere with or interrupt the grounding continuity. [250.148(A), (B) and (E)]

E3908.14 Connecting receptacle grounding terminal to box.

An equipment bonding jumper, sized in accordance with Table E3908.12 based on the rating of the overcurrent device protecting the circuit conductors, shall be used to connect the grounding terminal of

a grounding-type receptacle to a grounded box except where grounded in accordance with one of the following: (250.146)

1. Surface mounted box. Where the box is mounted on the surface, direct metal-to-metal contact between the device yoke and the box shall be permitted to ground the receptacle to the box. At least one of the insulating washers shall be removed from receptacles that do not have a contact yoke or device designed and listed to be used in conjunction with the supporting screws to establish the grounding circuit between the device yoke and flush-type boxes. This provision shall not apply to cover-mounted receptacles except where the box and cover combination are listed as providing satisfactory ground continuity between the box and the receptacle. A listed exposed work cover shall be considered to be the grounding and bonding means where the device is attached to the cover with at least two fasteners that are permanent, such as a rivet or have a thread locking or screw locking means and where the cover mounting holes are located on a flat non-raised portion of the cover. [250.146(A)]
2. Contact devices or yokes. Contact devices or yokes designed and listed for the purpose shall be permitted in conjunction with the supporting screws to establish equipment bonding between the device yoke and flush-type boxes. [250.146(B)]
3. Floor boxes. The receptacle is installed in a floor box designed for and listed as providing satisfactory ground continuity between the box and the device. [250.146(C)]

E3908.15 Metal boxes.

A connection shall be made between the one or more equipment grounding conductors and a metal box by means of a grounding screw that shall be used for no other purpose, equipment listed for grounding or by means of a listed grounding device. Where screws are used to connect grounding conductors or connection devices to boxes, such screws shall be one or more of the following: [250.148(C)]

1. Machine screw-type fasteners that engage not less than two threads.
2. Machine screw-type fasteners that are secured with a nut.
3. Thread-forming machine screws that engage not less than two threads in the enclosure. [250.8(5) and (6)]

E3908.16 Nonmetallic boxes.

One or more equipment grounding conductors brought into a nonmetallic outlet box shall be arranged to allow connection to fittings or devices installed in that box. [250.148(D)]

E3908.17 Clean surfaces.

Nonconductive coatings such as paint, lacquer and enamel on equipment to be grounded shall be removed from threads and other contact surfaces to ensure electrical continuity or the equipment shall be connected by means of fittings designed so as to make such removal unnecessary. (250.12)

E3908.18 Bonding other enclosures.

Metal raceways, cable armor, cable sheath, enclosures, frames, fittings and other metal noncurrent-carrying parts that serve as equipment grounding conductors, with or without the use of supplementary equipment grounding conductors, shall be effectively bonded where necessary to ensure electrical continuity and the capacity to conduct safely any fault current likely to be imposed on them. Any

nonconductive paint, enamel and similar coating shall be removed at threads, contact points and contact surfaces, or connections shall be made by means of fittings designed so as to make such removal unnecessary. [250.96(A)]

E3908.19 Size of equipment bonding jumper on load side of an overcurrent device.

The equipment bonding jumper on the load side of an overcurrent devices shall be sized, as a minimum, in accordance with Table E3908.12, but shall not be required to be larger than the circuit conductors supplying the equipment. An equipment bonding conductor shall be not smaller than No. 14 AWG.

A single common continuous equipment bonding jumper shall be permitted to connect two or more raceways or cables where the bonding jumper is sized in accordance with Table E3908.12 for the largest overcurrent device supplying circuits therein. [250.102(D) and 250.122]

E3908.20 Installation equipment bonding jumper.

Bonding jumpers or conductors and equipment bonding jumpers shall be installed either inside or outside of a raceway or an enclosure in accordance with Sections E3908.20.1 and E3908.20.2. [250.102(E)]

E3908.20.1 Inside raceway or enclosure.

Where installed inside a raceway or enclosure, equipment bonding jumpers and bonding jumpers or conductors shall comply with the requirements of Sections E3407.2 and E3908.13. [250.102(E)(1)]

E3908.20.2 Outside raceway or enclosure.

Where installed outside of a raceway or enclosure, the length of the bonding jumper or conductor or equipment bonding jumper shall not exceed 6 feet (1829 mm) and shall be routed with the raceway or enclosure. [250.102(E)(2)]

Equipment bonding jumpers and supply-side bonding jumpers installed for bonding grounding electrodes and installed at outdoor pole locations for the purpose of bonding or grounding isolated sections of metal raceways or elbows installed in exposed risers of metal conduit or other metal raceway, shall not be limited in length and shall not be required to be routed with a raceway or enclosure. [250.102(E)(2) Exception]

E3908.20.3 Protection.

Bonding jumpers or conductors and equipment bonding jumpers shall be installed in accordance with Section E3610.2. [250.102(E)(3)]

SECTION E3909

FLEXIBLE CORDS

E3909.1 Where permitted.

Flexible cords shall be used only for the connection of appliances where the fastening means and mechanical connections of such appliances are designed to permit ready removal for maintenance, repair or frequent interchange and the appliance is listed for flexible cord connection. Flexible cords shall not be installed as a substitute for the fixed wiring of a structure; shall not be run through holes in walls, structural ceilings, suspended ceilings, dropped ceilings or floors; shall not be concealed behind walls,

floors, ceilings or located above suspended or dropped ceilings; and shall not be attached to building surfaces. (400.10 and 400.12)

E3909.3 Splices.

Flexible cord shall be used only in continuous lengths without splices or taps. (400.13)

E3909.4 Attachment plugs.

Where used in accordance with Section E3909.1, each flexible cord shall be equipped with an attachment plug and shall be energized from a receptacle outlet. [400.10(B)]

SECTION E4001

SWITCHES

E4001.1 Rating and application of snap switches.

Switches shall be used within their ratings and shall control only the following loads:

1. Resistive and inductive loads not exceeding the ampere rating of the switch at the voltage involved.
2. Tungsten-filament lamp loads not exceeding the ampere rating of the switch at 120 volts.
3. Motor loads not exceeding 80 percent of the ampere rating of the switch at its rated voltage. [404.14(A)]

E4001.2 CO/ALR snap switches.

Snap switches rated 20 amperes or less directly connected to aluminum conductors shall be marked CO/ALR. [404.14(C)]

E4001.3 Indicating.

General-use and motor-circuit switches and circuit breakers shall clearly indicate whether they are in the open OFF or closed ON position. Where single-throw switches or circuit breaker handles are operated vertically rather than rotationally or horizontally, the up position of the handle shall be the closed (on) position.

E4001.4 Time switches and similar devices.

Time switches and similar devices shall be of the enclosed type or shall be mounted in cabinets or boxes or equipment enclosures. A barrier shall be used around energized parts to prevent operator exposure when making manual adjustments or switching. (404.5)

E4001.5 Grounding of enclosures.

Metal enclosures for switches or circuit breakers shall be connected to an equipment grounding conductor. Metal enclosures for switches or circuit breakers used as service equipment shall comply with the provisions of Section E3609.4. Where nonmetallic enclosures are used with metal raceways or metal-armored cables, provisions shall be made for connecting the equipment grounding conductor.

Nonmetallic boxes for switches shall be installed with a wiring method that provides or includes an equipment grounding conductor. (404.12)

E4001.6 Access.

Switches and circuit breakers used as switches shall be located to allow operation from a readily accessible location. Such devices shall be installed so that the center of the grip of the operating handle of the switch or circuit breaker, when in its highest position, will not be more than 6 feet 7 inches (2007 mm) above the floor or working platform. [404.8(A)]

Exception: This section shall not apply to switches and circuit breakers that are accessible by portable means and are installed adjacent to the motors, appliances and other equipment that they supply. [404.8(A) Exception]

E4001.7 Damp or wet locations.

A surface mounted switch or circuit breaker located in a damp or wet location or outside of a building shall be enclosed in a weatherproof enclosure or cabinet. A flush-mounted switch or circuit breaker in a damp or wet location shall be equipped with a weatherproof cover. Switches shall not be installed within wet locations in tub or shower spaces unless installed as part of a listed tub or shower assembly. [404.4(A), (B), and (C)]

E4001.8 Grounded conductors.

Switches or circuit breakers shall not disconnect the grounded conductor of a circuit except where the switch or circuit breaker simultaneously disconnects all conductors of the circuit. [404.2(B)]

E4001.9 Switch connections.

Three- and four-way switches shall be wired so that all switching occurs only in the ungrounded circuit conductor. Color coding of switch connection conductors shall comply with Section E3407.3. Where in metal raceways or metal-jacketed cables, wiring between switches and outlets shall be in accordance with Section E3406.7. [404.2(A)]

Exception: Switch loops do not require a grounded conductor. [404.2(A) Exception]

E4001.10B ox mounted.

Flush-type snap switches mounted in boxes that are recessed from the finished wall surfaces as covered in Section E3906.5 shall be installed so that the extension plaster ears are seated against the surface of the wall. Flush-type snap switches mounted in boxes that are flush with the finished wall surface or project therefrom shall be installed so that the mounting yoke or strap of the switch is seated against the box.

Screws used for the purpose of attaching a snap switch to a box shall be of the type provided with a listed snap switch, or shall be machine screws having 32 threads per inch or part of listed assemblies or systems, in accordance with the manufacturer's instructions. [404.10(B)]

E4001.11 Snap switch faceplates.

Faceplates provided for snap switches mounted in boxes and other enclosures shall be installed so as to completely cover the opening and, where the switch is flush mounted, seat against the finished surface. [404.9(A)]

E4001.11.1 Faceplate grounding.

Snap switches, including dimmer and similar control switches, shall be connected to an equipment grounding conductor and shall provide a means to connect metal faceplates to the equipment grounding conductor, whether or not a metal faceplate is installed. Metal faceplates shall be grounded. Snap switches shall be considered to be part of an effective ground-fault current path if either of the following conditions is met:

- 1.The switch is mounted with metal screws to a metal box or metal cover that is connected to an equipment grounding conductor or to a nonmetallic box with integral means for connecting to an equipment grounding conductor.
- 2.An equipment grounding conductor or equipment bonding jumper is connected to an equipment grounding termination of the snap switch. [404.9(B)]

Exceptions:

- 1.Where a means to connect to an equipment grounding conductor does not exist within the snap-switch enclosure or where the wiring method does not include or provide an equipment grounding conductor, a snap switch without a grounding connection to an equipment grounding conductor shall be permitted for replacement purposes only. A snap switch wired under the provisions of this exception and located within 8 feet (2438 mm) vertically or 5 feet (1524 mm) horizontally of ground or exposed grounded metal objects, shall be provided with a faceplate of nonconducting noncombustible material with nonmetallic attachment screws, except where the switch-mounting strap or yoke is nonmetallic or the circuit is protected by a ground-fault circuit-interrupter. [404.9(B) Exception No.1]
- 2.Listed kits or listed assemblies shall not be required to be connected to an equipment grounding conductor if all of the following conditions apply:
 - 2.1.The device is provided with a nonmetallic faceplate that cannot be installed on any other type of device.
 - 2.2.The device does not have mounting means to accept other configurations of faceplates.
 - 2.3.The device is equipped with a nonmetallic yoke.
 - 2.4.All parts of the device that are accessible after installation of the faceplate are manufactured of nonmetallic materials. [404.9(B) Exception No. 2]
- 3.Connection to an equipment grounding conductor shall not be required for snap switches that have an integral nonmetallic enclosure complying with Section E3905.1.3. [404.9(B) Exception No. 3]

E4001.12 Dimmer switches.

General-use dimmer switches shall be used only to control permanently installed incandescent luminaires (lighting fixtures) except where listed for the control of other loads and installed accordingly. [404.14(E)]

E4001.13 Multipole snap switches.

A multipole, general-use snap switch shall not be fed from more than a single circuit unless it is listed and marked as a two-circuit or three-circuit switch. [404.8(C)]

E4001.14 Cord-and-plug-connected loads.

Where snap switches are used to control cord-and-plug-connected equipment on a general-purpose branch circuit, each snap switch controlling receptacle outlets or cord connectors that are supplied by permanently connected cord pendants shall be rated at not less than the rating of the maximum permitted ampere rating or setting of the overcurrent device protecting the receptacles or cord connectors, as provided in Sections E4002.1.1 and E4002.1.2. [404.14(F)]

E4001.15 Switches controlling lighting loads.

The grounded circuit conductor for the controlled lighting circuit shall be installed at the location where switches control lighting loads that are supplied by a grounded general-purpose branch circuit serving bathrooms, hallways, stairways, or rooms suitable for human habitation or occupancy as defined in the code. Where multiple switch locations control the same lighting load such that the entire floor area of the room or space is visible from the single or combined switch locations, the grounded conductor shall be required only at one location. A grounded conductor shall not be required to be installed at lighting switch locations under any of the following conditions:

1. Where conductors enter the box enclosing the switch through a raceway, provided that the raceway is large enough for all contained conductors, including a grounded conductor.
2. Where the box enclosing the switch is accessible for the installation of an additional or replacement cable without removing finish materials.
3. Where snap switches with integral enclosures comply with Section E3905.1.3.
4. Where lighting in the area is controlled by automatic means.
5. Where a switch controls a receptacle load. [404.2(C)]

Effective January 1, 2020, the grounded conductor shall be extended to any switch location as necessary and shall be connected to switching devices that require line-to-neutral voltage to operate the electronics of the switch in the standby mode.

The requirement for connection to switching devices shall not apply to replacement or retrofit switches installed in locations prior to the adoption of Section E4001.15 and where the grounded conductor cannot be extended without removing finish materials. The number of electronic lighting control switches on a branch circuit shall not exceed five, and the number connected to any feeder on the load side of a system or main bonding jumper shall not exceed 25.

SECTION E4002

RECEPTACLES

E4002.1 Rating and type.

Receptacles and cord connectors shall be rated at not less than 15 amperes, 125 volts, or 15 amperes, 250 volts, and shall not be a lampholder type. Receptacles shall be rated in accordance with this section. [406.3(B)]

E4002.1.1 Single receptacle.

A single receptacle installed on an individual branch circuit shall have an ampere rating not less than that of the branch circuit. [210.21(B)(1)]

E4002.1.2 Two or more receptacles.

Where connected to a branch circuit supplying two or more receptacles or outlets, receptacles shall conform to the values listed in Table E4002.1.2. [210.21(B)(3)]

E4002.2 Grounding type.

Receptacles installed on 15- and 20-ampere-rated branch circuits shall be of the grounding type. [406.4(A)]

E4002.3 CO/ALR receptacles.

Receptacles rated at 20 amperes or less and directly connected to aluminum conductors shall be marked CO/ALR. [406.3(C)]

E4002.4 Faceplates.

Metal face plates shall be grounded. [406.6(B)]

E4002.5 Position of receptacle faces.

After installation, receptacle faces shall be flush with or project from face plates of insulating material and shall project a minimum of 0.015 inch (0.381 mm) from metal face plates. Faceplates shall be installed so as to completely cover the opening and seat against the mounting surface.

Receptacle faceplates mounted inside of a box having a recess-mounted receptacle shall effectively close the opening and seat against the mounting surface. [406.5(D), 406.6]

Exception: Listed kits or assemblies encompassing receptacles and nonmetallic faceplates that cover the receptacle face, where the plate cannot be installed on any other receptacle, shall be permitted. [406.5(D) Exception]

E4002.6 Receptacle mounted in boxes.

Receptacles mounted in boxes that are set back from the finished wall surface as permitted by Section E3906.5 shall be installed so that the mounting yoke or strap of the receptacle is held rigidly at the finished surface of the wall. Screws used for the purpose of attaching receptacles to a box shall be of the type provided with a listed receptacle, or shall be machine screws having 32 threads per inch or part of listed assemblies or systems, in accordance with the manufacturer's instructions. Receptacles mounted in boxes that are flush with the wall surface or project therefrom shall be so installed that the mounting yoke or strap is seated against the box or raised cover. [406.5(A) and (B)]

E4002.7 Receptacles mounted on covers.

Receptacles mounted to and supported by a cover shall be held rigidly against the cover by more than one screw or shall be a device assembly or box cover listed and identified for securing by a single screw. [406.5(C)]

E4002.8 Damp locations.

A receptacle installed outdoors in a location protected from the weather or in other damp locations shall have an enclosure for the receptacle that is weatherproof when the receptacle cover(s) is closed and an attachment plug cap is not inserted. An installation suitable for wet locations shall also be considered suitable for damp locations. A receptacle shall be considered to be in a location protected from the weather where located under roofed open porches, canopies and similar structures and not subject to rain or water runoff. Fifteen- and 20-ampere, 125- and 250-volt nonlocking receptacles installed in damp locations shall be listed a weather-resistant type. [406.9(A)]

E4002.9 Fifteen- and 20-ampere receptacles in wet locations.

Where installed in a wet location, 15- and 20-ampere, 125- and 250-volt receptacles shall have an enclosure that is weatherproof whether or not the attachment plug cap is inserted. An outlet box hood installed for this purpose shall be listed and identified as "extra-duty."

Exception: 15- and 20-ampere, 125- through 250-volt receptacles installed in a wet location and subject to routine high-pressure spray washing need not have an enclosure that is weatherproof when the attachment plug is inserted.

Fifteen- and 20-ampere, 125- and 250-volt nonlocking receptacles installed in wet locations shall be listed and so identified as the weather-resistant type. [406.9(B)(1)]

E4002.10 Other receptacles in wet locations.

Where a receptacle other than a 15- or 20-amp, 125- or 250-volt receptacle is installed in a wet location and where the product intended to be plugged into it is not attended while in use, the receptacle shall have an enclosure that is weatherproof both when the attachment plug cap is inserted and when it is removed. Where such receptacle is installed in a wet location and where the product intended to be plugged into it will be attended while in use, the receptacle shall have an enclosure that is weatherproof when the attachment plug cap is removed. [406.9(B)(2)]

E4002.11 Bathtub and shower space.

A receptacle shall not be installed within or directly over a bathtub or shower stall. [406.9(C)]

E4002.12 Flush mounting with faceplate.

In damp or wet locations, the enclosure for a receptacle installed in an outlet box flush-mounted in a finished surface shall be made weatherproof by means of a weatherproof faceplate assembly that provides a water-tight connection between the plate and the finished surface. [406.9(E)]

E4002.13 Exposed terminals.

Receptacles shall be enclosed so that live wiring terminals are not exposed to contact. [406.5(I)]

E4002.14 Tamper-resistant receptacles.

In areas specified in Section E3901.1, 15- and 20-ampere, 125- and 250-volt nonlocking-type receptacles shall be listed tamper-resistant receptacles. [406.12(A)]

Exception: Receptacles in the following locations shall not be required to be tamper resistant:

- 1.Receptacles located more than 5.5 feet (1676 mm) above the floor.

2.Receptacles that are part of a luminaire or appliance.

3.A single receptacle for a single appliance or a duplex receptacle for two appliances where such receptacles are located in spaces dedicated for the appliances served and, under conditions of normal use, the appliances are not easily moved from one place to another. The appliances shall be cord-and-plug-connected to such receptacles in accordance with Section E3909.4. [406.12(A) Exception]

E4002.15 Receptacles in countertops.

Receptacle assemblies for installation in countertop surfaces shall be listed for countertop applications. Receptacle assemblies and GFCI receptacle assemblies installed in work surfaces shall be listed for work surface or countertop applications. [406.5 (E) and (F)]

E4002.16 Receptacle position.

Receptacles shall not be installed in a face-up position in or on countertops surfaces or work surfaces except where the receptacles are listed for countertop or work surface applications. [406.5 (G)]

SECTION E4003

LUMINAIRES

E4003.1 Energized parts.

Luminaires, lampholders, and lamps shall not have energized parts normally exposed to contact. (410.5)

E4003.2 Luminaires near combustible material.

Luminaires shall be installed or equipped with shades or guards so that combustible material will not be subjected to temperatures in excess of 90°C (194°F). (410.11)

E4003.3 Exposed conductive parts.

The exposed metal parts of luminaires shall be connected to an equipment grounding conductor or shall be insulated from the equipment grounding conductor and other conducting surfaces. Lamp tie wires, mounting screws, clips and decorative bands on glass spaced at least 1 1/2 inches (38 mm) from lamp terminals shall not be required to be grounded. (410.42)

E4003.4 Screw-shell type.

Lampholders of the screw-shell type shall be installed for use as lampholders only. Where supplied by a circuit having a grounded conductor, the grounded conductor shall be connected to the screw shell. (410.90)

E4003.5 Recessed incandescent luminaires.

Recessed incandescent luminaires shall have thermal protection and shall be listed as thermally protected. [410.115(C)]

Exceptions:

1.Thermal protection shall not be required in recessed luminaires listed for the purpose and installed in poured concrete. [410.115(C) Exception No. 1]

2. Thermal protection shall not be required in recessed luminaires having design, construction, and thermal performance characteristics equivalent to that of thermally protected luminaires, and such luminaires are identified as inherently protected. [410.115(C) Exception No. 2]

E4003.6 Thermal protection.

The ballast of a fluorescent luminaire installed indoors shall have integral thermal protection. Replacement ballasts shall also have thermal protection integral with the ballast. A simple reactance ballast in a fluorescent luminaire with straight tubular lamps shall not be required to be thermally protected. [410.130(E)(1)]

E4003.7 High-intensity discharge luminaires.

Recessed high-intensity luminaires designed to be installed in wall or ceiling cavities shall have thermal protection and be identified as thermally protected. Thermal protection shall not be required in recessed high-intensity luminaires having design, construction and thermal performance characteristics equivalent to that of thermally protected luminaires, and such luminaires are identified as inherently protected. Thermal protection shall not be required in recessed high-intensity discharge luminaires installed in and identified for use in poured concrete. A recessed remote ballast for a high-intensity discharge luminaire shall have thermal protection that is integral with the ballast and shall be identified as thermally protected. [410.130(F)(1), (2), (3), and (4)]

E4003.8 Metal halide lamp containment.

Luminaires that use a metal halide lamp other than a thick-glass parabolic reflector lamp (PAR) shall be provided with a containment barrier that encloses the lamp, or shall be provided with a physical means that allows the use of only a lamp that is Type O. [410.130(F)(5)]

E4003.9 Wet or damp locations.

Luminaires installed in wet or damp locations shall be installed so that water cannot enter or accumulate in wiring compartments, lampholders or other electrical parts. All luminaires installed in wet locations shall be marked "SUITABLE FOR WET LOCATIONS." All luminaires installed in damp locations shall be marked "SUITABLE FOR WET LOCATIONS" or "SUITABLE FOR DAMP LOCATIONS." (410.10)

E4003.10 Lampholders in wet or damp locations.

Lamp-holders installed in wet locations shall be listed for use in wet locations. Lampholders installed in damp locations shall be listed for damp locations or shall be listed for wet locations. (410.96)

E4003.11 Bathtub and shower areas.

Cord-connected luminaires, chain-, cable-, or cord-suspended-luminaires, lighting track, pendants, and ceiling-suspended (paddle) fans shall not have any parts located within a zone measured 3 feet (914 mm) horizontally and 8 feet (2438 mm) vertically from the top of a bathtub rim or shower stall threshold. This zone is all encompassing and includes the space directly over the tub or shower. Luminaires within the actual outside dimension of the bathtub or shower to a height of 8 feet (2438 mm) vertically from the top of the bathtub rim or shower threshold shall be marked for damp locations and where subject to shower spray, shall be marked for wet locations. [410.4(D)]

E4003.12 Luminaires in clothes closets.

For the purposes of this section, storage space shall be defined as a volume bounded by the sides and back closet walls and planes extending from the closet floor vertically to a height of 6 feet (1829 mm) or the highest clothes-hanging rod and parallel to the walls at a horizontal distance of 24 inches (610 mm) from the sides and back of the closet walls respectively, and continuing vertically to the closet ceiling parallel to the walls at a horizontal distance of 12 inches (305 mm) or the width of the shelf, whichever is greater. For a closet that permits access to both sides of a hanging rod, the storage space shall include the volume below the highest rod extending 12 inches (305 mm) on either side of the rod on a plane horizontal to the floor extending the entire length of the rod (see Figure E4003.12). (410.2)

The types of luminaires installed in clothes closets shall be limited to surface-mounted or recessed incandescent or LED luminaires with completely enclosed light sources, surface-mounted or recessed fluorescent luminaires, and surface-mounted fluorescent or LED luminaires identified as suitable for installation within the closet storage area. Incandescent luminaires with open or partially enclosed lamps and pendant luminaires or lamp-holders shall be prohibited. The minimum clearance between luminaires installed in clothes closets and the nearest point of a closet storage area shall be as follows: [410.16(A) and (B)]

1. Surface-mounted incandescent or LED luminaires with a completely enclosed light source shall be installed on the wall above the door or on the ceiling, provided that there is a minimum clearance of 12 inches (305 mm) between the fixture and the nearest point of a storage space.

2. Surface-mounted fluorescent luminaires shall be installed on the wall above the door or on the ceiling, provided that there is a minimum clearance of 6 inches (152 mm).

3. Recessed incandescent luminaires or LED luminaires with a completely enclosed light source shall be installed in the wall or the ceiling provided that there is a minimum clearance of 6 inches (152 mm).

4. Recessed fluorescent luminaires shall be installed in the wall or on the ceiling provided that there is a minimum clearance of 6 inches (152 mm) between the fixture and the nearest point of a storage space.

5. Surface-mounted fluorescent or LED luminaires shall be permitted to be installed within the closet storage space where identified for this use. [410.16(C)]

E4003.13 Luminaire wiring—general.

Wiring on or within luminaires shall be neatly arranged and shall not be exposed to physical damage. Excess wiring shall be avoided. Conductors shall be arranged so that they are not subjected to temperatures above those for which the conductors are rated. (410.48)

E4003.13.1 Polarization of luminaires.

Luminaires shall be wired so that the screw shells of lampholders will be connected to the same luminaire or circuit conductor or terminal. The grounded conductor shall be connected to the screw shell. (410.50)

E4003.13.2 Luminaires as raceways.

Luminaires shall not be used as raceways for circuit conductors except where such luminaires are listed and marked for use as a raceway or are identified for through-wiring.

Luminaires designed for end-to-end connection to form a continuous assembly, and luminaires connected together by recognized wiring methods, shall not be required to be listed as a raceway where they contain the conductors of one 2-wire branch circuit or one multiwire branch circuit and such conductors supply the connected luminaires. One additional 2-wire branch circuit that separately supplies one or more of the connected luminaires shall also be permitted. [410.64(A), (B), and (C)]

SECTION E4004

LUMINAIRE INSTALLATION

E4004.1 Outlet box covers.

In a completed installation, each outlet box shall be provided with a cover except where covered by means of a luminaire canopy, lampholder or device with a faceplate. (410.22)

E4004.2 Combustible material at outlet boxes.

Combustible wall or ceiling finish exposed between the inside edge of a luminaire canopy or pan and the outlet box and having a surface area of 180 square inches (1160 mm²) or more shall be covered with a noncombustible material. (410.23)

E4004.3 Access.

Luminaires shall be installed so that the connections between the luminaire conductors and the circuit conductors can be accessed without requiring the disconnection of any part of the wiring. Luminaires that are connected by attachment plugs and receptacles meet the requirement of this section. (410.8)

E4004.4 Supports.

Luminaires and lampholders shall be securely supported. A luminaire that weighs more than 6 pounds (2.72 kg) or exceeds 16 inches (406 mm) in any dimension shall not be supported by the screw shell of a lampholder. [410.30(A)]

E4004.5 Means of support.

Outlet boxes or fittings installed as required by Sections E3905 and E3906 shall be permitted to support luminaires. [410.36(A)]

E4004.6 Exposed components.

Luminaires having exposed ballasts, transformers, LED drivers or power supplies shall be installed so that such ballasts, transformers, LED drivers or power supplies are not in contact with combustible material unless listed for such condition. [410.136(A)]

E4004.7 Combustible low-density cellulose fiberboard.

Where a surface-mounted luminaire containing a ballast, transformer, LED driver or power supply is installed on combustible low-density cellulose fiberboard, the luminaire shall be marked for this purpose or it shall be spaced not less than 11/2 inches (38 mm) from the surface of the fiberboard. Where such luminaires are partially or wholly recessed, the provisions of Sections E4004.8 and E4004.9 shall apply. [410.136(B)]

E4004.8 Recessed luminaire clearance.

A recessed luminaire that is not identified for contact with insulation shall have all recessed parts spaced at least 1/2 inch (12.7 mm) from combustible materials. The points of support and the finish trim parts at the opening in the ceiling, wall or other finished surface shall be permitted to be in contact with combustible materials. A recessed luminaire that is identified for contact with insulation, Type IC, shall be permitted to be in contact with combustible materials at recessed parts, points of support, and portions passing through the building structure and at finish trim parts at the opening in the ceiling or wall. [410.116(A)(1) and (A)(2)]

E4004.9 Recessed luminaire installation.

Thermal insulation shall not be installed above a recessed luminaire or within 3 inches (76 mm) of the recessed luminaire's enclosure, wiring compartment, ballast, transformer, LED driver or power supply except where such luminaire is identified for contact with insulation, Type IC. [410.116(B)]

APPLIANCE INSTALLATION

SECTION E4101

GENERAL

E4101.2 Installation.

Appliances and equipment shall be installed in accordance with the manufacturer's installation instructions. Electrically heated appliances and equipment shall be installed with the required clearances to combustible materials. [110.3(B) and 422.17]

E4101.3 Flexible cords.

Cord-and-plug-connected appliances shall use cords suitable for the environment and physical conditions likely to be encountered. Flexible cords shall be used only where the appliance is listed to be connected with a flexible cord. The cord shall be identified as suitable in the installation instructions of the appliance manufacturer. Receptacles for cord-and-plug-connected appliances shall be accessible and shall be located to avoid physical damage to the flexible cord. Except for a listed appliance marked to indicate that it is protected by a system of double-insulation, the flexible cord supplying an appliance shall terminate in a grounding-type attachment plug. The cord lengths specified for built-in dishwashers and trash compactors shall be measured from the face of the attachment plug to the plane of the rear of the appliance. A receptacle for a cord-and-plug-connected range hood shall be supplied by an individual branch circuit. A receptacle for a built-in dishwasher shall be located in a space adjacent to the space occupied by the dishwasher. Specific appliances have additional requirements as specified in Table E4101.3 (see Section E3909). [422.16(B)(1), (B)(2), (B)(4)]

E4101.4 Overcurrent protection.

Each appliance shall be protected against overcurrent in accordance with the rating of the appliance and its listing. [110.3(B), 422.11(A)]

E4101.4.1 Single nonmotor-operated appliance.

The overcurrent protection for a branch circuit that supplies a single nonmotor-operated appliance shall not exceed that marked on the appliance. Where the overcurrent protection rating is not marked and the appliance is rated at over 13.3 amperes, the overcurrent protection shall not exceed 150 percent of

the appliance rated current. Where 150 percent of the appliance rating does not correspond to a standard overcurrent device ampere rating, the next higher standard rating shall be permitted. Where the overcurrent protection rating is not marked and the appliance is rated at 13.3 amperes or less, the overcurrent protection shall not exceed 20 amperes. [422.11(E)]

E4101.5 Disconnecting means.

Each appliance shall be provided with a means to disconnect all ungrounded supply conductors. For fixed electric space-heating equipment, means shall be provided to disconnect the heater and any motor controller(s) and supplementary overcurrent-protective devices. Switches and circuit breakers used as a disconnecting means shall be of the indicating type. Disconnecting means shall be as set forth in Table E4101.5. (422.30, 422.35, and 424.19)

E4101.6 Support of ceiling-suspended paddle fans.

Ceiling-suspended fans (paddle) shall be supported independently of an outlet box; by a listed outlet box or outlet box system identified for the use and installed in accordance with Section E3905.8; or by a listed outlet box system, a listed locking support and mounting receptacle, and a compatible factory installed attachment fitting designed for support, identified for the use and installed in accordance with Section E3906.12. (422.18)

E4101.7 Snow-melting and deicing equipment protection.

Outdoor receptacles that are not readily accessible and are supplied from a dedicated branch circuit for electric snow-melting or deicing equipment shall be permitted to be installed without ground-fault circuit-interrupter protection for personnel. However, ground-fault protection of equipment shall be provided for fixed outdoor electric deicing and snow-melting equipment. [210.8(A)(3) Exception, 426.28]

E4101.8 Lockable disconnecting means.

Where a disconnecting means is required to be lockable, it shall be capable of being locked in the open position. The provisions for locking shall remain in place with or without the lock installed.

Exception: Locking provisions for a cord-and-plug connection shall not be required to remain in place without the lock installed.

SECTION E4201

GENERAL

E4201.1 Scope.

The provisions of this chapter shall apply to the construction and installation of electric wiring and equipment associated with all swimming pools, wading pools, decorative pools, fountains, hot tubs and spas, and hydromassage bathtubs, whether permanently installed or storable, and shall apply to metallic auxiliary equipment, such as pumps, filters and similar equipment. Sections E4202 through E4206 provide general rules for permanent pools, spas and hot tubs. Section E4207 provides specific rules for storable pools and storable/portable spas and hot tubs. Section E4208 provides specific rules for spas and hot tubs. Section E4209 provides specific rules for hydromassage bathtubs. (680.1)

SECTION E4202

WIRING METHODS FOR POOLS, SPAS, HOT TUBS AND HYDROMASSAGE BATHTUBS

E4202.1 General.

Wiring methods used in conjunction with permanently installed swimming pools, spas or hot tubs that are installed in corrosive environments described in Section E4202.2.1 shall comply with Table E4202.1, Sections E4202.2 and E4205 and Chapter 38 except as otherwise stated in this section. Wiring methods used in conjunction with permanently installed swimming pools, spas or hot tubs that are not installed in noncorrosive environments shall comply with Chapter 38. Storable swimming pools shall comply with Section E4207. Hydromassage bathtubs shall comply with Section E4209. [680.7; 680.14 (A) and (B); 680.21(A); 680.23(B) and (F); 680.25(A); 680.42; 680.43; and 680.70]

E4202.3 Flexible cords.

Flexible cords used in conjunction with a pool, spa, hot tub or hydromassage bathtub shall be installed in accordance with the following:

1. For other than underwater luminaires, fixed or stationary equipment shall be permitted to be connected with a flexible cord to facilitate removal or disconnection for maintenance or repair. For other than storable pools, the flexible cord shall not exceed 3 feet (914 mm) in length. Cords that supply swimming pool equipment shall have a copper equipment grounding conductor not smaller than 12 AWG and shall terminate in a grounding-type attachment plug. [680.8(A), (B), and (C); 680.21(A)(5)]

2. Other than listed low-voltage lighting systems not requiring grounding, wet-niche luminaires that are supplied by a flexible cord or cable shall have all exposed noncurrent-carrying metal parts grounded by an insulated copper equipment grounding conductor that is an integral part of the cord or cable. Such grounding conductor shall be connected to a grounding terminal in the supply junction box, transformer enclosure, or other enclosure and shall be not smaller than the supply conductors and not smaller than 16 AWG. [680.23(B)(3)]

3. A listed packaged spa or hot tub installed outdoors that is GFCI protected shall be permitted to be cord-and-plug-connected provided that such cord does not exceed 15 feet (4572 mm) in length. [680.42(A)(2)]

4. A listed packaged spa or hot tub rated at 20 amperes or less and installed indoors shall be permitted to be cord-and-plug-connected to facilitate maintenance and repair. (680.43 Exception No. 1)

5. For other than underwater and storable pool lighting luminaire, the requirements of Item 1 shall apply to any cord-equipped luminaire that is located within 16 feet (4877 mm) radially from any point on the water surface. [680.22(B)(5)]

SECTION E4203

EQUIPMENT LOCATION AND CLEARANCES

E4203.1 Receptacle outlets.

Receptacle outlets shall be installed and located in accordance with Sections E4203.1.1 through E4203.1.5. Distances shall be measured as the shortest path that an appliance supply cord connected to

the receptacle would follow without penetrating a floor, wall, ceiling, doorway with hinged or sliding door, window opening, or other effective permanent barrier. [680.22(A)(5)]

E4203.1.1 Location.

Receptacles that provide power for water-pump motors or other loads directly related to the circulation and sanitation system shall be of the grounding type, located not less than 6 feet (1829 mm) from the inside walls of pools and outdoor spas and hot tubs, and ground-fault circuit-interrupter protected.

E4203.1.2 Other receptacles.

Other receptacles on the property shall be located not less than 6 feet (1829 mm) from the inside walls of pools and outdoor spas and hot tubs. [680.22 (A)(3)]

E4203.1.3 Where required.

Not less than one 125-volt, 15- or 20-ampere receptacle supplied by a general-purpose branch circuit shall be located not less than 6 feet (1829 mm) from and not more than 20 feet (6096 mm) from the inside wall of permanently installed pools and outdoor spas and hot tubs. This receptacle shall be located not more than 6 feet, 6 inches (1981 mm) above the floor, platform or grade level serving the pool, spa or hot tub. [680.22(A)(1)]

E4203.1.4 GFCI protection.

All 15- and 20-ampere, single phase, 125-volt receptacles located within 20 feet (6096 mm) of the inside walls of pools and outdoor spas and hot tubs shall be protected by a ground-fault circuit-interrupter. Outlets supplying pool pump motors supplied from branch circuits rated at 120 volts through 240 volts, single phase, whether by receptacle or direct connection, shall be provided with ground-fault circuit-interrupter protection for personnel. [680.21(C) and 680.22(A)(4)]

E4203.1.5 Indoor locations.

Receptacles shall be located not less than 6 feet (1829 mm) from the inside walls of indoor spas and hot tubs. A minimum of one 125-volt receptacle shall be located between 6 feet (1829 mm) and 10 feet (3048 mm) from the inside walls of indoor spas or hot tubs. [680.43(A) and 680.43(A)(1)]

E4203.1.6 Indoor GFCI protection.

All 125-volt receptacles rated 30 amperes or less and located within 10 feet (3048 mm) of the inside walls of spas and hot tubs installed indoors, shall be protected by ground-fault circuit-interrupters. [680.43(A)(2)]

E4203.2 Switching devices.

Switching devices shall be located not less than 5 feet (1524 mm) horizontally from the inside walls of pools, spas and hot tubs except where separated from the pool, spa or hot tub by a solid fence, wall, or other permanent barrier or the switches are listed for use within 5 feet (1524 mm). Switching devices located in a room or area containing a hydromassage bathtub shall be located in accordance with the general requirements of this code. [680.22(C); 680.43(C); and 680.72

E4203.3 Disconnecting means.

One or more means to simultaneously disconnect all ungrounded conductors for all utilization equipment, other than lighting, shall be provided. Each of such means shall be readily accessible and within sight from the equipment it serves and shall be located at least 5 feet (1524 mm) horizontally from the inside walls of a pool, spa, or hot tub unless separated from the open water by a permanently installed barrier that provides a 5-foot (1524 mm) or greater reach path. This horizontal distance shall be measured from the water's edge along the shortest path required to reach the disconnect. (680.13)

E4203.4 Luminaires, equipment and ceiling fans.

Lighting outlets, luminaires, equipment and ceiling-suspended paddle fans shall be installed and located in accordance with Sections E4203.4.1 through E4203.4.7. [680.22(B)]

E4203.4.1 Outdoor location.

In outdoor pool, outdoor spas and outdoor hot tubs areas, luminaires, lighting outlets, and ceiling-suspended paddle fans shall not be installed over the pool or over the area extending 5 feet (1524 mm) horizontally from the inside walls of a pool except where no part of the luminaire or ceiling-suspended paddle fan is less than 12 feet (3658 mm) above the maximum water level. [680.22(B)(1)]

E4203.4.2 Indoor locations.

In indoor pool areas, the limitations of Section E4203.4.1 shall apply except where the luminaires, lighting outlets and ceiling-suspended paddle fans comply with all of the following conditions:

- 1.The luminaires are of a totally enclosed type.
- 2.Ceiling-suspended paddle fans are identified for use beneath ceiling structures such as porches and patios.
- 3.A ground-fault circuit-interrupter is installed in the branch circuit supplying the luminaires or ceiling-suspended paddle fans.
- 4.The distance from the bottom of the luminaire or ceiling-suspended paddle fan to the maximum water level is not less than 7 feet, 6 inches (2286 mm). [680.22(B)(2)]

E4203.4.3 Low-voltage luminaires.

Listed low-voltage luminaires not requiring grounding, not exceeding the low-voltage contact limit, and supplied by listed transformers or power supplies that comply with Section E4206.1 shall be permitted to be located less than 5 feet (1.5 m) from the inside walls of the pool. [680.22(B)(6)]

E4203.4.5 Indoor spas and hot tubs.

1.Luminaires, lighting outlets, and ceiling-suspended paddle fans located over the spa or hot tub or within 5 feet (1524 mm) from the inside walls of the spa or hot tub shall be not less than 7 feet, 6 inches (2286 mm) above the maximum water level and shall be protected by a ground-fault circuit-interrupter. [680.43(B)(1)(b)]

Luminaires, lighting outlets, and ceiling-suspended paddle fans that are located 12 feet (3658 mm) or more above the maximum water level shall not require ground-fault circuit-interrupter protection. [680.43(B)(1)(a)]

2. Luminaires protected by a ground-fault circuit-interrupter and complying with Item 2.1 or 2.2 shall be permitted to be installed less than 7 feet, 6 inches (2286 mm) over a spa or hot tub.

2.1. Recessed luminaires shall have a glass or plastic lens and nonmetallic or electrically isolated metal trim, and shall be suitable for use in damp locations.

2.2. Surface-mounted luminaires shall have a glass or plastic globe and a nonmetallic body or a metallic body isolated from contact. Such luminaires shall be suitable for use in damp locations. [680.43(B)(1)(c) (1) and (2)]

E4203.4.6 GFCI protection in adjacent areas.

Luminaires, lighting outlets and ceiling-suspended paddle fans that are installed in the area extending between 5 feet (1524 mm) and 10 feet (3048 mm) from the inside walls of pools and outdoor spas and hot tubs shall be protected by ground-fault circuit-interrupters except where such luminaires, lighting outlets and ceiling-suspended paddle fans are installed not less than 5 feet (1524 mm) above the maximum water level and are rigidly attached to the structure. [680.22(B)(4)]

E4203.4.7 Low-voltage gas-fired luminaires, decorative fireplaces, fire pits and similar equipment.

Listed low-voltage gas-fired luminaires, decorative fireplaces, fire pits and similar equipment that use low-voltage ignitors that do not require grounding, and that are supplied by listed transformers or power supplies that comply with Section E4206.1 with outputs that do not exceed the low-voltage contact limit, shall be permitted to be located less than 5 feet (1524 mm) from the inside walls of the pool. Metallic equipment shall be bonded in accordance with the requirements in Section E4204.2. Transformers and power supplies supplying this type of equipment shall be installed in accordance with the requirements of Section E4206.9.1. Metallic gas piping shall be bonded in accordance with the requirements of Sections E3609.7 and 4204.2(7). [680.22 (B) (7)]

E4203.5 Other outlets.

Other outlets such as for remote control, signaling, fire alarm and communications shall be not less than 10 feet (3048 mm) from the inside walls of the pool. Measurements shall be determined in accordance with Section E4203.1. [680.22(D)]

E4203.6 Overhead conductor clearances.

Except where installed with the clearances specified in Table E4203.6, the following parts of pools and outdoor spas and hot tubs shall not be placed under existing service-drop conductors, overhead service conductor, or any other open overhead wiring; nor shall such wiring be installed above the following:

1. Pools and the areas extending not less than 10 feet, (3048 mm) horizontally from the inside of the walls of the pool.

2. Diving structures and the areas extending not less than 10 feet (3048 mm) horizontally from the outer edge of such structures.

3. Observation stands, towers, and platforms and the areas extending not less than 10 feet (3048 mm) horizontally from the outer edge of such structures.

Overhead conductors of network-powered broadband communications systems shall comply with the provisions in Table E4203.6 for conductors operating at 0 to 750 volts to ground.

Utility-owned, -operated and -maintained communications conductors, community antenna system coaxial cables and the supporting messengers shall be permitted at a height of not less than 10 feet (3048 mm) above swimming and wading pools, diving structures, and observation stands, towers, and platforms. [680.8(A), (B), and (C)]

SECTION E4204

BONDING

E4204.2 Bonded parts.

The parts of pools, spas, and hot tubs specified in Items 1 through 7 shall be bonded together using insulated, covered or bare solid copper conductors not smaller than 8 AWG or using rigid metal conduit of brass or other identified corrosion-resistant metal. An 8 AWG or larger solid copper bonding conductor provided to reduce voltage gradients in the pool, spa, or hot tub area shall not be required to be extended or attached to remote panelboards, service equipment, or electrodes. Connections shall be made by exothermic welding, by listed pressure connectors or clamps that are labeled as being suitable for the purpose and that are made of stainless steel, brass, copper or copper alloy, machine screw-type fasteners that engage not less than two threads or are secured with a nut, thread-forming machine screws that engage not less than two-threads, or terminal bars. Connection devices or fittings that depend solely on solder shall not be used. Sheet metal screws shall not be used to connect bonding conductors or connection devices: [680.26(B)]

1. Conductive pool shells. Bonding to conductive pool shells shall be provided as specified in Item 1.1 or 1.2. Poured concrete, pneumatically applied or sprayed concrete, and concrete block with painted or plastered coatings shall be considered to be conductive materials because of their water permeability and porosity. Vinyl liners and fiberglass composite shells shall be considered to be nonconductive materials.

1.1. Structural reinforcing steel. Unencapsulated structural reinforcing steel shall be bonded together by steel tie wires or the equivalent. Where structural reinforcing steel is encapsulated in a nonconductive compound, a copper conductor grid shall be installed in accordance with Item 1.2.

1.2. Copper conductor grid. A copper conductor grid shall be provided and shall comply with Items 1.2.1 through 1.2.4:

1.2.1. It shall be constructed of minimum 8 AWG bare solid copper conductors bonded to each other at all points of crossing.

1.2.2. It shall conform to the contour of the pool.

1.2.3. It shall be arranged in a 12-inch (305 mm) by 12-inch (305 mm) network of conductors in a uniformly spaced perpendicular grid pattern with a tolerance of 4 inches (102 mm).

1.2.4. It shall be secured within or under the pool not more than 6 inches (152 mm) from the outer contour of the pool shell. [680.26(B)(1)]

2.Perimeter surfaces. The perimeter surface to be bonded shall be considered to extend for 3 feet (914 mm) horizontally beyond the inside walls of the pool and shall include unpaved surfaces, poured concrete surfaces and other types of paving. Perimeter surfaces that are separated from the pool by a permanent wall or building 5 feet (1524 mm) or more in height shall require equipotential bonding only on the pool side of the permanent wall or building. Bonding to perimeter surfaces shall be provided as specified in Item 2.1 or 2.2 and shall be attached to the pool, spa, or hot tub reinforcing steel or copper conductor grid at a minimum of four points uniformly spaced around the perimeter of the pool, spa, or hot tub. For nonconductive pool shells, bonding at four points shall not be required.

Exceptions:

1.Equipotential bonding of perimeter surfaces shall not be required for spas and hot tubs where all of the following conditions apply:

1.1.The spa or hot tub is listed as a self-contained spa for above-ground use.

1.2.The spa or hot tub is not identified as suitable only for indoor use.

1.3.The installation is in accordance with the manufacturer's instructions and is located on or above grade.

1.4.The top rim of the spa or hot tub is not less than 28 inches (711 mm) above all perimeter surfaces that are within 30 inches (762 mm), measured horizontally from the spa or hot tub. The height of nonconductive external steps for entry to or exit from the self-contained spa is not used to reduce or increase this rim height measurement.

2.The equipotential bonding requirements for perimeter surfaces shall not apply to a listed self-contained spa or hot tub located indoors and installed above a finished floor.

2.1.Structural reinforcing steel. Structural reinforcing steel shall be bonded in accordance with Item 1.1.

2.2.Alternate means. Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper conductor(s) shall be used in accordance with Items 2.2.1 through 2.2.5:

2.2.1.At least one minimum 8 AWG bare solid copper conductor shall be provided.

2.2.2.The conductors shall follow the contour of the perimeter surface.

2.2.3.Splices shall be listed.

2.2.4.The required conductor shall be 18 to 24 inches (457 to 610 mm) from the inside walls of the pool.

2.2.5.The required conductor shall be secured within or under the perimeter surface 4 to 6 inches (102 mm to 152 mm) below the subgrade. [680.26(B)(2)]

3.Metallic components. All metallic parts of the pool structure, including reinforcing metal not addressed in Item 1.1, shall be bonded. Where reinforcing steel is encapsulated with a nonconductive compound, the reinforcing steel shall not be required to be bonded. [680.26(B)(3)]

4.Underwater lighting. All metal forming shells and mounting brackets of no-niche luminaires shall be bonded. [680.26(B)(4)]

Exception: Listed low-voltage lighting systems with nonmetallic forming shells shall not require bonding. [680.26(B)(4) Exception]

5. Metal fittings. All metal fittings within or attached to the pool structure shall be bonded. Isolated parts that are not over 4 inches (102 mm) in any dimension and do not penetrate into the pool structure more than 1 inch (25.4 mm) shall not require bonding. [680.26(B)(5)]

6. Electrical equipment. Metal parts of electrical equipment associated with the pool water circulating system, including pump motors and metal parts of equipment associated with pool covers, including electric motors, shall be bonded. [680.26(B)(6)]

Exception: Metal parts of listed equipment incorporating an approved system of double insulation shall not be bonded. [680.26(B)(6) Exception]

6.1. Double-insulated water pump motors. Where a double-insulated water pump motor is installed under the provisions of this item, a solid 8 AWG copper conductor of sufficient length to make a bonding connection to a replacement motor shall be extended from the bonding grid to an accessible point in the vicinity of the pool pump motor. Where there is no connection between the swimming pool bonding grid and the equipment grounding system for the premises, this bonding conductor shall be connected to the equipment grounding conductor of the motor circuit. [680.26(B)(6)(a)]

6.2. Pool water heaters. For pool water heaters rated at more than 50 amperes and having specific instructions regarding bonding and grounding, only those parts designated to be bonded shall be bonded and only those parts designated to be grounded shall be grounded. [680.26(B)(6)(b)]

7. All fixed metal parts including, but not limited to, metal-sheathed cables and raceways, metal piping, metal awnings, metal fences and metal door and window frames. [680.26(B)(7)]

Exceptions:

1. Those separated from the pool by a permanent barrier that prevents contact by a person shall not be required to be bonded. [680.26(B)(7) Exception No. 1]

2. Those greater than 5 feet (1524 mm) horizontally from the inside walls of the pool shall not be required to be bonded. [680.26(B)(7) Exception No. 2]

3. Those greater than 12 feet (3658 mm) measured vertically above the maximum water level of the pool, or as measured vertically above any observation stands, towers, or platforms, or any diving structures, shall not be required to be bonded. [680.26(B)(7) Exception No. 3]

E4204.4 Bonding of outdoor hot tubs and spas.

Outdoor hot tubs and spas shall comply with the bonding requirements of Sections E4204.1 through E4204.3. Bonding by metal-to-metal mounting on a common frame or base shall be permitted. The metal bands or hoops used to secure wooden staves shall not be required to be bonded as required in Section E4204.2. [680.42 and 680.42(B)]

E4204.5 Bonding of indoor hot tubs and spas.

The following parts of indoor hot tubs and spas shall be bonded together:

1. All metal fittings within or attached to the hot tub or spa structure. [680.43(D)(1)]

2. Metal parts of electrical equipment associated with the hot tub or spa water circulating system, including pump motors unless part of a listed self-contained spa or hot tub. [680.43(D)(2)]

3. Metal raceway and metal piping that are within 5 feet (1524 mm) of the inside walls of the hot tub or spa and that are not separated from the spa or hot tub by a permanent barrier. [680.43(D)(3)]

4. All metal surfaces that are within 5 feet (1524 mm) of the inside walls of the hot tub or spa and that are not separated from the hot tub or spa area by a permanent barrier. [680.43(D)(4)]

Exception: Small conductive surfaces not likely to become energized, such as air and water jets and drain fittings, where not connected to metallic piping, towel bars, mirror frames, and similar nonelectrical equipment, shall not be required to be bonded. [680.43(D)(4) Exception]

5. Electrical devices and controls that are not associated with the hot tubs or spas and that are located less than 5 feet (1524 mm) from such units. [680.43(D)(5)]

E4204.5.1 Methods.

All metal parts associated with the hot tub or spa shall be bonded by any of the following methods:

1. The interconnection of threaded metal piping and fittings. [680.43(E)(1)]

2. Metal-to-metal mounting on a common frame or base. [680.43(E)(2)]

3. The provision of an insulated, covered or bare solid copper bonding jumper not smaller than 8 AWG. It shall not be the intent to require that the 8 AWG or larger solid copper bonding conductor be extended or attached to any remote panelboard, service equipment, or any electrode, but only that it shall be employed to eliminate voltage gradients in the hot tub or spa area as prescribed. [680.43(E)(3)]

SECTION E4205

GROUNDING

E4205.1 Equipment to be grounded.

The following equipment shall be grounded:

1. Through-wall lighting assemblies and underwater luminaires other than those low-voltage lighting products listed for the application without a grounding conductor.

2. All electrical equipment located within 5 feet (1524 mm) of the inside wall of the pool, spa or hot tub.

3. All electrical equipment associated with the recirculating system of the pool, spa or hot tub.

4. Junction boxes.

5. Transformer and power supply enclosures.

6. Ground-fault circuit-interrupters.

7. Panelboards that are not part of the service equipment and that supply any electrical equipment associated with the pool, spa or hot tub. (680.7)

E4205.2 Luminaires and related equipment.

Where branch-circuit wiring on the supply side of enclosures and junction boxes connected to conduits run to underwater luminaires are installed in corrosive environments as described in Section E4202.2.1, the wiring method of that portion of the branch circuit shall be as required in Section E4202.2.2 or shall be liquid-tight flexible nonmetallic conduit (LFNMC). Where installed in noncorrosive environments, branch circuits shall comply with Chapter 38. Wiring methods shall contain an insulated copper equipment grounding conductor sized in accordance with Table E3809.12 but not smaller than 12 AWG. The equipment grounding conductor between the wiring chamber of the secondary winding of a transformer and a junction box shall be sized in accordance with the overcurrent device in such circuit.

The insulated copper equipment grounding conductor shall be connected to all through-wall lighting assemblies, wet-niche, dry-niche, or no-niche luminaires other than listed low-voltage luminaires not requiring grounding. The junction box, transformer enclosure, or other enclosure in the supply circuit to a wet-niche or no-niche luminaire and the field-wiring chamber of a dry-niche luminaire shall be grounded to the equipment grounding terminal of the panelboard. The equipment grounding terminal shall be directly connected to the panelboard enclosure. The equipment grounding conductor shall be installed without joint or splice. [680.23(F)(1), (F)(2) and 680.23(F)(2) Exception]

Exceptions:

1. Where more than one underwater luminaire is supplied by the same branch circuit, the equipment grounding conductor, installed between the junction boxes, transformer enclosures, or other enclosures in the supply circuit to wet-niche luminaires, or between the field-wiring compartments of dry-niche luminaires, shall be permitted to be terminated on grounding terminals. [680.23(F)(2)(a)]

2. Where an underwater luminaire is supplied from a transformer, ground-fault circuit-interrupter, clock-operated switch, or a manual snap switch that is located between the panelboard and a junction box connected to the conduit that extends directly to the underwater luminaire, the equipment grounding conductor shall be permitted to terminate on grounding terminals on the transformer, ground-fault circuit-interrupter, clock-operated switch enclosure, or an outlet box used to enclose a snap switch. [680.23(F)(2)(b)]

E4205.3 Nonmetallic conduit.

Where a nonmetallic conduit is installed between a forming shell and a junction box, transformer enclosure, or other enclosure, a 8 AWG insulated copper bonding jumper shall be installed in this conduit except where a listed low-voltage lighting system not requiring grounding is used. The bonding jumper shall be terminated in the forming shell, junction box or transformer enclosure, or ground-fault circuit-interrupter enclosure. The termination of the 8 AWG bonding jumper in the forming shell shall be covered with, or encapsulated in, a listed potting compound to protect such connection from the possible deteriorating effect of pool water. [680.23(B)(2)(b)]

E4205.4 Flexible cords.

Other than listed low-voltage lighting systems not requiring grounding, wet-niche luminaires that are supplied by a flexible cord or cable shall have all exposed noncurrent-carrying metal parts grounded by an insulated copper equipment grounding conductor that is an integral part of the cord or cable. This grounding conductor shall be connected to a grounding terminal in the supply junction box, transformer

enclosure, or other enclosure. The grounding conductor shall not be smaller than the supply conductors and not smaller than 16 AWG. [680.23(B)(3)]

E4205.6 Feeders.

These provisions shall apply to any feeder on the supply side of panelboards supplying branch circuits for pool equipment covered in this chapter and on the load side of the service equipment. Where feeders are installed in corrosive environments as described in Section E4202.2.1, the wiring method of that portion of the feeder shall comply with Section E4202.2.2 or shall be liquid-tight flexible nonmetallic conduit (LFNMC). Wiring methods installed in corrosive environments as described in Section E4202.2.1 shall contain an insulated copper equipment grounding conductor sized in accordance with Table E3908.12, but not smaller than 12 AWG.

Where installed in noncorrosive environments, feeder wiring methods shall comply with Chapter 38. [680.25(A)].

E4205.7 Cord-connected equipment.

Where fixed or stationary equipment is connected with a flexible cord to facilitate removal or disconnection for maintenance, repair, or storage, as provided in Section E4202.2, the equipment grounding conductors shall be connected to a fixed metal part of the assembly. The removable part shall be mounted on or bonded to the fixed metal part. [680.7(C)]

E4205.9 Grounding and bonding terminals.

Grounding and bonding terminals shall be identified for use in wet and corrosive environments. Field-installed grounding and bonding connections in a damp, wet or corrosive environment shall be composed of copper, copper alloy or stainless steel and shall be listed for direct burial use. (680.7)

SECTION E4206

EQUIPMENT INSTALLATION

E4206.1 Transformers and power supplies.

Transformers and power supplies used for the supply of underwater luminaires, together with the transformer or power supply enclosure, shall be listed, labeled and identified for swimming pool and spa use. The transformer or power supply shall incorporate either a transformer of the isolated-winding type with an ungrounded secondary that has a grounded metal barrier between the primary and secondary windings, or a transformer that incorporates an approved system of double insulation between the primary and secondary windings. [680.23(A)(2)]

E4206.2 Ground-fault circuit-interrupters.

Ground-fault circuit-interrupters shall be self-contained units, circuit-breaker types, receptacle types or other approved types. (680.5)

E4206.3 Wiring on load side of ground-fault circuit-interrupters and transformers.

For other than grounding conductors, conductors installed on the load side of a ground-fault circuit-interrupter or transformer used to comply with the provisions of Section E4206.4, shall not occupy raceways, boxes, or enclosures containing other conductors except where the other conductors are

protected by ground-fault circuit-interrupters or are grounding conductors. Supply conductors to a feed-through type ground-fault circuit-interrupter shall be permitted in the same enclosure. Ground-fault circuit-interrupters shall be permitted in a panelboard that contains circuits protected by other than ground-fault circuit-interrupters. [680.23(F)(3)]

SECTION R314

SMOKE ALARMS

R314.1 General.

Smoke alarms shall comply with NFPA 72 and Section R314.

R314.1.1 Listings.

Smoke alarms shall be listed in accordance with UL 217. Combination smoke and carbon monoxide alarms shall be listed in accordance with UL 217 and UL 2034.

R314.2 Where required.

Smoke alarms shall be provided in accordance with this section.

R314.2.1 New construction.

Smoke alarms shall be provided in dwelling units.

R314.3 Location.

Smoke alarms shall be installed in the following locations:

1. In each sleeping room.
2. Outside each separate sleeping area in the immediate vicinity of the bedrooms.
3. On each additional story of the dwelling, including basements and habitable attics and not including crawl spaces and uninhabitable attics. In dwellings or dwelling units with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full story below the upper level.
4. Smoke alarms shall be installed not less than 3 feet (914 mm) horizontally from the door or opening of a bathroom that contains a bathtub or shower unless this would prevent placement of a smoke alarm required by this section.

R314.3.1 Installation near cooking appliances.

Smoke alarms shall not be installed in the following locations unless this would prevent placement of a smoke alarm in a location required by Section R314.3.

1. Ionization smoke alarms shall not be installed less than 20 feet (6096 mm) horizontally from a permanently installed cooking appliance.

2. Ionization smoke alarms with an alarm-silencing switch shall not be installed less than 10 feet (3048 mm) horizontally from a permanently installed cooking appliance.

3. Photoelectric smoke alarms shall not be installed less than 6 feet (1828 mm) horizontally from a permanently installed cooking appliance.

R314.4 Interconnection.

Where more than one smoke alarm is required to be installed within an individual dwelling unit in accordance with Section R314.3, the alarm devices shall be interconnected in such a manner that the actuation of one alarm will activate all of the alarms in the individual dwelling unit. Physical interconnection of smoke alarms shall not be required where listed wireless alarms are installed and all alarms sound upon activation of one alarm.

R314.5 Combination alarms.

Combination smoke and carbon monoxide alarms shall be permitted to be used in lieu of smoke alarms.

R314.6 Power source.

Smoke alarms shall receive their primary power from the building wiring where such wiring is served from a commercial source and, where primary power is interrupted, shall receive power from a battery. Wiring shall be permanent and without a disconnecting switch other than those required for overcurrent protection.

Exceptions:

1. Smoke alarms shall be permitted to be battery operated where installed in buildings without commercial power.

2. Smoke alarms installed in accordance with Section R314.2.2 shall be permitted to be battery powered.

SECTION R315

CARBON MONOXIDE ALARMS

R315.1 General.

Carbon monoxide alarms shall comply with Section R315.

R315.1.1 Listings.

Carbon monoxide alarms shall be listed in accordance with UL 2034. Combination carbon monoxide and smoke alarms shall be listed in accordance with UL 2034 and UL 217.

R315.2 Where required.

Carbon monoxide alarms shall be provided in accordance with Sections R315.2.1 and R315.2.2.

R315.2.1 New construction.

For new construction, carbon monoxide alarms shall be provided in dwelling units where either or both of the following conditions exist.

1.The dwelling unit contains a fuel-fired appliance.

2.The dwelling unit has an attached garage with an opening that communicates with the dwelling unit.

R315.3 Location.

Carbon monoxide alarms in dwelling units shall be installed outside of each separate sleeping area in the immediate vicinity of the bedrooms. Where a fuel-burning appliance is located within a bedroom or its attached bathroom, a carbon monoxide alarm shall be installed within the bedroom.

R315.3 Location.

Carbon monoxide alarms in dwelling units shall be installed outside of each separate sleeping area in the immediate vicinity of the bedrooms. Where a fuel-burning appliance is located within a bedroom or its attached bathroom, a carbon monoxide alarm shall be installed within the bedroom.

R315.4 Combination alarms.

Combination carbon monoxide and smoke alarms shall be permitted to be used in lieu of carbon monoxide alarms.

R315.5 Interconnectivity.

Where more than one carbon monoxide alarm is required to be installed within an individual dwelling unit in accordance with Section R315.3, the alarm devices shall be interconnected in such a manner that the actuation of one alarm will activate all of the alarms in the individual dwelling unit. Physical interconnection of carbon monoxide alarms shall not be required where listed wireless alarms are installed and all alarms sound upon activation of one alarm.

Exception: Interconnection of carbon monoxide alarms in existing areas shall not be required where alterations or repairs do not result in removal of interior wall or ceiling finishes exposing the structure, unless there is an attic, crawl space or basement available that could provide access for interconnection without the removal of interior finishes.

R315.6 Power source.

Carbon monoxide alarms shall receive their primary power from the building wiring where such wiring is served from a commercial source and, where primary power is interrupted, shall receive power from a battery. Wiring shall be permanent and without a disconnecting switch other than those required for overcurrent protection.

Exceptions:

1. Carbon monoxide alarms shall be permitted to be battery operated where installed in buildings without commercial power.

2. Carbon monoxide alarms installed in accordance with Section R315.2.2 shall be permitted to be battery powered.

R315.7 Carbon monoxide detection systems.

Carbon monoxide detection systems shall be permitted to be used in lieu of carbon monoxide alarms and shall comply with Sections R315.7.1 through R315.7.4.

R315.7.1 General.

Household carbon monoxide detection systems shall comply with NFPA 720. Carbon monoxide detectors shall be listed in accordance with UL 2075.

R315.7.2 Location.

Carbon monoxide detectors shall be installed in the locations specified in Section R315.3. These locations supersede the locations specified in NFPA 720.

R315.7.3 Permanent fixture.

Where a household carbon monoxide detection system is installed, it shall become a permanent fixture of the occupancy and owned by the homeowner.

R315.7.4 Combination detectors.

Combination carbon monoxide and smoke detectors installed in carbon monoxide detection systems in lieu of carbon monoxide detectors shall be listed in accordance with UL 2075 and UL 268.

2018 IECC COMPLIANCE NOTES

1. ALL SUPPLY AND RETURN AIR DUCTS AND PLENUMS SHALL BE INSULATED WITH A MINIMUM OF R-6 INSULATION WHEN LOCATED IN UNCONDITIONED SPACES AND A MINIMUM OF R-8 INSULATION WHEN LOCATED OUTSIDE THE BUILDING. WHEN LOCATED WITHIN A BUILDING ENVELOPE ASSEMBLY, THE DUCT OR PLENUM SHALL BE SEPARATED FROM THE BUILDING EXTERIOR OR UNCONDITIONED OR EXEMPT SPACES BY A MINIMUM OF R-8 INSULATION.

EXCEPTIONS:

1. WHEN LOCATED WITHIN EQUIPMENT.
 2. WHEN THE DESIGN TEMPERATURE DIFFERENCE BETWEEN THE INTERIOR AND THE EXTERIOR OF THE DUCT OR PLENUM DOES NOT EXCEED 15 DEG. F.
2. PROVIDE AUTOMATIC CHANGEOVER 7-DAY PROGRAMMABLE THERMOSTATS FOR EACH ZONE WITH A 2-HOUR OCCUPANT OVERRIDE, INTELLIGENT RECOVERY, AND 10-HOUR MINIMUM BATTERY BACKUP. PROGRAM SETBACK TEMPERATURES TO 85°F (COOL) AND 55°F (HEAT). THERMOSTATS USED TO CONTROL BOTH HEATING AND COOLING, SHALL PROVIDE A SETPOINT OVERLAP RESTRICTION SUCH AS A DEADBAND OF AT LEAST 5°F. ALL TEMPERATURE CONTROLS ARE TO BE TESTED, ADJUSTED, AND CALIBRATED FOR PROPER OPERATION. MOUNT ALL THERMOSTATS AND TEMPERATURE SENSORS AS INDICATED ON THE DRAWINGS. COORDINATE EXACT LOCATION WITH THE ARCHITECT. PROVIDE LOCKING COVER AS REQUIRED BY THE ARCHITECT OR THE OWNER. MOUNT BETWEEN 48"-54" AFF.
 3. WHERE MECHANICAL VENTILATION IS PROVIDED, THE SYSTEM SHALL PROVIDE THE CAPABILITY TO REDUCE THE OUTDOOR AIR SUPPLY TO THE MINIMUM REQUIRED BY CHAPTER 4 OF THE INTERNATIONAL ENERGY EFFICIENCY CODE. OUTDOOR AIR SUPPLY AND EXHAUST DUCTS SHALL BE PROVIDED WITH AUTOMATIC MEANS TO REDUCE AND SHUT OFF AIRFLOW.
 4. SEALING DUCTWORK: ALL JOINTS, LONGITUDINAL AND TRANSVERSE SEAMS AND CONNECTIONS IN DUCTWORK MUST BE SECURELY SEALED USING WELDMENTS; MECHANICAL FASTENERS WITH SEALS, GASKETS OR MASTICS; MESH AND MASTIC SEALING SYSTEMS; OR TAPES. TAPES AND MASTICS MUST BE LISTED AND LABELED IN ACCORDANCE WITH UL 181A OR 181B.
 5. OUTDOOR AIR SUPPLY AND EXHAUST DUCTS SHALL BE EQUIPPED WITH MOTORIZED DAMPERS THAT WILL AUTOMATICALLY SHUT WHEN THE SYSTEMS OR SPACES SERVED ARE NOT IN USE. EXCEPTION – GRAVITY DAMPERS SHALL BE PERMITTED IN BUILDING LESS THAN 3 STORIES IN HEIGHT.
 6. PROVIDE OWNER WITH COMPLETE OPERATION AND MAINTENANCE MANUALS FOR ALL EQUIPMENT AND CONTROLS INSTALLED. DOCUMENTATION MUST INCLUDE EQUIPMENT CAPACITY (INPUT & OUTPUT), REQUIRED MAINTENANCE ACTIONS, CONTROLS AND CALIBRATION INFORMATION INCLUDING WIRING DIAGRAMS, CONTROL SEQUENCE DESCRIPTIONS, DESIRED OR FIELD-

DETERMINED SETPOINTS, AND A COMPLETE NARRATIVE OF HOW EACH SYSTEM IS INTENDED TO OPERATE.

MECHANICAL SPECIFICATIONS

NOTE: NOT ALL SPECIFICATIONS MAY APPLY.

NOTICE TO OWNERS, ARCHITECTS AND CONTRACTORS REGARDING PRICING ESTIMATES

1. UNDER NO CIRCUMSTANCES SHALL THESE DRAWINGS BE "FINAL" OR "HARD BID" UNTIL THE PROJECT IS FULLY PERMITTED.
2. ALL PRELIMINARY PRICING EFFORTS SHALL BE CONSIDERED AS ESTIMATES ONLY AND SHALL INCLUDE SUCH CONTINGENCIES, ALLOWANCES, ALTERNATIVES, ETC. TO ACCOUNT FOR MODIFICATIONS AND ADDITIONS THAT WILL OCCUR TO THE DRAWINGS DURING FINALIZATION OF THE DESIGN AND PERMITTING PROCESS.

SCOPE OF WORK

1. THE WORK INCLUDED UNDER THIS SECTION CONSISTS OF FURNISHING ALL MATERIALS, EQUIPMENT AND LABOR, AND THE PERFORMING OF ALL FUNCTIONS, EXCEPT AS OTHERWISE SPECIFIED HEREIN OR SHOWN ON THE DRAWINGS TO BE PERFORMED BY OTHERS, AND FOR THE INSTALLATION OF ALL HEATING AND COOLING EQUIPMENT, PIPING AND ALL DUCTWORK, GRILLES, REGISTERS, ETC. INCLUDING ALL CONNECTIONS OF EACH SYSTEM AS SPECIFIED HEREIN AND SHOWN ON THE DRAWINGS. IT SHALL FURTHER INCLUDE FURNISHING AND INSTALLING ALL MISCELLANEOUS ITEMS REQUIRED FOR THE OPERATION OF THE SYSTEM, WHETHER SPECIFICALLY CALLED OUT OR NOT.
2. SPECIAL INSPECTIONS: WHERE THE PLANS INDICATE SPECIAL INSPECTIONS AND REPORT, OR AS REQUIRED BY THE AUTHORITY HAVING JURISDICTION (AHJ), THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, HIRE AN INDEPENDENT THIRD-PARTY INSPECTOR OR TESTING AGENCY TO PERFORM THE REQUIRED INSPECTIONS FOR THE TYPES OF WORK REQUIRED OR IDENTIFIED ON THE SPECIAL INSPECTION FORM. THE SPECIAL INSPECTOR SHALL SUBMIT A FINAL SIGNED REPORT TO THE REGISTERED DESIGN PROFESSIONAL ENGINEER, PROVIDING TEST RESULTS AND STATING WHETHER THE ITEMS REQUIRING SPECIAL INSPECTION WERE IN COMPLIANCE WITH THE INSPECTION REQUIREMENTS. PROVIDE ADDITIONAL COST FOR ENGINEER'S SEALED LETTER OF APPROVAL.

COORDINATION

1. CONTRACT DRAWINGS ARE DIAGRAMMATIC AND INTENDED TO SHOW APPROXIMATE LOCATIONS. COORDINATE WORK WITH ALL TRADES TO AVOID INTERFERENCE. INSTALLED HVAC WORK WHICH INTERFERES WITH THE WORK OF OTHER TRADES DUE TO LACK OF COORDINATION SHALL BE RE-INSTALLED AT NO ADDITIONAL COST TO THE OWNER.
2. REFER TO THE ARCHITECTURAL DRAWINGS FOR EXACT LOCATION OF EQUIPMENT, PARTITIONS, WALLS, AND GENERAL CONSTRUCTION.

3. ALL CONTRACTORS SHALL BE RESPONSIBLE FOR COORDINATING WORK WITH OTHER TRADES AFFECTED BY EACH OTHERS WORK.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING ALL FIELD CONDITIONS WHICH MAY AFFECT HIS WORK BEFORE SUBMITTING BIDS.
5. PERFORMACE OF ALL WORK SHALL BE SCHEDULED AS APPROVED BY THE OWNER. AVOID INTERFERENCE WITH FUNCTIONS IN OTHER PARTS OF THE FACILITY, AND COORDINATE WITH THE WORK OF OTHER TRADES. SERVICES SHALL NOT BE INTERRUPTED WITHOUT WRITTEN PRIOR APPROVAL OF THE OWNER.
6. NO STRUCTURAL MEMBER SHALL BE CUT WITHOUT PERMISSION FROM THE ARCHITECT AND THE STRUCTURAL ENGINEER.
7. PROTECT EXISTING BUILDING STRUCTURE AND GROUNDS FROM DAMAGE WHICH MAY OCCUR DURING DEMOLITION WORK. ANY DAMAGE TO THE EXISTING FACILITIES SHALL BE REPAIRED, REPLACED, OR RESTORED TO THE ORIGINAL CONDITION AT NO ADDITIONAL COST AND TO THE SATISFACTION OF THE OWNER.
8. SPACE ABOCE CEILINGS IS CRITICAL – THE CONTRACTOR SHALL VERIFY SPACE ABOVE CEILING & COORDINATE WITH PLUMBING, ELECTRICAL, STRUCTURAL, FIRE PROTECTION, ARCHITECTURAL, AND ALL OTHER TRADES INVOLVED BEOFRE COMMENCEMENT OF WORK.

CODES AND PERMITS

1. ALL MATERIALS, EQUIPMENT AND INSTALLATION MUST COMPLY WITH ALL APPLICABLE LAWS, CODES, RULES AND REGULATIONS, REQUIRED BY CITY, COUNTY AND STATE, AS WELL AS FEDERAL REQUIREMENTS.
2. COMBUSTIBLE MATERIALS SHALL NOT BE USED IN A NON-COMBUSTIBLE BUILDING AS DEFINED BY THE BUILDING CODE. COMBUSTIBLE MATERIALS MAY BE PROTECTED AS SPECIFIED BY THE ENGINEER AND ARCHITECT OF RECORD.
3. PERMITS: OBTAIN AND PAY FOR ALL REQUIRED PERMITS, LICENSES AND FEES.
4. INSPECTIONS: FURNISH OWNER WITH CERTIFICATE OF INSPECTION AND APPROVAL BY LOCAL AUTHORITIES PRIOR TO FINAL ACCEPTANCE OF THE PROJECT BY THE OWNER. ALL WORK MUST BE INSPECTED.

PRODUCTS

1. ALL PRODUCTS SHALL BE NEW AND UNUSED OF ESTABLISHED AND REPUTABLE AMERICAN MANUFACTURERS. ITEMS OF EQUIPMENT USED FOR THE SAME PURPOSE SHALL BE OF THE SAME MANUFACTURER.
2. SYSTEMS SHALL BE COMPLETE AND OPERABLE. ANY ACCESSORIES REQUIRED FOR THE OPERATION OF THE SYSTEM SHALL BE INCLUDED AS THOUGH SPECIFICALLY INDICATED TO BE PROVIDED. SUCH ACCESSORIES WOULD INCLUDE FILTERS, CONDENSATE DRAINS, RELIEF VALVES, SERVICE VALVES, THERMOSTATS, VIBRATION ISOLATORS, ETC. MOTOR STARTERS FOR PREWIRED EQUIPMENT (AND OTHER PROTECTION AND CONTROL DEVICES) ARE ALSO INCLUDED IN THIS SPECIFICATION.

3. SPECIFIC REFERENCE TO A MANUFACTURER'S PRODUCT IS ONLY TO ESTABLISH TYPE, QUALITY, AND PERFORMANCE REQUIRED. THESE QUALIFICATIONS ARE IN ADDITION TO THE REQUIREMENTS SHOWN ON THE DRAWINGS AND WITHIN THESE SPECIFICATIONS. LISTING OF ALTERNATE EQUIPMENT MANUFACTURERS SHALL NOT BE CONSTRUED AS AN UNCONDITIONAL APPROVAL OF THE PRODUCTS OF THOSE MANUFACTURERS.
4. ACCEPTABLE HVAC EQUIPMENT MANUFACTURERS: CARRIER, TRANE, YORK, LENNOX, APPROVED EQUAL OR AS SPECIFIED ELSEWHERE IN THESE DOCUMENTS.
5. PROVIDE CLEARANCES AS PER MANUFACTURERS RECOMMENDATIONS.

SUBSTITUTIONS

1. SUBSTITUTIONS OF MATERIALS OR PRODUCTS SHOWN HEREIN SHALL BE BY OWNER'S, ARCHITECTS, OR ENGINEER'S WRITTEN APPROVAL. ANY DEVIATION FROM THESE DRAWINGS WILL NOT BE ALLOWED.
2. MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION OF ANY SUBSTITUTIONS AND COSTS OF CHANGES INCURRED BY OTHER TRADES DUE TO THE SUBSTITUTIONS. OTHER TRADES INCLUDE: ELECTRICAL, PLUMBING, STRUCTURAL, ROOFING, OR ANY TRADE EFFECTED BY THE SUBSTITUTION.

SHOP DRAWING SUBMITTALS

1. PRIOR TO PROCUREMENT, CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR REVIEW FOR ALL EQUIPMENT, INCLUDING THE FOLLOWING:
 - A. DIFFUSERS, REGISTERS, LOUVERS AND FLEXIBLE DUCTWORK.
 - B. PACKAGED ROOFTOP UNITS, SPLIT-SYSTEM AIR HANDLING UNITS, CONDENSING UNITS, EVAPORATIVE COOLING UNITS AND EXHAUST FANS.
 - C. THERMAL INSULATION, ACOUSTIC LINER AND FIRE DAMPERS.
 - D. PIPING, SUPPORTS AND VALVES.
 - E. AUTOMATIC TEMPERATURE CONTROLS.

THERMOSTATS, CONTROLS AND CONTROL WIRING

1. ALL CONTROL EQUIPMENT, INTEGRAL STARTERS, INTERLOCKING STARTERS, SMOKE DETECTORS, RELAYS, TRANSFORMERS, PANELS AND OTHER DEVICES SHOWN, SPECIFIED OR NEEDED FOR A COMPLETE CONTROLS SYSTEM ARE TO BE PROVIDED AND INSTALLED UNDER THIS MECHANICAL DIVISION. COMPONENTS AND WIRING NOT SHOWN, BUT REQUIRED FOR THE PROPER OPERATION OF EQUIPMENT OR CONTROL SYSTEMS, SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE PROJECT.
2. POWER WIRING, LOW VOLTAGE WIRING AND RACEWAYS RELATED TO CONTROLS SYSTEMS ARE TO BE PROVIDED AND INSTALLED UNDER THE MECHANICAL DIVISION.
3. INSTALLATION OF ALL EQUIPMENT, DEVICES AND WIRING SHALL CONFORM TO THE NATIONAL ELECTRIC CODE. ALL CONTROLS SHALL BE FURNISHED AND

PROPERLY IDENTIFIED WITH INSTRUCTIONS FOR PROPER CONNECTIONS. RESPONSIBILITY FOR PROPER CONNECTIONS AND OPERATION IS INCLUDED UNDER THE MECHANICAL CONTRACTOR'S RESPONSIBILITY. VERIFY ALL VOLTAGES, PHASES AND ELECTRICAL CONNECTIONS WITH THE ELECTRICAL CONTRACTOR BEFORE ORDERING ANY EQUIPMENT, AND IF DISCREPANCIES OCCUR, THEY SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT BEFORE PROCEEDING WITH ANY WORK.

4. ALL TEMPERATURE CONTROLS ARE TO BE TESTED, ADJUSTED, AND CALIBRATED FOR PROPER OPERATION.
5. COORDINATE EXACT THERMOSTAT MOUNTING HEIGHT ABOVE FINISHED FLOOR AND FINAL LOCATION WITH THE ARCHITECT.
6. THERMOSTATS LOCATED ON EXTERIOR WALLS SHALL HAVE AN INSULATED SUB-BASE.

DUCTWORK

1. ALL DUCTWORK AND PLENUMS SHALL BE GALVANIZED SHEET METAL. FABRICATE AND INSTALL ALL DUCTWORK IN STRICT CONFORMANCE WITH THE LATEST SMACNA MANUAL, AND APPLICABLE MECHANICAL CODES FOR LOW VELOCITY DUCT CONSTRUCTION STANDARDS.
2. EACH DUCT SYSTEM SHALL BE COMPLETE WITH ALL REQUIRED DUCTWORK FITTINGS, TURNING VANES, SPLITTER DAMPERS AND SUPPORTS, AND EXTRACTORS AT ALL RIGHT-ANGLE TAKEOFFS AND TEES.
3. DUCTWORK SHALL BE GALVANIZED, PRIME-GRADE, LOCK-FORMING QUALITY STEEL (LFQ) HAVING A GALVANIZED COATING OF 1-3/4 OUNCES TOTAL FOR BOTH SIDES OF ONE SQUARE FOOT OF A SHEET.
4. CROSSBREAK ALL SIDES OF ALL DUCTS IN ACCORDANCE WITH SMACNA GUIDELINES. DUCTWORK INSTALLATIONS SHALL MAKE NO OBJECTIONABLE NOISE, AND CONTRACTOR SHALL PROVIDE ANY ADDITIONAL STIFFENERS REQUIRED.
5. ALL LONGITUDINAL SEAMS SHALL BE PITTSBURGH LOCK SEAM, HAMMERED FLAT, WITH ALL TRANSVERSE JOINTS TAPED WITH 8 OZ. CANVAS AND SEALED WITH ARABOL, AIRTIGHT. DUCT TAPE IS NOT ALLOWED.
6. PROVIDE DOUBLE THICKNESS, FACTORY FABRICATED GALVANIZED SHEET STEEL TURNING VANES WITH AIRFOIL CONTOUR IN ALL RIGHT-ANGLE ELBOWS, TEES, AND ELBOWS WITH RADIUS LESS THAN 1-1/2 TIMES THE WIDTH OF THE DUCT.
7. ALL ROUND DUCT BRANCH TAKEOFFS SHALL BE PROVIDED WITH SPIN-IN COLLAR AND BALANCING DAMPER.
8. DUCT SIZES SHOWN ON THE DRAWINGS ARE TO THE INSIDE OF ACOUSTICAL LININGS. INCREASE SIZES OF DUCTS AS REQUIRED TO ACCOMMODATE ACOUSTICAL INSULATION.
9. DUCTWORK SHALL CONFORM TO DIMENSIONS ON THE DRAWINGS, UNLESS LOCATION OF STRUCTURAL MEMBERS IS PROHIBITIVE. IN CASE OF CHANGE IN DIMENSIONS, CROSS SECTIONAL AREAS SHALL BE MAINTAINED.

10. ALL DUCTS SHALL BE SUBSTANTIALLY SUPPORTED WITH HANGARS TO THE STRUCTURE OR OTHERWISE DEPENDING ON LOCATION CONDITIONS, PLACING SUPPORTS NOT OVER 8 FEET APART ALONG THE LENGTH OF THE DUCT. HANGARS SHALL CONFORM TO ALL APPLICABLE MECHANICAL CODES AND SMACNA REQUIREMENTS.
11. FLEXIBLE ROUND DUCTS TO OUTLETS SHALL BE THERMALFLEX TYPE MKE, A MAXIMUM LENGTH OF 8'-0" LONG (AND ALLOWED ONLY WHERE INDICATED ON THE DRAWINGS).
12. ALL FACTORY-MADE DUCTS MUST BE CLASS 0 OR 1 AS APPROVED BY THE LOCAL APPLICABLE MECHANICAL CODE.
13. ALL MATERIALS EXPOSED WITHIN THE DUCTS OR PLENUMS SHALL HAVE A FLAME SPREAD INDEX OF NOT MORE THAN 25, AND A SMOKE-DEVELOPED RATING OF NOT MORE THAN 50 WHEN TESTED IN ACCORDANCE WITH THE TEST FOR SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS.

ACOUSTICAL LINER

1. SUPPLY, RETURN AND PLENUM DUCTS SHALL BE ACOUSTICALLY LINED FOR THE FIRST 15'-0" MINIMUM FROM UNIT CONNECTION POINTS.
2. ALL SHEET METAL SUPPLY, RETURN AND PLENUM DUCTWORK REQUIRING ACOUSTICAL LINER SHALL BE LINED WITH 1" THICK LINER.

THERMAL DUCT AND PLENUM INSULATION

1. ALL SUPPLY AND RETURN DUCTS SHALL BE INSULATED IN ACCORDANCE WITH THE PREVAILING ENERGY CODE (IECC OR TITLE 24). PROVIDE WATERPROOF ALUMINUM JACKETING FOR OUTDOOR INSULATED DUCTS. EXPOSED UN-INSULATED SUPPLY AIR DUCTS IN CONDITIONED SPACES WILL NOT BE ALLOWED WITHOUT PRIOR WRITTEN REQUEST AND APPROVAL BY THE OWNER AND MECHANICAL ENGINEER.
2. ALL RESIDENTIAL SUPPLY AND RETURN DUCTS SHALL BE INSULATED WITH R-8 INSULATION.
3. EXHAUST DUCTS SHALL NOT BE INSULATED.
4. ALL INSULATION AND LINERS, MATERIAL, COVERINGS, ADHESIVE, VAPOR-BARRIERS AND TAPES SHALL CONFORM TO NFPA 90A, FLAME SPREAD CLASSIFICATION NOT TO EXCEED 25 AND SMOKE DEVELOPMENT, NOT TO EXCEED 50.
5. EXTERNALLY INSULATED DUCTS
 - A. ALL EXTERNALLY INSULATED DUCTS SHALL BE INSULATED WITH MINIMUM 2" THICK .75 LB. DENSITY FIBERGLASS BLANKET WITH FRK (FOIL REINFORCED KRAFT) VAPOR BARRIER FACING. INSULATION SHALL HAVE A CONDUCTIVITY NOT TO EXCEED 0.27 BTU PER INCH PER SQUARE FOOT PER DEGREE FAHRENHEIT PER HOUR AT 75 DEGREE FAHRENHEIT MEAN TEMPERATURE.

- B. INSULATION SHALL BE WRAPPED TIGHTLY ON THE DUCTWORK WITH ALL CIRCUMFERENTIAL JOINTS BUTTED AND LONGITUDINAL JOINTS OVERLAPPED A MINIMUM OF 2". ADHERE INSULATION TO METAL ON THE BOTTOM OR RECTANGULAR DUCTWORK OVER 24" WIDE WITH 4" STRIP OF INSULATION BONDING ADHESIVE, BENJAMIN FOSTER 85-15, OR EQUAL, AND ADDITIONALLY SECURE INSULATION WITH MECHANICAL FASTENERS AT NOT MORE THAN 18" O.C. ON ALL JOINTS, THE 2" FLANGE OF THE FACING OR THE 2" OVERLAP SHALL BE SECURED USING 9/16" FLARE-DOOR STAPLES APPLIED 6" O/C AND TAPED WITH MINIMUM 3" WIDE FOIL REINFORCED KRAFT TAPE. ALL PIN PENETRATIONS OR PUNCTURES IN FACING SHALL ALSO BE TAPED. VERTICAL DUCTS SHALL HAVE INSULATION ADEQUATELY SECURED TO PREVENT SLIPPING.

6. INTERNALLY INSULATED DUCTS

- A. MATERIAL: MINIMUM 1-1/2 LB. NEOPRENE OR HEAVY DENSITY COATED FIBERGLASS DUCT LINER SUITABLE FOR VELOCITIES UP TO 4,000 FPM COMPLYING WITH NFPA 90A.
- B. APPLICATION: COATED DUCT LINER SHALL BE CUT TO ASSURE OVERLAPPED AND COMPRESSED LONGITUDINAL CORNER JOINTS. APPLY LINER WITH COATED SURFACE FACING THE AIR STREAM AND ADHERED WITH 100% COVERAGE FIRE RETARDANT ADHESIVE. COAT ALL EXPOSED LEADING EDGES AND ALL TRANSVERSE JOINTS WITH MECHANICAL FASTENERS WHICH SHALL COMPRESS THE DUCT LINER SUFFICIENTLY TO HOLD IT FIRMLY IN PLACE AS FOLLOWS:
- C. INSTALLATION FOR VELOCITIES TO 2,000 FPM: FASTENERS SHALL START WITHIN 3" OF JOINTS AND SHALL BE SPACED AT A MAXIMUM OF 12" O.C. AROUND THE PERIMETER OF THE DUCT, EXCEPT THAT THEY MAY BE A MAXIMUM OF 12" FROM A CORNER BREAK. ELSEWHERE, THEY SHALL BE A MAXIMUM OF 18" O.C. EXCEPT THAT THEY SHALL BE PLACED NOT MORE THAN 6" FROM A LONGITUDINAL JOINT OF THE LINER NOR 12" FROM A CORNER BREAK. COAT ALL EXPOSED JOINTS AND EDGES OF TRANSVERSE JOINTS WITH A FIRE RETARDANT ADHESIVE.
- D. OUTDOOR DUCTWORK SHALL BE INSULATED INTERNALLY WITH 2" DUCT LINER. INSTALL PER MANUFACTURERS INSTRUCTIONS. ALL OUTDOOR DUCTWORK JOINTS SHALL BE SEALED WITH SILICONE SEALANT AND MADE COMPLETELY WATERTIGHT AND LEAK PROOF.

GRILLES, REGISTERS, AND DIFFUSERS

- 1. FURNISH AND INSTALL ALL GRILLES, REGISTERS, CEILING DIFFUSERS AND DOOR GRILLES WHERE INDICATED. THEY SHALL BE OF SIZE AND MODEL CALLED FOR ON THE DRAWINGS.
- 2. ALL GRILLES, REGISTERS, AND CEILING DIFFUSERS MUST BE SET FLUSH AND TRUE TO WALL OR CEILING TO PREVENT AIR LEAKAGE AROUND EDGES. ALL UNITS SHALL BE PROVIDED WITH NEOPRENE GASKETING AROUND THE INSIDE OF THE FRAME.

3. ALL UNITS SHALL BE FACTORY FINISHED, OF COLOR SELECTED BY THE ARCHITECT, OR AS OTHERWISE INDICATED.
4. PAINT ALL DUCTWORK, TURNING VANES, INSULATION, ETC. THAT IS VISIBLE THROUGH GRILLES, REGISTERS, OR CEILING DIFFUSERS FLAT BLACK.

RELIEF VENTS

1. ALL RELIEF VENT EXTERIOR PENETRATIONS SHALL BE PROVIDED WITH COUNTERBALANCED BAROMETRIC BACKDRAFT DAMPERS.

EQUIPMENT

1. ALL MECHANICAL EQUIPMENT SHALL BE PROPERLY LISTED AND LABELED BY AN APPROVED AGENCY.
2. ALL EQUIPMENT SHALL BE LABELED WITH STEEL TAGS EMBOSSED WITH ¼" HIGH LETTERS, PERMANENTLY ATTACHED. TAG SHALL CLEARLY INDICATE THE AREA SERVED BY THE EQUIPMENT.
3. MAINTAIN MANUFACTURER'S RECOMMENDATIONS FOR ALL REQUIRED SERVICE CLEARANCES AND INSTALLATION OF EQUIPMENT.
4. REFER TO ARCHITECTURAL DRAWINGS FOR ACCESS TO ROOF INSTALLED MECHANICAL EQUIPMENT. ROOF ACCESS TO COMPLY WITH THE MECHANICAL CODE ADOPTED BY THE LOCAL JURISDICTION.

AIR CONDITIONING AND REFRIGERATION PIPING

1. COPPER TUBE WITH BRAZE JOINTS.
2. TYPE ACR HARD OR ANNEALED TEMPER SEAMLESS COPPER TUBING ASTM B280
3. BRAZED JOINT PRESSURE FITTINGS ASME B16.50 WROUGHT COPPER ALLOY
4. JOINTS: FLARED OR BRAZED: ASTM A5.8 BCUP-SERIES COPPER-PHOSPHORUS ALLOYS

CONDENSATE DRAIN

1. FOR EACH HVAC UNIT, PROVIDE FULL SIZED 4" DEEP (MINIMUM) TRAPPED CONDENSATE DRAIN OF COPPER TYPE "M" HARD DRAWN. SCHEDULE 40 PVC ALLOWED FOR INDOOR PORTION OF DRAIN WITH DUCTED RETURN AIR HVAC SYSTEMS.
2. PVC DRAIN PIPING NOT ALLOWED IN PLENUM RETURNS. PROVIDE NON-TRAPPED DRAIN FOR EVAPORATIVE COOLING UNITS. FIELD VERIFY ROUTING IS NOT OVER CRITICAL SPACES CONTAINING WATER SENSITIVE EQUIPMENT.
3. ROUTE PIPING TO 6" ABOVE NEAREST FLOOR SINK, MOP SINK OR DRAIN OR AS INDICATED ON THE DRAWINGS. (LAVATORY TAILPIECE IS AN ACCEPTABLE RECEPTACLE IF ALLOWED BY OWNER AND AUTHORITY HAVING JURISDICTION.)
4. SLOPE ALL CONDENSATE PIPING AT A MINIMUM OF 1/8" PER FOOT.
5. INSTALL CLEAN OUTS AT EVERY 90 DEGREE TURN ON ALL CONDENSATE DRAIN LINES.

6. PROVIDE AN APPROVED SECONDARY DRAIN SYSTEM OR APPROVED WATER LEVEL DETECTION DEVICE CONFORMING TO UL508 WHERE DAMAGE TO ANY BUILDING COMPONENTS WILL OCCUR AS A RESULT OF OVERFLOW OR STOPPAGE OF THE PRIMARY CONDENSATE DRAIN SYSTEM.
7. INSULATE THE FIRST 8 FEET OF CONDENSATE DRAIN PIPING AND ANY ADDITIONAL CONDENSATE DRAIN PIPING WHERE ENVIRONMENTAL CONDITIONS MAY CAUSE CONDENSATION TO DRIP FROM PIPING.
8. PROVIDE MEANS OF PREVENTING DISSIMILAR METAL CONTACT BETWEEN ALL PIPING MATERIALS FROM ANY OTHER METAL OR STRUCTURAL MEMBER TO PREVENT GALVANIC ACTION BETWEEN THE TWO METALS.

PIPE INSULATION

1. INSULATE THE FIRST 8 FEET OF CONDENSATE DRAIN PIPING AND ANY ADDITIONAL CONDENSATE DRAIN PIPING WHERE ENVIRONMENTAL CONDITIONS MAY CAUSE CONDENSATION TO DRIP FROM PIPING.
2. EXTERIOR INSULATION SHALL BE RATED FOR EXTERIOR USE OR PROVIDED WITH UV RATED PROTECTIVE COATING.
3. ALL HEATING WATER AND CHILLED WATER PIPING SHALL HAVE FIBERGLASS INSULATION WITH ASJ JACKET, ACHIEVING A THERMAL CONDUCTIVITY (K-FACTOR) OF 0.24 AT 75 DEGREES MEAN TEMPERATURE. INSULATION THICKNESS SHALL MEET THE REQUIREMENTS OF THE CURRENT IECC CODE.
4. THE MAXIMUM FIRE HAZARD CLASSIFICATION OF THE INSULATION SYSTEM SHALL NOT HAVE MORE THAN A FLAME SPREAD OF 25, A FUEL CONTRIBUTED RATING OF 50, AND A SMOKE DEVELOPED RATING OF 50 WHEN TESTED IN ACCORDANCE WITH U.L. REQUIREMENTS. PIPE COVERING SHALL BEAR THE U.L. LABEL.
5. INSULATE ALL FITTINGS, VALVE BODIES ETC. WITH SINGLE OR MULTIPLE LAYERS OF INSULATION WITH PREFABRICATED FITTINGS WITH P.V.C. JACKETS.
6. PROVIDE MANUFACTURER SUBMITTAL FOR ALL INSULATION MATERIALS.

FINAL TESTS

1. AN INDEPENDENT AABC OR NEBB CERTIFIED CONTRACTOR SHALL BALANCE AIR DISTRIBUTION TO VALUES LISTED ON DRAWINGS. A FINAL COPY OF THE TEST AND BALANCE REPORT SHALL BE PROVIDED TO THE ENGINEER UPON COMPLETION OF THE REPORT. A PROJECT SHALL NOT BE CONSIDERED IN COMPLIANCE WITH THE PLANS AND SPECIFICATIONS UNTIL SUCH A REPORT HAS BEEN PROVIDED TO THE ENGINEER.
2. BEFORE ACCEPTANCE AND FINAL PAYMENT, IT SHALL BE DEMONSTRATED THAT ALL APPARATUS IS FUNCTIONING PROPERLY AND EFFICIENTLY. THE CONTRACTOR SHALL MAKE A THOROUGH TEST OF EACH SUPPLY, RETURN, AND EXHAUST SYSTEMS TO ASSURE THAT EACH DIFFUSER AND REGISTER HAS THE PROPER QUANTITY OF AIR IN ACCORDANCE WITH AABC OR NEBB. PROVIDE ADDITIONAL COMFORT BALANCE ADJUSTMENTS PER OWNER/TENANT REQUIREMENTS TO ADDRESS ANY NEEDED VARIATIONS IN DESIGN AIR FLOWS.

3. THE TEST AND BALANCE CONTRACTOR HAS THE RIGHT TO COMMUNICATE ANY INFORMATION TO THE MECHANICAL ENGINEER.

GUARANTEE

1. THE CONTRACTOR SHALL GUARANTEE ALL MATERIALS, EQUIPMENT AND WORKMANSHIP FROM DEFECT OF WORKMANSHIP, AND SHALL REPLACE OR REPAIR WITHOUT ADDITIONAL COST TO THE OWNER ALL DEFECTIVE MATERIAL AND WORKMANSHIP, FOR A PERIOD OF (1) YEAR AFTER COMPLETION AND ACCEPTANCE.

CLOSEOUT

1. PROVIDE OWNER WITH COMPLETE OPERATION AND MAINTENANCE MANUALS FOR ALL EQUIPMENT AND CONTROLS INSTALLED. DOCUMENTATION MUST INCLUDE EQUIPMENT CAPACITY (INPUT & OUTPUT), REQUIRED MAINTENANCE ACTIONS, CONTROLS AND CALIBRATION INFORMATION INCLUDING WIRING DIAGRAMS, CONTROL SEQUENCE DESCRIPTIONS, DESIRED OR FIELD-DETERMINED SETPOINTS, AND A COMPLETE NARRATIVE OF HOW EACH SYSTEM IS INTENDED TO OPERATE.
2. PROVIDE A COMPLETE SET OF FULL SIZE AS-BUILT DRAWINGS OF THE COMPLETE INSTALLATION INCLUDING ALL CHANGES MADE DURING CONSTRUCTION.

ORDER OF PRECEDENCE OF DOCUMENTS

1. SHOULD A CONFLICT ARISE BETWEEN CONSTRUCTION DOCUMENTS, THE ORDER OF PRECEDENCE SHALL BE:
 - A. SPECIAL PROVISIONS
 - B. GENERAL PROVISIONS
 - C. SPECIFICATIONS
 - D. DETAILS ON DRAWINGS
 - E. PLAN DRAWINGS
2. THE ENGINEER OF RECORD SHALL BE NOTIFIED BEFORE A DECISION IS MADE.

PLUMBING SPECIFICATIONS

NOTE: ALL SPECIFICATIONS MAY NOT APPLY

NOTICE TO OWNERS, ARCHITECTS AND CONTRACTORS REGARDING PRICING ESTIMATES

1. UNDER NO CIRCUMSTANCES SHALL THESE DRAWINGS BE "FINAL" OR "HARD BID" UNTIL THE PROJECT IS FULLY PERMITTED.
2. ALL PRELIMINARY PRICING EFFORTS SHALL BE CONSIDERED AS ESTIMATES ONLY AND SHALL INCLUDE SUCH CONTINGENCIES, ALLOWANCES, ALTERNATIVES, ETC. TO ACCOUNT FOR MODIFICATIONS AND ADDITIONS THAT WILL OCCUR TO THE DRAWINGS DURING FINALIZATION OF THE DESIGN AND PERMITTING PROCESS.

SCOPE OF WORK

1. ALL WORK REQUIRED CONSISTS OF PERFORMING ALL LABOR AND FURNISHING ALL MATERIALS, FIXTURES, AND EQUIPMENT REQUIRED TO PROVIDE COMPLETE PLUMBING INSTALLATION AS INDICATED ON THE DRAWINGS. IT SHALL FURTHER INCLUDE FURNISHING AND INSTALLING ALL MISCELLANEOUS ITEMS REQUIRED FOR THE OPERATION OF THE SYSTEMS, WHETHER SPECIFICALLY CALLED FOR OR NOT. CONNECT ALL EQUIPMENT FURNISHED UNDER OTHER TRADES AS REQUIRED. DETERMINE IN ADVANCE THE SHUT-DOWN OF EXISTING UTILITIES.
2. EXACT LOCATION OF PLUMBING FIXTURES SHALL BE DETERMINED FROM ARCHITECTURAL DRAWINGS.
3. SPECIAL INSPECTIONS: WHERE THE PLANS INDICATE SPECIAL INSPECTIONS AND REPORT, OR AS REQUIRED BY THE AUTHORITY HAVING JURISDICTION (AHJ), THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, HIRE AN INDEPENDENT THIRD-

PARTY INSPECTOR OR TESTING AGENCY TO PERFORM THE REQUIRED INSPECTIONS FOR THE TYPES OF WORK REQUIRED OR IDENTIFIED ON THE SPECIAL INSPECTION FORM. THE SPECIAL INSPECTOR SHALL SUBMIT A FINAL SIGNED REPORT TO THE REGISTERED DESIGN PROFESSIONAL ENGINEER, PROVIDING TEST RESULTS AND STATING WHETHER THE ITEMS REQUIRING SPECIAL INSPECTION WERE IN COMPLIANCE WITH THE INSPECTION REQUIREMENTS. PROVIDE ADDITIONAL COST FOR ENGINEER'S SEALED LETTER OF APPROVAL.

CODES

1. ALL MATERIALS, EQUIPMENT AND INSTALLATION MUST COMPLY WITH ALL APPLICABLE LAWS, CODES, RULES, AND REGULATIONS, REQUIRED BY CITY, COUNTY, STATE, AND FEDERAL AGENCIES.

PERMITS

1. THIS CONTRACTOR SHALL PAY FOR ALL PERMITS, LICENSES AND FEES REQUIRED BY STATE AND LOCAL AUTHORITIES.
2. COMBUSTIBLE MATERIALS SHALL NOT BE USED IN A NON-COMBUSTIBLE CONSTRUCTION TYPE BUILDING AS DEFINED BY THE BUILDING CODE. COMBUSTIBLE MATERIALS SHALL BE PROTECTED AS SPECIFIED BY THE ENGINEER AND ARCHITECT OF RECORD.

INSPECTION

1. FURNISH OWNER WITH CERTIFICATE OF INSPECTION AND APPROVAL BY LOCAL AUTHORITIES PRIOR TO FINAL ACCEPTANCE OF THE PROJECT BY THE OWNER. ALL WORK MUST BE INSPECTED.

EXISTING CONDITIONS

1. THE CONTRACTOR SHALL VERIFY EXACT LOCATIONS OF ALL UTILITIES PRIOR TO COMMENCING WORK. THE CONTRACTOR SHALL VISIT THE SITE AND INSPECT THE WORK TO BE PERFORMED, IN ADDITION TO WHAT IS SHOWN HEREIN, AND INCLUDE IN BID AS AMOUNT TO DO SUCH WORK.
2. CONTRACTOR SHALL VERIFY INVERT ELEVATIONS OF SEWERS TO WHICH NEW WASTE LINES ARE TO BE CONNECTED BEFORE MAKING UP OR INSTALLATION OF NEW SYSTEM.
3. PRIOR TO COMMENCING WORK, PLUMBING CONTRACTOR SHALL CLEAN, TEST, AND INSPECT ALL EXISTING SEWER PIPING IS IN SATISFACTORY WORKING CONDITION. CONTRACTOR SHALL REPORT ANY DEFECTS/DEFICIENCIES TO OWNER/ARCHITECT IMMEDIATELY. SUBMIT ADDENDUM BID TO ACCOMMODATE ANY REPAIR/REPLACEMENTS AS REQUIRED.
4. CONTRACTOR SHALL NOT CUT HOLES IN STRUCTURAL MEMBERS WITHOUT FIRST SECURING WRITTEN APPROVAL FROM THE ARCHITECT.

SHOP DRAWING SUBMITTALS

1. PRIOR TO PROCUREMENT, CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR REVIEW FOR ALL EQUIPMENT, INCLUDING THE FOLLOWING:

- A. DOMESTIC WATER, GAS, SANITARY AND STORM PIPING AND FITTINGS.
- B. BALL, BUTTERFLY VALVES, PRESSURE REDUCING VALVES AND SOLENOID VALVES.
- C. THERMAL INSULATION.
- D. WATER HEATERS AND PUMPS.
- E. OIL AND GREASE INTERCEPTORS.

MATERIALS

WATER PIPING:

1. ALL PIPING SHALL CONFORM TO THE REQUIREMENTS OF THE ANSI SAFETY CODE AND BE FREE FROM ALL DEFECTS AND BE PROPERLY IDENTIFIED.
2. ABOVE GROUND SHALL BE:
 - 2.1. TYPE "L" OR TYPE "M" HARD DRAWN COPPER TUBING CONFORMING TO ASTM B 88.
 - 2.2. CPVC PLASTIC PIPE CONFORMING TO ASTM D 2846; ASTM F 441-442; CSA B137.6.
 - 2.3. CROSS-LINKED POLYETHYLENE (PEX) PLASTIC TUBING, IF ALLOWED BY THE AUTHORITY HAVING JURISDICTION, CONFORMING TO ASTM F 876; ASTM F 877; CSA B137.5.
3. BELOW GROUND: (INSTALLED IN CONCRETE OR UNDER CONCRETE) TYPE "K" SOFT DRAWN COPPER TUBING, CONFORMING TO ASTM B 88-72, SPIRALLY WRAP PIPING BELOW GRADE OR FLOORS WITH 3 LAYERS OF 20 MIL POLYETHYLENE TAPE WITH ½ OVERLAP. INSTALL NO PIPING JOINTS BELOW FLOOR.
4. ALL COPPER TUBING SHALL UTILIZE SWEAT FITTINGS SOLDERED WITH ASTM B 32, ALLOY SN95, SN94, OR E, LEAD FREE SOLDER.

SOIL, WASTE AND VENT PIPING:

1. ALL SOIL AND WASTE PIPING SHALL SLOPE MINIMUM OF ¼" PER FOOT. PIPING 4" AND LARGER MAY SLOPE 1/8" PER FOOT IF SITE CONDITIONS WON'T ALLOW ¼" PER FOOT SLOPE.
2. CHANGES IN DIRECTION, WHERE SPACE PERMITS, SHALL BE MADE WITH LONG SWEEP BENDS, Y-FITTINGS AND 1/8 BENDS.
3. SANITARY TEE BRANCHES AND ¼ BENDS MAY BE USED FOR CONNECTION OF BRANCH LINES TO FIXTURES AND FROM STACKS TO HORIZONTAL DRAINAGE.
4. MATERIALS:
 - 4.1. CAST IRON: NO-HUB CAST IRON, CISPI DESIGNATION 301-12 FOR ALL SOIL, WASTE AND VENT PIPING WITH STANDARD WEIGHT FITTINGS. USE STAINLESS STEEL NO-HUB CAST IRON COUPLINGS THROUGHOUT THE PROJECT. INSTALL PIPE AND FITTINGS PER CISPI DESIGNATION 301-12. RESTRAIN PIPE AND FITTINGS USING ENGINEERED (HOLDRITE OR EQUAL) ASSEMBLIES INSTALLED PER MANUFACTURERS INSTRUCTIONS.

- 4.2. GALVANIZED IRON: SCHEDULE 40 STANDARD WEIGHT CONFORMING TO ASTM A72-68. USE WROUGHT IRON SCREWED FITTINGS TO MATCH PIPE. MAKE ALL SCREWED JOINTS WITH TEFLON TAPE. (NO GALVANIZED IRON OR STEEL PIPE SHALL BE USED UNDERGROUND.)
- 4.3. ABS: ABS PIPING CONFORMING TO ASTM D2661-78 FOR ALL SOIL, WASTE AND VENT PIPING WITH MATCHING FITTINGS. ABS ABOVE AND BELOW GRADE FOR COMBUSTIBLE CONSTRUCTION OR ALLOWED BY LOCAL JURISDICTION. ABS FOR NON-COMBUSTIBLE CONSTRUCTION BELOW GRADE ONLY.
- 4.4. PVC: SCHEDULE 40 SOLID WALL PIPE DWV FITTING SYSTEM: PIPE AND FITTINGS SHALL BE MANUFACTURED FROM PVC COMPOUND WITH A CELL CLASS OF 12454 PER ASTM D 1784 AND CONFORM WITH NATIONAL SANITATION FOUNDATION (NSF) STANDARD 14. PIPE AND FITTINGS SHALL BE IRON PIPE SIZE (IPS) CONFORMING TO ASTM D 1785 AND ASTM D 2665. ALL PIPE AND FITTINGS TO BE PRODUCED AND INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND LOCAL CODE REQUIREMENTS. SOLVENT CEMENTS SHALL CONFORM TO ASTM D 2564. PRIMER SHALL CONFORM TO ASTM F 656. THE SYSTEM IS INTENDED FOR NON-PRESSURE DRAINAGE APPLICATIONS WHERE THE TEMPERATURE WILL NOT EXCEED 140°F.

VALVES:

1. SIZE OF SHUT-OFF VALVES, CONTROL VALVES, BALANCING COCKS, UNIONS, ETC., SHALL BE FULL LINE SIZE.
2. PROVIDE SHUT-OFF VALVES IN CEILING SPACE FOR COLD AND HOT WATER PIPING CONNECTIONS TO ALL PLUMBING FIXTURES, HOSE BIBBS AND TRAP PRIMERS. PROVIDE STAINLESS STEEL CEILING/WALL ACCESS PANELS AS NECESSARY, IN ACCORDANCE WITH ARCHITECT'S REQUIREMENTS.

GAS PIPING:

1. THE PLUMBING CONTRACTOR SHALL SEE THAT THE PROPER GAS METER AND REGULATOR ARE INSTALLED BY THE UTILITY CO., AND PAY FOR ANY FEES CHARGED FOR THE INSTALLATION OF THE METER AND SERVICE LINES. GAS LINES SHALL EXTEND FROM THE METER TO ALL EQUIPMENT REQUIRING GAS.
2. MATERIALS:
 - 2.1. GAS PIPING ABOVE GROUND:
 - A. SCREWED STANDARD WEIGHT SCHEDULE 40 BLACK STEEL CONFORMING TO ASTM A53 SPECIFICATIONS FOR GAS PIPING.
 - B. 4" DIAMETER AND LARGER INTERIOR GAS PIPING SHALL BE WELDED.
 - 2.2. GAS PIPING INSTALLED BELOW GROUND:
 - A. SCHEDULE 40 BLACK STEEL SHALL BE PROVIDED WITH FACTORY WRAPPED PROTECTIVE COATING WITH FITTINGS TRIPLE SPIRALLY WRAPPED WITH 20 MIL POLYETHYLENE TAPE WITH ½ OVERLAP. PROVIDE CATHODIC PROTECTION CONSISTING OF ONE 17 POUND MAGNESIUM ANODE PER 100 SQUARE FEET OF GROUND EXPOSED PIPE SURFACE.

- B. POLYETHYLENE PLASTIC PIPE, TUBING AND FITTINGS USED TO SUPPLY FUEL GAS SHALL CONFORM TO ASTM D 2513. SUCH PIPE SHALL BE MARKED "GAS" AND "ASTM D 2513"
3. GAS PIPE SHALL BE PROVIDED WITH SUITABLE DRIP LEGS ON ALL MAINS AND RISERS AT EQUIPMENT CONNECTIONS. ALL EQUIPMENT CONNECTIONS SHALL BE PROVIDED WITH AN AGA APPROVED SHUTOFF VALVE.
 4. PROVIDE SLEEVES AT ALL PIPING PENETRATING MASONARY WALLS AND PACKED WATERTIGHT WITH APPROVED PACKING.
 5. GAS PRESSURE REGULATORS. A LINE PRESSURE REGULATOR SHALL BE INSTALLED WHERE THE APPLIANCE IS DESIGNED TO OPERATE AT A LOWER PRESSURE THAN THE SUPPLY PRESSURE. LINE GAS PRESSURE REGULATORS SHALL BE LISTED AS COMPLYING WITH ANSI Z21.80. ACCESS SHALL BE PROVIDED TO PRESSURE REGULATORS. PRESSURE REGULATORS SHALL BE PROTECTED FROM PHYSICAL DAMAGE. REGULATORS INSTALLED ON THE EXTERIOIR OF THE BUILDING SHALL BE APPROVED FOR OUTDOOR INSTALLATION.
 6. MEDIUM PRESSURE (MP) REGULATORS SHALL COMPLY WITH ALL OF THE REQUIRMENTS OF THE LOCAL ADOPTED CODES.
 7. VENTING OF REGULATORS. PRESSURE REGULATORS THAT REQUIRE A VENT SHALL BE VENTED DIRECTLY TO THE OUTDOORS. THE VENT SHALL BE DESIGNED TO PREVENT THE ENTRY OF INSECTS, WATER AND FOREIGN OBJECTS,
 8. VENT PIPING. VENT PIPING FOR RELIEF VENTS AND BREATHER VENTS SHALL BE CONSTRUCTED OF MATERIALS ALLOWED FOR GAS PIPING AND INSTALLED IN ACCORDANCE WITH ALL LOCAL ADOPTED CODES. VENT PIPING SHALL BE NOT SMALLER THAN THE VENT CONNECTION ON THE PRESSURE REGULATING DEVICE.

PIPE HANGERS:

1. PIPE HANGERS SHALL BE MICHIGAN #400 FOR STEEL PIPING, #402 FOR GAS AND COPPER PIPING. SUPPORT PIPING 1-1/4" AND SMALLER 6'-0" O/C, AND PIPING 1-1/2" AND LARGER 10'-0" O/C. WASTE PIPING SHALL BE SUPPORTED AT 4'-0" O/C. PROVIDE 3/8" DIA. THREADED ROD PROPERLY BRACED FOR SEISMIC RESTRAINT ZONE 2.

PIPE INSULATION:

1. ALL DOMESTIC COLD-WATER PIPING SHALL HAVE 1/2 INCH THICK FIBERGLASS INSULATION WHERE DAMAGE TO ANY BUILDING COMPONENTS WILL OCCUR AS A RESULT OF CONDENSATION FORMING ON COLD WATER PIPING.
2. ALL DOMESTIC HOT WATER AND HOT WATER RETURN PIPING SHALL HAVE 1-INCH-THICK FIBERGLASS INSULATION.
3. PIPE INSULATION SHALL HAVE AN ASJ JACKET AND A THERMAL CONDUCTIVITY (K-FACTOR) NOT EXCEEDING 0.27 AT 75 DEGREES MEAN TEMPERATURE.
4. THE MAXIMUM FIRE HAZARD CLASSIFICATION OF THE INSULATION SYSTEM SHALL NOT HAVE MORE THAN A FLAME SPREAD OF 25, A FUEL CONTRIBUTED RATING OF 50, AND A SMOKE DEVELOPED RATING OF 50 WHEN TESTED IN ACCORDANCE WITH U.L. REQUIREMENTS. PIPE COVERING SHALL BEAR THE U.L. LABEL.

5. INSULATE ALL FITTINGS, VALVE BODIES ETC. WITH SINGLE OR MULTIPLE LAYERS OF INSULATION WITH PREFABRICATED FITTINGS WITH P.V.C. JACKETS.
6. SUBMIT SHOP DRAWINGS FOR ALL INSULATION MATERIALS.

CLEAN OUTS: (ZURN, JOSAM, SMITH)

1. CLEAN OUTS SHALL BE THE SAME SIZE AS THE LARGEST DOWNSTREAM PIPE IT IS SERVING. NO PLATIC CLEAN OUTS WILL BE ACCEPTED. PLUGS SHALL BE BRONZE.

PIPE EXPANSION:

1. ALL PIPE CONNECTIONS SHALL BE INSTALLED TO ALLOW FOR FREEDOM OF MOVEMENT OF THE PIPING DURING EXPANSION AND CONTRACTION.
2. EXPANSION LOOPS AND EXPANSION JOINTS WITH PROPER ANCHORS AND GUIDES SHALL BE PROVIDED AS REQUIRED. ANCHORS AND JOINTS SHALL BE SUBJECT TO THE REVIEW OF THE ARCHITECT.
3. ALL SUPPORTS SHALL BE INSTALLED TO PERMIT THE MATERIALS TO CONTRACT AND EXPAND FREELY WITHOUT PUTTING A STRAIN OR STRESS ON ANY PART OF THE SYSTEM. PROVIDE ANCHORS AS REQUIRED.

UNIONS

1. PROVIDE A UNION BETWEEN CONNECTIONS TO EACH FIXTURE, DEVICE OR PIECE OF EQUIPMENT FOR DISCONNECTING OF PIPING.
2. CONTRACTOR SHALL INSTALL DIELECTRIC UNIONS AT CONNECTIONS OF DISSIMILAR METALS.

PIPE INSTALLATION

1. INSTALL PIPING TO BEST SUIT FIELD CONDITIONS, COORDINATE LAYOUT OF PIPING WITH DUCT WORK AND OFFSET PIPING AS REQUIRED TO CLEAR NEW WORK.
2. ALL VENTS THROUGH ROOF SHALL BE MINIMUM 10'-0" REMOVED FROM ALL AIR INTAKES, EVAPORATIVE COOLERS, ETC.
3. CONTRACTOR SHALL ROUGH-IN ALL WASTE AND SUPPLY PIPING TO SPECIAL EQUIPMENT ACCORDING TO MANUFACTURER'S SHOP DRAWINGS AND MAKE FINAL CONNECTIONS. ALL SUPPLIES SHALL BE VALVED.
4. A WATER-HAMMER ARRESTOR SHALL BE INSTALLED WHERE QUICK-CLOSING VALVES ARE UTILIZED. INCLUDED TOILET FLUSH VALVE GROUPS AND CONNECTIONS TO ALL SOLENOID ACTIVATED VALVES. WATER-HAMMER ARRESTORS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS AND SHALL CONFORM TO ASSE 1010.
5. PROVIDE MEANS OF PREVENTING DISSIMILAR METAL CONTACT BETWEEN ALL PIPING MATERIALS FROM ANY OTHER METAL OR STRUCTURAL MEMBER TO PREVENT GALVANIC ACTION BETWEEN THE TWO METALS.
6. WHEN WATER PIPE AND SEWER ARE LAID PARALLEL TO EACH OTHER, ONE OF THE FOLLOWING PROCEDURES MUST BE FOLLOWED:

- A. THE HORIZONTAL DISTANCE BETWEEN THE WATER PIPE AND SEWER SHALL NOT BE LESS THAN SIX (6) FEET.
- B. EACH LINE SHALL BE LAID IN A SEPARATE TRENCH, OR IN BETWEEN FILLED WITH COMPACT FILL.
- C. THE WATER SERVICE PIPE MAY BE PLACED IN THE TRENCH WITH THE BUILDING DRAIN AND/OR BUILDING SEWER, PROVIDED THE BOTTOM OF THE WATER SERVICE PIPE, AT ALL POINTS SHALL BE AT LEAST TWELVE (12) INCHES ABOVE THE TOP OF THE SEWER LINE, AND SHALL BE PLACED ON A SOLID SHELF EXCAVATED AT ONE SIDE OF THE COMMON TRENCH.
- D. WATER SERVICE AND SEWER SHALL BE CONSTRUCTED OF MATERIALS APPROVED FOR USE WITHIN A BUILDING AND PRESSURE TESTED TO ASSURE WATER TIGHTNESS BEFORE BACKFILLING.

ACCESSIBILITY

1. THE INSTALLATION OF ALL VALVES, UNIONS, THERMOMETERS, GAUGES, OR OTHER INDICATING OR RECORDING DEVICES, OR SPECIALTIES REQUIRING FREQUENT READING, REPAIRS, ADJUSTMENT, INSPECTION, REMOVAL, OR REPLACEMENT SHALL BE CONVENIENTLY AND ACCESSIBLY LOCATED WITH REFERENCE TO THE FINISHED BUILDING.

TESTING

1. FILL DOMESTIC WATER SYSTEM WITH WATER AND PRESSURE TO 125 PSI AND MAINTAIN FOR (4) FOUR HOURS WITH NO PRESSURE DROP.
2. FILL WASTE, SOIL, VENT AND STORM DRAINAGE SYSTEMS WITH WATER TO HIGHEST POINT OF THE SYSTEM. HOLD PRESSURE FOR (4) HOURS WITH NO DROP IN WATER LEVEL.
3. IF THE SYSTEM IS TESTED IN SECTIONS, EACH SECTION SHALL BE FILLED WITH WATER BUT NO SECTION SHALL BE TESTED WITH LESS THAN A TEN FOOT HEAD OF WATER.
4. GAS TESTING:
 - A. AIR PRESSURE TEST SYSTEM TO 75 PSI AND MAINTAIN FOR A PERIOD OF (8) HOURS WITH NO PRESSURE DROP.
 - B. PURGE LINE WITH NITROGEN AT JUNCTION WITH MAIN LINE AT GAS METER TO REMOVE ALL AIR. CLEAR COMPLETE LINE BY ATTACHING A TEST PILOT FIXTURE AT CAPPED STUB-IN LINE AT THE BUILDING LOCATION AND LET GAS FLOW UNTIL TEST PILOT IGNITES. CAUTION: FAILURE TO PURGE SYSTEM MAY RESULT IN EXPLOSION WITHIN LINE WHEN AIR-TO-GAS IS AT A CORRECT MIXTURE.
5. TEST AND OBTAIN APPROVAL ON ALL UNDERGROUND PIPING BEFORE COVERING WORK. PROVIDE WRITTEN TESTING REPORT TO ARCHITECT.

CLEANING

1. AT THE COMPLETION OF THE WORK AND PRIOR TO FINAL ACCEPTANCE, ALL PARTS OF THE WORK INSTALLED UNDER THIS SPECIFICATION SHALL BE THOROUGHLY CLEANED. ALL EQUIPMENT, FIXTURES, PIPE, VALVES AND FITTINGS SHALL BE CLEANED OF GREASE, METAL CUTTINGS AND SLUDGE WHICH MAY HAVE ACCUMULATED BY OPERATION OF THE SYSTEM FOR TESTING HEREIN BEFORE SPECIFIED OR FROM OTHER CAUSES.

STERILIZATION

1. STERILIZE THE ENTIRE WATER DISTRIBUTION SYSTEM THOROUGHLY WITH A SOLUTION CONTAINING NOT LESS THAN 50 PARTS PER MILLION OF AVAILABLE CHLORINE. FOR CHLORINATING MATERIALS USE SODIUM HYPOCHLORITE SOLUTION CONFORMING TO FEDERAL SPEC. 0-8-441, GRADE D, AND INTRODUCE INTO THE SYSTEM BY USE OF A COCK AT A SLOW, EVEN, CONTINUOUS RATE. ALLOW THE STERILIZATION SOLUTION TO REMAIN IN THE SYSTEM FOR A PERIOD OF 24 HOURS, DURING WHICH TIME ALL VALVES AND FAUCETS SHALL BE OPENED AND CLOSED SEVERAL TIMES. AFTER STERILIZATION, FLUSH THE SOLUTION FROM THE SYSTEM WITH CLEAN WATER UNTIL THE RESIDUAL CHLORINE CONTENT IS NO GREATER THAN 0.2 PARTS PER MILLION. PLATE COUNT SHALL INDICATE COUNT LESS THAN 100 BACTERIA PER CC.

GUARANTEE

1. THE CONTRACTOR SHALL GUARANTEE ALL MATERIALS, EQUIPMENT, AND WORKMANSHIP FROM DEFECT OF MATERIAL AND WORKMANSHIP, AND SHALL REPLACE OR REPAIR, WITHOUT ADDITIONAL COST TO THE OWNER, ALL DEFECTIVE MATERIAL AND WORKMANSHIP FOR A PERIOD (1) YEAR AFTER COMPLETION AND ACCEPTANCE.

COORDINATION

1. ALL CONTRACTORS SHALL BE RESPONSIBLE FOR COORDINATING WORK WITH OTHER TRADES AFFECTED BY EACH OTHERS WORK AND FOR CUTTING AND REFINISHING OF EXISTING WALLS, FLOORS, SOLID AND SUSPENDED CEILINGS ETC., WHERE REQUIRED BY WORK SHOWN AND NOTED HEREIN. INSTALL ALL WORK TO CLEAR NEW AND EXISTING ARCHITECTURAL AND STRUCTURAL MEMBERS. ITEMS SUCH AS PIPE, FITTINGS, ETC., SHALL NOT BE INSTALLED IN CONFLICT WITH EQUIPMENT. COORDINATE ALL CUTTING AND PATCHING WITH THE GENERAL CONTRACTOR. SUBCONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING AND PATCHING OF HIS WORK. OBTAIN WRITTEN PERMISSION OF ARCHITECT BEFORE PROCEEDING WITH ANY CUTTING OR PATCHING OF STRUCTURAL SYSTEMS.

SUBSTITUTIONS

1. SUBSTITUTIONS OF MATERIALS OR PRODUCT SHOWN HEREIN SHALL BE AT THE OWNER'S, ARCHITECT'S, OR ENGINEER'S WRITTEN APPROVAL ONLY, WITH COPIES OF APPROVAL SENT TO ARCHITECT FOR PROJECT FILE. DEVIATION FROM THESE DRAWINGS WILL NOT BE ALLOWED. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION OF ALL SUBSTITUTIONS AND ALL COSTS OF CHANGES INCURRED BY THEMSELVES AND OTHERS DUE TO THE SUBSTITUTIONS.

RECORD DRAWINGS

1. PROVIDE TWO (2) SETS OF “RECORD” DRAWINGS (AS-BUILTS) AND TWO (2) BOUND SETS OF ALL OPERATIONS MANUALS, DIAGRAMS, SERVICE CONTRACTS, GUARANTEES, ETC., ONE FOR THE OWNER AND ONE FOR BUILDING OPERATIONS DEPARTMENT. OBTAIN A COMPLETE SET OF RECORD DRAWINGS OF EXISTING CONSTRUCTION FROM THE OWNERS FOR INFORMATION ON EXISTING CONDITIONS. INCORPORATE ANY EXISTING CONDITIONS ON NEW RECORD DRAWINGS REQUIRED TO SHOW THE “INSTALLED” INSTALLATION.

ORDER OF PRECEDENCE OF DOCUMENTS

1. SHOULD A CONFLICT ARISE BETWEEN CONTRUCTION DOCUMENTS, THE ORDER OF PRECEDENCE SHALL BE:
 - A. SPECIAL PROVISIONS
 - B. GENERAL PROVISIONS
 - C. SPECIFICATIONS
 - D. DETAILS ON DRAWINGS
 - E. PLAN DRAWINGS
2. THE ENGINEER OF RECORD SHALL BE NOTIFIED BEFORE A DECISION IS MADE.