PROJECT MANUAL

For

HUMBOLDT COUNTY
EUREKA VETERANS MEMORIAL BUILDING SEISMIC REPAIRS PROJECT

at

1018 'H' STREET
EUREKA, CALIFORNIA

PROJECT NUMBER: 210502

Prepared by:

The Humboldt County Department of Public Works
and
Associate Architect: K. Boodjeh Architects

BID SET DRAFT
-NOT FOR CONSTRUCTION-

Issued on:
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PROJECT SPECIFICATIONS FOR
EUREKA VETERANS MEMORIAL BUILDING SEISMIC REPAIRS PROJECT

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SECTION 00 11 16 – INVITATION TO BIDDERS

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

CONSTRUCTION OF
EUREKA VETERANS MEMORIAL BUILDING SEISMIC REPAIRS PROJECT
COUNTY OF HUMBOLDT
PROJECT NUMBER: 210502

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

A pre-bid meeting is scheduled for 2:00 p.m. Pacific Time, January 4th, 2017 at the Humboldt County Eureka Veterans Memorial Building located at 1018 'H' Street, Eureka, California. Contract Documents, Plans and Specifications will be available on December 13th, 2016.

Each Bid must be contained in a sealed envelope addressed as set forth in said Bid Documents, and filed at the office of the Clerk of the Board of Supervisors of Humboldt County, 825 5th Street, Room 111, Eureka, California at or before 2:00 P.M., Pacific Daylight Time, on January 31st, 2017. All Bids will be publicly opened and summary amounts read aloud. The officer whose duty it is to open the Bids will decide when the specified time for the opening of Bids has arrived.

Plans and Specifications and other Contract Document forms will be available for examination at the Department of Public Works, 1106 Second Street, Eureka, CA, 95501, Phone: (707) 445-7493. Plans will also be available for viewing at area plan centers and on the County's website at: http://humboldtgov.org/Bids.aspx. Complete sets may be obtained through the office of the Department of Public Works, 1106 Second Street, Eureka, CA, 95501, Phone: (707) 445-7493. Complete sets may be obtained upon advanced payment of $350.00 each, 100 % of which shall be refunded upon the return of such sets unmarked and in good condition within ten (10) days after the bids are opened. Checks should be made payable to County of Humboldt.

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

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

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

The County reserves the right to reject any or all Bids or to waive any informalities in any Bid. No Bid shall be withdrawn for a period of ninety (90) calendar days subsequent to the opening of Bids without the consent of the County.

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

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

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

This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations. 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.

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

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

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

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

DATED:

ATTEST:

By: _____

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

SECTION 00 21 13 - INSTRUCTIONS TO BIDDERS

Sealed Bids will be received by the Clerk of the Board of Supervisors of the County of Humboldt, Humboldt County Courthouse, 825 5th Street, Room 111, Eureka, California 95501, until 2:00 p.m. Pacific Time, on January 31st, 2017 at which time they will be publicly opened by the Clerk of the Board of the County of Humboldt at a public meeting in the Office of the Clerk of the Board, for performance of the following work:

CONSTRUCTION OF
EUREKA VETERANS MEMORIAL BUILDING SEISMIC REPAIRS PROJECT
COUNTY OF HUMBOLDT
PROJECT NUMBER: 210502

A. SECURING DOCUMENTS

Plans and Specifications and other Contract Document forms will be available for examination at the Department of Public Works, 1106 Second Street, Eureka, CA, 95501, Phone: (707) 445-7493. Plans will also be available for viewing at area plan centers and on the County's website at: http://humboldtgov.org/Bids.aspx. Complete sets may be obtained through the Department of Public Works upon advanced payment of $350.00 each, 100 % of which shall be refunded upon the return of such sets unmarked and in good condition within ten (10) days after the bids are opened. Checks should be made payable to County of Humboldt.

B. BASIC INFORMATION

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

Owner	Humboldt County Board of Supervisors 825 Fifth Street Eureka, CA 95501
Owner's Lead Agency:	Department of Public Works County of Humboldt 1106 Second Street Eureka, California 95501 Phone: (707) 445-7493 Fax: 445-9409
Project Location:	Humboldt County Eureka Veterans Memorial Building 1018 'H' Street Eureka, California
Architect:	Humboldt County Public Works Department Jake Johnson, Architect 1106 Second Street Eureka, California 95501 Phone: (707) 445-7493
Associate Architect:	K. Boodjeh Architects 531 Third Street Eureka, California 95501 Phone: (707) 798-6107

C. RECEIPT OF BIDS

Each bidder should mark its bid as "Bid for the Construction of Eureka Veterans Memorial Building Seismic Repairs Project." Bids shall be deemed to include the written responses to the bidder to any questions or requests for information of County made as part of bid evaluation process after submission of bid. Telephone

and telefax proposals will not be accepted. County will reject all bids received after the specified time and will return such bids to bidders unopened.

D. DETERMINATION OF APPARENT LOW BIDDER

Apparent low bid will be based on the amount of the bids listed of the Bid Form with the following criteria:

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

E. REQUIRED BID FORM

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

F. CONTENTS OF BID ENVELOPE

The bid envelope shall contain all of the following:

Section 00 41 00 - Bid Form
Section 00 43 13 - Bid Security Form (Bid Bond)
Section 00 43 36 - Subcontractor List
Section 00 45 19 - Non-collusion Affidavit
Section 00 45 26 - Workers' Compensation Certification
Section 00 45 46 - Responsibility/Non-responsibility
Section 00 45 47 - Public Contract Code 10232 Statement
Section 00 45 48 - Debarment and Suspension Certification

G. BID OPENING

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

H. FAILURE TO EXECUTE AND DELIVER DOCUMENTS

IF the bidder to whom the Contract is awarded shall fail or neglect , with ten (10) calendar days from the date of the receipt of a notice of award, to execute and deliver all required Contract Documents and file all required bonds, insurance certificates and other documents, County may, in its sole discretion, deposit bidder’s surety bond, cashier’s check or certified check for collection, and retain the proceeds thereof as liquidated damages for bidder’s failure to enter into the Contract Documents. Bidder agrees that

calculating the damages County may suffer as a result of bidder's failure to execute and deliver all required Contract Documents would be extremely difficult and impractical and that the amount of bidder's required bid security shall be the agreed and presumed amount of County's damages.

I. BIDDER'S BOND, PERFORMANCE BOND AND PAYMENT BOND

Bid security must be submitted with the bid. The successful bidder, prior to execution of the Contract, must submit a Performance Bond in the full amount of the Contract. The successful bidder, prior to execution of the Contract, must submit a Payment Bond in the full amount of the Contract.

J. INSURANCE

It is highly recommended that bidders confer with their respective insurance carriers or brokers to determine in advance of bid submission the availability of the insurance certificates and endorsements required. A bidder, who executes the Contract and thereafter fails to comply strictly with the insurance requirements, will be deemed to be in breach of Contract.

K. RESERVATION OF RIGHTS

County specifically reserves the right, in its sole discretion, to reject any or all bids, or re-bid, or to waive minor irregularities from bid requirements. If no bids are received, the County reserves the right to identify interested contractor(s) and negotiate directly without re-bidding.

L. SECURITIES IN LIEU OF RETENTION

Public Contract Code Section 22300 gives the Contractor for option to deposit securities with an escrow agent as a substitute for retention earnings to be withheld by the County.

M. PRE-BID MEETING

The Pre-Bid Meeting is scheduled for 2:00 p.m. Pacific Time, January 4th, 2017, 2016 at the Humboldt County Eureka Veterans Memorial Building located at 1018 'H' Street, Eureka, California 95501. The Pre-Bid meeting is not mandatory. See Paragraph "R" below.

N. WITHDRAWAL OF BIDS

Any bidder may withdraw his/her bid, either personally or by written request, any time prior to the scheduled closing time for receipt of bids.

O. QUESTIONS AND CLARIFICATIONS

In order to avoid any misinterpretation or misrepresentation between the Bidder, the Architect and the County as regards the plans and specifications for the Project, neither the County nor Architect will respond to any verbal or telephone inquiries, however Bidders may submit written inquiries for clarifications or questions by email, mail or fax to the attention of Department of Public Works, 1106 Second Street, Eureka, CA, 95501, FAX (707) 445-7409, email: jbjohnson@co.humboldt.ca.us. Any responses to written Bidder inquiries will be at the full discretion of the County, and any responses will be in writing in the form of an Addendum to these Contract Documents, which will be sent to all Bidders.

P. ADDENDA OR BULLETINS

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

Q. BIDDERS INTERESTED IN MORE THAN ONE BID

No person, firm, or corporation shall be allowed to make or file, or be interested in more than one bid for the same work, unless alternate bids are called for. A person, firm, or corporation, who has submitted a subproposal to a bidder, is not thereby disqualified from submitting a subproposal or quoting prices to the other bidders.

R. VISITING THE SITE & KNOWLEDGE OF PLANS & SPECIFICATIONS

Before submitting a bid for the work, it is recommended that the Bidder inspect the sites and inform himself as to the conditions under which he will be obligated to execute the work. A Pre-Bid meeting and walk-through are scheduled for this project. See Paragraph "C" above.

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

END OF SECTION 00 21 13

SECTION 00 22 13 - SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

1. PROJECT DESCRIPTION

The Eureka Veterans Memorial Building, constructed circa 1928, is a combination of different types of construction methods; cast-in-place concrete, steel and wood framing. The structure is essentially rectangular in plan, with approximate overall plan dimensions of 142 feet by 81 feet. The building suffered damage as a result of an earthquake in 2010, and this project will effect repairs to the damage as well as bring the building up to current code standards in a number of areas.

This project will repair vertical and horizontal cracks and spalling in concrete walls, including around doors and windows. Repair existing exterior and interior shear walls and add additional shear walls. Replace roof and floor shear diaphragms and enhance structural connections. Remove hazardous materials. Remove, replace or repair significantly damaged cement plaster interior finishes, including walls, ceilings and architectural plaster. Upgrade plumbing, HVAC and electrical systems and install new elevator. Upgrade fire & life safety including installing fire sprinklers, enhancement of emergency exiting & stairways. Upgrade accessibility, including new site work.

A. Project Location:
Humboldt County Eureka Veterans Memorial Building
1018 ‘H’ Street
Eureka, California

2. TIME FOR COMPLETION

The Contractor shall complete the entire project within 450 calendar days from the County’s issuance of the "Notice to Proceed".

3. LIQUIDATED DAMAGES

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 County of Humboldt the sum of $2,500 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.”

5. ADDENDA

No addenda shall be issued within 48 hours of the designated Bid opening time. Any addenda resulting in material changes, addition, or deletion shall be issued at least 72 hours before the designated Bid opening time; otherwise the Bid time shall be extended by not less than 72 hours.

6. COMMUNICATIONS

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

B. Any notice to or demand upon the Contractor shall be sufficiently given if delivered at the office of the Contractor stated on the signature page of the Contract or at such other office as Contractor may from time to time designate in writing to the County of Humboldt or deposited in the United States mail in a sealed postage-prepaid envelope, or if delivered with charges prepaid to any delivery company for transmission, in each case addressed to such office.

C. All papers required to be delivered to the County shall, unless otherwise specified in writing to the Contractor, be delivered to the County and any notice to or demand upon the County of Humboldt shall be mailed in a sealed, postage-prepaid envelope, or delivered with charges prepaid to any delivery company for transmission to the County of Humboldt at such address, or to such other representatives of the County of Humboldt or to such other address as the County may subsequently specify in writing to the Contractor for such purpose.

D. Any such notice shall be deemed to have been given as of the time of actual delivery; or, in the case of mailing, when the same should have been received in due course of post; or, in case of any delivery company, at the time of actual receipt.

7. MINIMUM RATES OF PAY

A schedule of the minimum rates of pay applicable to this Contract is on file at the principal office of Humboldt County Public Works at 1106 Second Street, Eureka, California, and shall be made available to any interested party on request.

8. JOB OFFICES

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

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

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

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

9. PERFORMANCE AND PAYMENT BONDS

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.

10. NOISE ABATEMENT PROVISIONS

A. Noise Affecting Sites and Adjacent Neighborhoods:

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

B. External Noise:

1. Locate stationary noise sources away from noise sensitive land uses and buildings to the extent possible. Obtain approval from the Owner's Representative before locating stationary noise sources.

2. Use truck haul routes through surrounding communities which minimize impacts on noise sensitive land uses. On the site, use routes as directed and approved by Owner's Representative.

C. Vibration Control: Provide ten (10) working days notice before conducting construction activities that might cause vibration, such as, but not limited to, drilling, excavation, compaction, pile driving, etc.

D. Noise Levels: Do not exceed an average continuous sound level of 72 dBA, measured at the perimeter of the work area, and do not exceed an impact noise level of 100 dBA measured at the perimeter of the work area, and only two impact occurrences between 72 dBA and 100 dBA are permitted in a one-hour period.

END OF SECTION 00 22 13

SECTION 00 41 00 - BID FORM

TO
THE COUNTY OF HUMBOLDT

CONSTRUCTION OF EUREKA VETERANS MEMORIAL BUILDING SEISMIC REPAIRS PROJECT

PROJECT NUMBER: 210502

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 the County of Humboldt, Dated November 10, 2016, the Agreement annexed hereto and the General Prevailing Wage provisions as specified in the "Invitation To Bidders".

Bids are submitted for the entire work. The amount of "The Bid" for comparison purposes will be the determination of the apparent low bid as specified in Section 00 21 13, "Instructions to Bidders".
The Bidder shall set forth for the Base Bid and each Alternate, if any, in clearly legible figures, a written lump sum price and a numeric lump sum 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.

If this proposal shall be accepted and the undersigned shall fail to enter into the Contract and to give the two required bonds in the sums to be determined as aforesaid, with surety satisfactory to the Department of Public Works, within seven (7) days, not including Sundays and legal Holidays, after the Bidder has received notice from the Department that the contract has been awarded, the County may, at its option, determine that the Bidder has abandoned the Contract, and thereupon this Proposal and the acceptance thereof shall be null and void and the forfeiture of such security accompanying this Proposal shall operate and the same shall be the property of the County of Humboldt.

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 the County of Humboldt, 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_____
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 _____, 2017

The project shall be complete within the time limits specified in Section 00 22 13, "Supplementary Instructions To Bidders." The undersigned is aware the Contract includes provisions for liquidated damages as specified in Section 00 21 13, "Supplementary Instructions To Bidders," if the Project is not completed within the agreed time of completion.

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:

Base Bid (Lump Sum):	
_____	$ _____
Total Amount in Words	Total

BID ALTERNATES

None

UNIT PRICES

For changing quantities of work items from those indicated on the contract drawings and specifications, upon written instructions from the Architect, the following prices shall prevail:

1. Concrete Patch at a unit cost PER CUBIC FOOT: $_____
2. Paint interior surfaces (prime & 2 top coats) at a unit cost PER 50 SQUARE FEET: $_____
3. Plaster Crack Repair in walls at a unit cost PER LINEAL FOOT: $_____
4. Install interior plaster veneer over gypsum board base as specified at a unit cost PER 50 SQUARE FEET: $_____
5. Type 1 Epoxy Injection (crack widths of 1/32” to 1/16”). at a unit cost PER LINEAL FOOT: $_____
6. Type 1 Epoxy Injection (crack widths of 1/16” to 1/8”). at a unit cost PER LINEAL FOOT: $_____
7. Type 2 Epoxy Injection and Finishing (crack widths of 1/32” to 1/16”). at a unit cost PER LINEAL FOOT: $_____
8. Type 2 Epoxy Injection and Finishing (crack widths of 1/16” to 1/8”). at a unit cost PER LINEAL FOOT: $_____
9. Ceramic tile replacement at a unit cost PER SQUARE FOOT: $_____

The above unit prices shall include all labor, materials, bailing, shoring, removal, overhead, profit, insurance etc., to cover the finished work of the several kinds called for. Changes shall be processed in accordance with the General Conditions.

Proposal Signature Page

Accompanying this proposal is _____
(Insert the words "Cash ($)", "Cashier's Check", "Certified Check", or "Bidder's Bond", as the case may be)
in the amount of at least ten percent (10%) of the total Bid Price submitted. The names of all persons interested in the foregoing proposal as Principals are as follows:

_____

_____

_____

(NOTE: If a Bidder or other interested person is a Corporation, state the legal name of the corporation, also names of the president, secretary, treasurer, and manager thereof; if a Co-partnership, state the true

name of the firm, also state the names of all individual co-partners composing the firm; if the Bidder or other interested person is an Individual, state the first and last names in full.)

Licensed in accordance with an Act providing for the registration of Contractors:

License No.: _____ Expiration Date:_____

By my signature on this proposal I certify, under penalty of perjury under the laws of the State of California, that the foregoing questionnaire and statements of Public Contract Code Section 10162, and 10232, are true and correct and that the bidder has complied with the requirements of Section 8102 of the Fair Employment and Housing Commission Regulations (Chapter 5, Title 2 of the California Administrative Code). By my signature on this proposal I further certify, under penalty of perjury under the laws of the State of California and the United States of America, that the Noncollusion Affidavit required by Title 23 United States Code, Section 112 and Public Contract Code Section 7106; and the Title 49 Code of Federal Regulation, Part 29 Debarment and Suspension Certification are true and correct.

_____ _____
Signature of Bidder Date

If a Bidder is a Corporation or a Co-partnership:

_____
Name of Corporation or Firm Name of Co-partnership

Signatures of officer(s) or partners authorized to sign contracts on behalf of the Corporation or Co-partnership, Corporations require signature by 2 (two) corporate officers:

_____ _____
Name Title

_____ _____
Name Title

If Signature is by an agent, other than an officer of a corporation or a member of a partnership, a Power of Attorney must be on file with the Department prior to opening Bids or may be submitted with the Bid; otherwise the Bid will be disregarded as irregular and unauthorized.

Bidder's Business Address: _____

Place of Residence: _____

Date: _____

END OF SECTI0N 00 41 00

SECTION 00 43 13 - BID SECURITY FORM

KNOW ALL MEN BY THESE PRESENTS:

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

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

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

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

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

_____

By:_____ By:_____.

Principal (Seal) Surety (Seal)

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

END OF SECTION 00 43 13

SECTION 00 43 23 - ALTERNATES

PART 1 - GENERAL

1.1 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.

1.2 DEFINITIONS

A. Alternate: An alternate is an amount proposed by bidders and stated on the Bid Form that will be added to or deducted from Base Bid amount if the Owner decides to accept a corresponding change in either scope of work or in products, materials, equipment, systems or installation methods described in Contract Documents.

1.3 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

SECTION 00 43 25 - PRE-BID SUBSTITUTION REQUEST FORM

PROJECT: Eureka Veterans Memorial Building Seismic Repairs Project DATE:_____
Project Number: 210502

Note to Contractor: All substitution requests for "equal" products or systems shall be submitted to the Owner's Representative, (10) ten days prior to the contract bid date. See specification section 00 22 13 - SUPPLEMENTARY INSTRUCTIONS TO BIDDERS, sub-section 4.

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

SECTION:_____ Paragraph:_____

Specified Item: _____

Proposed Substitution:_____

1. Attach completed technical data, including laboratory tests, color and material samples, if applicable

2. Include complete information on changes to Drawings and/or Specifications which proposed substitution will require for its proper installation. (Plan layout changes, electrical hookup locations)

3. Does the substitution affect dimensions shown on Drawings? [ ] Yes [ ] No

4. Will the undersigned pay for changes to the building design, including detailing costs caused by the requested substitution? [ ] Yes [ ] No

5. What effect does substitution have on other trades?

6. Differences between proposed substitution and specified item?

7. Cost of proposed substitution in comparison with product, system, or method specified?

8. Availability of maintenance and repair services, and sources of repair or replacement items?

9. Manufacturer's guarantees of the proposed and specified items are:

   [ ] Same [ ] Different (Explain on attachment)

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

Submitted By: _____

Signature: _____

Firm: _____

Address: _____

Telephone: _____

FOR USE BY ARCHITECT:

[ ] Accepted [ ] Accepted as Noted

[ ] Not Accepted [ ] Received Too Late

By: Date:

Remarks:

END OF SECTION 00 43 25

SECTION 00 43 36 - SUBCONTRACTOR LIST

LIST OF SUBCONTRACTORS
PROJECT NAME: EUREKA VETERANS MEMORIAL BUILDING SEISMIC REPAIRS PROJECT
PROJECT NUMBER: 210502

The Bidder shall list all Subcontractors in accordance with Article 18 of the Supplementary General Conditions.

Name of Subcontractor, CA Contractor License Number	Address	Description of Work to be Performed

Name of Subcontractor, CA Contractor License Number & DIR Registration Number	Address	Description of Work to be Performed

END OF SECTION 00 43 36

SECTION 00 43 93 - BID SUBMITTAL CHECKLIST

The following documents shall be submitted by each Bidder, as part of their complete Bid:

1. Section 00 41 00 - Bid Form
2. Section 00 43 13 - Bid Security Form (Bid Bond)
3. Section 00 43 36 - Subcontractor List
4. Section 00 45 19 - Non-collusion Affidavit
5. Section 00 45 26 - Workers' Compensation Certification
6. Section 00 45 46 – Evidence of Responsibility/Non-responsibility
7. Section 00 45 47 - Public Contract Code 10232 Statement
8. Section 00 45 48 - Debarment and Suspension Certification

END OF SECTION 00 43 93

SECTION 00 45 19 - NONCOLLUSION AFFIDAVIT

TO THE COUNTY OF HUMBOLDT, DEPARTMENT OF PUBLIC WORKS

Non-Collusion Affidavit

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

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

_____
Signature of Bidder

_____
Date

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

END OF SECTION 00 45 19

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 self-insure either as an individual employer, or as one employer in a group of employers, which may be given upon furnishing proof satisfactory to the Director of Industrial Relations of ability to self-insure and to pay any compensation that may become due to their employees."

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

Signature of Contractor

_____

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

SECTION 00 45 46 – RESPONSIBILITY / NONRESPONSIBILITY

1. DETERMINATION OF BIDDER RESPONSIBILITY

   A. A responsible bidder is a bidder who has demonstrated the attribute of trustworthiness, as well as quality, fitness, capacity and experience to satisfactorily perform the contract. It is the County's policy to conduct business only with responsible contractors. (Ord. 2291, § 1, 01/07/2003)

   B. Bidders are hereby notified that the County may determine whether the bidder is responsible based on a review of the bidder's performance on any contracts, including but not limited to County contracts. Particular attention will be given to violations of labor laws related to employee compensation and benefits, and evidence of false claims made by the bidder against public entities. This will include subcontractors and their employees as well.(Ord. 2291, § 1, 01/07/2003)

   C. The County may declare a bidder to be non-responsible for the purpose of this contract, if the Board of Supervisors, in its discretion, finds that the bidder has done any of the following: (1) committed any act or omission which negatively reflects on the bidder's quality, fitness or capacity to perform this contract with the County or a contract with any other public entity, or engaged in a pattern or practice which negatively reflects on same; (2) committed an act or omission which indicates a lack of business integrity or business honesty; or (3) made or submitted a false claim against the County or any other public entity. (Ord. 2291, § 1, 01/07/2003)

   D. If there is evidence that the apparent low bidder may not be responsible, the department shall notify the bidder in writing of the evidence relating to the bidder's responsibility, and its intention to recommend to the Board of Supervisors that the bidder be found not responsible. The department shall provide the bidder and/or the bidder's representative with an opportunity to present evidence as to why the bidder should be found to be responsible and to rebut evidence which is the basis for the department's recommendation. If the bidder fails to avail itself of the opportunity to rebut the department's evidence, the bidder may be deemed to have waived all rights of appeal. (Ord. 2291, § 1, 01/07/2003)

   E. If the bidder presents evidence in rebuttal to the department, the department shall evaluate the merits of such evidence, and based on that evaluation, make a recommendation to the Board of Supervisors. The final decision concerning the responsibility of the bidder shall reside with the Board of Supervisors. (Ord. 2291, § 1, 01/07/2003)

   F. These terms shall also apply to proposed [subcontracts/ subconsultants] of bidders on County contracts. (Ord. 2291, § 1, 01/07/2003)

2. DETERMINATION OF BIDDER DEBARMENT

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

   B. If there is evidence that the apparent low bidder may be subject to debarment, the department shall notify the bidder in writing of the evidence which is the basis for the proposed debarment, and shall advise the bidder of the scheduled date for a debarment hearing before the Contractor Hearing Board (CHB). (Ord. 2291, § 1, 01/07/2003)

   C. The CHB shall conduct a hearing where evidence on the proposed debarment is presented. The bidder and/or the bidder's representative shall be given an opportunity to submit evidence at that hearing. After the hearing, the CHB shall prepare a proposed decision, which shall contain a recommendation regarding whether the bidder should be debarred, and, if so, the appropriate length of time of the debarment. If the bidder fails to avail itself of the opportunity to submit evidence to the CHB, the bidder may be deemed to have waived all rights of appeal. (Ord. 2291, § 1, 01/07/2003)

D. A record of the hearing, the proposed decision and any other recommendation of the CHB shall be presented to the Board of Supervisors, by the department head. The Board of Supervisors shall have the right to modify, deny or adopt the proposed decision and recommendation of the hearing board.(Ord. 2291, § 1, 01/07/2003)

E. These terms shall also apply to proposed [subcontractors/ subconsultants] of bidder's on County contracts.(Ord. 2291, § 1, 01/07/2003)

EVIDENCE OF RESPONSIBILITY / NONRESPONSIBILITY

(Humboldt County Code Sections 2141 et seq.)

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

1. Is the bidder under suspension, debarment, or determination of ineligibility by any federal, state or local agency? **[ ] No [ ] Yes (explain)**

2. Has the bidder been suspended, debarred, or determined ineligible by any federal, state or local agency within the preceding 5 years: **[ ] No [ ] Yes (explain)**

3. Is there pending against the bidder any proposed debarment or suspension proceeding?

[ ] No [ ] Yes (explain)

4. Has the bidder been indicted, charged with, or convicted, or assessed civil or administrative penalties, or had a civil judgment rendered against it, in any matter involving:

(a) fraud, false claims, or dishonesty;

(b) any serious or wilful violation of the California Occupational Safety and Health Act of 1973 (Labor Code Sections 6300 et seq) or the Federal Occupational Safety and Health Act of 1970;

(c) violation of the state workers’ compensation laws;

(d) violation of the Contractor’s State License Law (Bus & Prof Code Sections 7000 et seq.)

(e) violation of prevailing wage laws;

(f) violation of state or federal environmental laws;

(g) violation of local laws related to permits, land use, or waste disposal?

[ ] No [ ] Yes (explain)

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

[ ] No [ ] Yes (explain)

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

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

END OF SECTION 00 45 46

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

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

SECTION 00 52 00 - AGREEMENT

This is an AGREEMENT made and entered into this _____ day of _____, 2017 by and between the County of Humboldt, a political subdivision of the State of California (hereinafter referred to as COUNTY) and _____, a corporation organized and existing under the laws of the State of _____, a partnership consisting of

;

an individual doing business as _____ in the State of California, (hereinafter referred to as "CONTRACTOR").

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

SECTION 1 - SCOPE OF WORK

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

HUMBOLDT COUNTY
EUREKA VETERANS MEMORIAL BUILDING SEISMIC REPAIRS PROJECT
PROJECT NUMBER: 210502

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

The scope of work includes the work included in the “Base Bid” for the project and the following bid alternatives:_____

SECTION 2 - CONTRACT PRICE

County shall pay, and Contractor shall accept Contractor's Price, as follows:
_____ Dollars and /100 ($)

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

SECTION 3 - CONTRACT DOCUMENTS

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

- Notice to Contractors
- Bid Form
- Bid Security Form
- This Agreement
- Payment Bond
- Performance Bond
- Insurance Certificates
- Public contract code Statement
- Special Conditions
- General Conditions
- Supplementary General Conditions
- General Requirements
- Technical Specifications
- Plans and Drawings
- Subcontractor List
- Non collusion Affidavit
- Evidence of Responsibility/Nonresponsibility
- Debarment suspension certification

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

- General Prevailing Wage Rates

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

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

SECTION 4 - BEGINNING OF WORK

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

SECTION 5 - TIME OF COMPLETION

The work called for in this Agreement shall be commenced within ten (10) calendar days of the date of receipt by Contractor of the Notice to Proceed and shall be fully completed within 500 calendar days following receipt of the Notice to Proceed by the Contractor.

SECTION 6 - PREVAILING WAGE

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

SECTION 7 - WORKERS' COMPENSATION

By my signature hereunder, as CONTRACTOR, I certify that I am aware of the provisions of Section 3700 of the Labor Code which requires every employer to be insured against liability for Workers'

Compensation or to undertake self insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this contract.

SECTION 8 - NOTICES

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

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

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

SECTION 9 - NUCLEAR FREE HUMBOLDT COUNTY ORDINANCE COMPLIANCE

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

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

COUNTY OF HUMBOLDT

(SEAL)

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

ATTEST:

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

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

By: _____

Title: _____

By: _____

Title: _____

APPROVED AS TO FORM:

By: _____
Deputy County Counsel

INSURANCE CERTIFICATES REVIEWED AND APPROVED:

By: _____
Risk Manager

END OF SECTION

SECTION 00 61 13 - PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS:

That _____
(Name of Contractor)

_____
(Address of Contractor)

a _____, hereinafter called Principal, and:
(Corporation, Partnership or Individual)

_____
(Name of Surety)

_____
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

HUMBOLDT COUNTY
825 5th Street
Eureka, California 95501

hereinafter called OWNER, in the penal sum of

_____

Dollars ..... ($ _____)

in lawful money of the United States, for the payment of which sum well and truly to be made, we bond ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the _____ day of _____, 20__, a copy of which is hereto attached and made a part hereof for the construction of:

_____

_____

_____

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all of the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the OWNER, with or without notice to the Surety and during the one year guaranty period, and if Principal shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the OWNER from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the OWNER all outlay and expense which the OWNER may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

Signed and sealed this _____ day of _____, 20___.

By: _____
Principal

By: _____
Surety

SURETY

(Power of Attorney for person signing for Surety Company, or a certified copy thereof, must be attached. Signatures of person or persons executing for the Surety must be acknowledged.)

END OF SECTION 00 61 13

SECTION 00 61 14 - PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS, THAT WHEREAS, the County of Humboldt, by its order made _____, 20___, has awarded to _____, hereinafter designated as the "Principal," a contract for the work described as follows:

_____

_____

_____

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

THE CONDITION OF THIS OBLIGATION IS SUCH that is said Principal, his/her or its heirs, executors, administrators, successors or assigns, shall fail to pay any of the persons named in Section 9100 of the Civil Code, or amounts due under the Unemployment Insurance Code with respect to work or labor performed by any such claimant, or for any amounts required to be deducted, withheld, and paid over to the Franchise Tax Board from the wages of employees of the Contractor and their subcontractors pursuant to Section 18806 of the Revenue and Taxation Code with respect to such work and labor as required by Sections 9550 et seq. of the Civil Code of California, then said Surety will pay for the same, in or to an amount not exceeding the amount hereinafter set forth, and also will pay in case suit is brought upon this bond, such reasonable attorney's fees, as shall be fixed by the court, awarded and taxed as in the above-mentioned statutes provided.

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

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

_____	_____
PRINCIPAL	SURETY
BY:_____	BY_____
	ATTORNEY-IN-FACT

END OF SECTION 00 61 14

SECTION 00 72 00 - GENERAL CONDITIONS

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GC 1. DEFINITIONS

A. COUNTY: The term "County, or pronouns in place of same where used herein, shall mean Humboldt County acting through its Board of Supervisors.

B. BOARD: The term "Board", or pronouns in place of same where used herein, shall mean the Humboldt County Board of Supervisors.

C. OWNER: The "Owner" is the person or entity identified as such in the Owner-Contractor Agreement; the term Owner means the Owner or their authorized representative.

D. ARCHITECT: The term "Architect" shall mean the licensed professional architect employed by the Humboldt County Department of Public Works as the authorized representative of the Owner.

E. CONTRACTOR: The term "Contractor", where used herein, shall mean the Contractor to whom the contract for the work described and specified herein has been awarded by the Board.

F. PLANS AND SPECIFICATIONS: The term "Plans and Specifications", where used herein, shall mean and include all specifications and provisions of every kind, whether general, detailed or otherwise, relating to the equipment, material of work, and the installation thereof, and the plans and drawings accompanying same which are made a part thereof. Such Plans and Specifications are recognized as instruments of professional service.

G. OWNER'S REPRESENTATIVE: The term "Owner's Representative" shall mean agent assigned to the Project by Humboldt County Department of Public Works.

H. PROJECT INSPECTOR: The term "Project Inspector" shall mean agent assigned to the Project by Humboldt County Department of Public Works.

GC 2. CONTRACT

A. The Contract Documents include all documents identified as such in the Agreement (Section 00 52 13), any amendments and Change Orders thereto

B. In the execution of the work or any portion thereof, Contractor shall operate as an independent contractor and not as the agent of Owner or Architect.

C. No verbal agreement or conversation with any officer, agent, or employee of Owner or Architect, either before or after execution of the Agreement, shall affect or modify any terms or obligations of the Contract unless duly incorporated into the Contract by written Change Order or amendment of the Contract.

D. The Contract Documents shall not be construed to create any contractual relationship of any kind between the Architect and the Contractor, but the Architect shall be entitled to performance of obligations intended for their benefit, and to enforcement thereof. Nothing contained in the Contract Documents shall create any contractual relationship between the Owner or the Architect and any subcontractor or sub-subcontractor.

GC 3. BONDS

A. The successful bidder, simultaneously with the execution of the Agreement, will be required to furnish a Payment Bond in an amount equal to one hundred (100%) percent of the contract price, and a faithful Performance Bond in an amount equal to one hundred (100%) percent of the contract price. The Contractor must submit a certificate from the Humboldt County Clerk's Office with all payment bonds. The Clerk's certificate must indicate that the surety is admitted to transact business in the State of California, and certify that the surety's certificate of authority, issued by the Insurance Commissioner, has not been suspended, revoked, canceled, or annulled.

B. The bonds shall comply with Section 9554 of the Civil Code of the State of California. The payment Bond and the faithful Performance Bond shall each be in a form that is satisfactory to the County Counsel, or Risk Management of the County of Humboldt. A copy of an acceptable format is attached to the Agreement forms of these specifications.

GC 4. INSURANCE REQUIREMENTS

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

B. Without limiting Contractor's indemnification provided herein, Contractor shall and shall require any of its subcontractors to take out and maintain, throughout the period of this Agreement, the following policies of insurance placed with insurers with a current A.M. Bests rating of no less than A:VII or its equivalent against injury/death to persons or damage to property which may arise from or in connection with the activities hereunder of Contractor, its agents, employees or subcontractors:

C. Comprehensive or Commercial General Liability Insurance at least as broad as Insurance Services Office Commercial General Liability coverage (occurrence from CG 0001), in an amount of $2,000,000 per occurrence. If work involves explosive, underground or collapse risks, XCU must be included. If a general aggregate limit is used, either the general aggregate limit shall apply separately to this project or the general aggregate shall be $5,000,000. Said policy shall contain, or be endorsed with, the following provisions:
   1. The County, its officers, employees and agents, are covered as additional insured for liability arising out of the operations performed by or on behalf of Contractor. The coverage shall contain no special limitations on the scope of protection afforded to the County, its officers, agents, and employees.
   2. The policy shall not be canceled or materially reduced in coverage without thirty (30) days prior written notice (10 days for non-payment of the premium) to County by certified mail.
   3. The inclusion of more than one insured shall not operate to impair the rights of one insured against another insured, and the coverage afforded shall apply as though separate policies had been issued to each insured, but the inclusion of more than one insured shall not operate to increase the limits of the insurer's liability.
   4. For claims related to this project, the Contractor's insurance is primary coverage to the County, and any insurance or self-insurance programs maintained by the County are excess to Contractor's insurance and will not be called upon to contribute with it.
   5. Any failure to comply with reporting or other provisions of the parties, including breach of warranties, shall not affect coverage provided to County, its officers, employees, and agents.

D. Automobile liability insurance with coverage at least as broad as Insurance Services Office form CA 0001 06092, Code 1 (any auto), for vehicles used in the performance of this Agreement with minimum coverage of not less than $1,000,000 per accident combined single limit (CSL). Such policy shall contain or be endorsed with the provision that coverage shall not be canceled or materially reduced in coverage without thirty (30) days prior written notice (10 days for non-payment of premium) to County by certified mail.

E. Workers' Compensation insurance meeting statutory limits of the California Labor Code which policy shall contain or be endorsed to contain a waiver of subrogation against County, its officers, agents, and employees and provide for thirty (30) days prior written notice in the event of cancellation.

F. If applicable, Builder's Risk or Course of Construction, written on an "All-Risk" form, for 100% of the completed value of the insurable part of the project. The Builder's Risk policy shall provide for losses to be payable to County and the Contractor as their interests may appear, and that in the event of payment for any loss under the coverage provided, the insurer shall have no rights of recovery against County and Contractor.

G. Contractor shall furnish County with certificates and original endorsements effecting the required coverage prior to execution of this Agreement by County. The endorsements shall be on forms as approved by the County's Risk Manager or County Counsel. Any deductible or self-insured retention over $100,000 shall be disclosed to and approved by County. If Contractor does not keep all required policies in full force and effect, County may, in addition to other remedies under this Agreement, take out the necessary insurance, and Contractor agrees to pay the cost of said insurance.

H. SUBCONTRACTORS: Should contractor subcontract any portion of the work to be performed under this Agreement, said subcontractors shall be required by contractor to:

1. Enter into a written contract with contractor acknowledging that no employee/employer relationship exists between contractor and subcontractor and that no Workers' Compensation, unemployment benefits, or other personnel benefits are required by or available to subcontractor through contractor or County.
2. Hold harmless and to indemnify, defend and save harmless contractor and County, its Board of Supervisors, officers, agents, employees and volunteers, from any and all claims and losses accruing or resulting to any and all contractors, subcontractors, material suppliers, laborers, and any other person, firm or corporation who may be injured or damaged by subcontractor in the performance of this Agreement.

I. HOLD HARMLESS/INDEMNIFICATION CLAUSE

Pursuant to Government Code section 895.4, the parties to this Agreement shall indemnify, defend and hold harmless the other parties hereto and their officers, agents, and employees, from any and all claims, demands, losses, damages, and liabilities of any kind or nature, including attorney's fees, which arise by the virtue of its own acts or omissions (either directly or through or by its officers, agents or employees) in connection with its duties and obligations under this Agreement and any amendments hereto.

Acceptance of insurance, if required by this Agreement, does not relieve Contractor from liability under this indemnification clause. This indemnification clause shall apply to all damages or claims for damages suffered by Contractor's operations regardless if any insurance is applicable or not.

GC 5. TERMINATION OF CONTRACT

A. Each of these general conditions, whether preceding or following this paragraph, is to be considered material and failure to comply with any of such conditions by the Contractor will be deemed a breach of contract.

B. Should the Contractor fail to perform any of the provisions of the Contract, the Owner shall have the right, whether or not an alternative right is provided, to declare the Contract terminated. A written notice by the Owner to the Contractor that the Contract is terminated shall be deemed a complete termination of same.

C. On the Contract being so terminated, the Contractor shall, provided Contractor is ordered to do so by the Owner, immediately remove from the premises all or any materials and personal property belonging to Contractor which have not been used in the construction of the Work or which is not in place in the Work; and both Contractor and their surety shall be liable upon their bond for all damages caused to the Owner by reason of failure to complete the Contract.

D. See GC Article 29, SUFFICIENT LABOR OR MATERIAL.

GC 6. NON-CONTINUANCE OF WORK

A. Should the Contractor at any time during the progress of the Work refuse, neglect or be unable for any reason, except the documented inability to supply a sufficiency of materials or workmen necessary, to complete the Work within the time specified in the Contract, the Owner shall have the power to terminate the Contract as prescribed.

GC 7. ASSIGNMENT OF CONTRACT

A. The Contractor shall not assign or sublet the Contract in whole or in part without the prior written consent of the Owner. The Contractor shall not assign any monies due or to become due to them under the Contract without the prior written consent of the Owner.

B. Any assignments permitted under these documents or approved by the Owner shall, in addition, have prior written approval of all sureties of the Contractor executing bonds or insurance in the interest of this Contract.

C. If the Contractor seeks to assign any portions or monies as permitted, Contractor shall pay to the Owner $1,000 to cover Owner's costs each time an assignment occurs.

GC 8. SEPARATE CONTRACTS

A. The Owner reserves the right to let other contracts in connection with this Project. The Contractor shall afford all other such contractors reasonable opportunity for storage of their materials; shall provide that the execution of their work properly connects and coordinates with theirs; and shall cooperate with them to the end of facilitating the Work.

B. The work performed or executed under other contracts in advance of work under this Contract shall be inspected and determined to be in proper condition by the Contractor before permitting related or connecting work to proceed under this Contract.

C. Contractor shall immediately notify Architect of any discrepancies, defects or other conditions found unsuitable for proper execution of the work.

GC 9. CONFERENCES

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

GC 10. TERMS OF PAYMENT

A. At the end of each calendar month, the Contractor shall submit to the Owner’s Representative a statement of all materials actually placed in the building during the month, the labor expended thereon, and the cost thereof; whereupon after verification by the Owner’s Representative it is found to be acceptable, a certificate for the amount less five percent (5%) thereof will be issued by the Owner’s Representative except that no certificate will be issued for defective work and materials until they have been removed, replaced and made good. The Owner will also pay the costs of material on

hand under the following conditions: Written approval is given by the Owner's Representative prior to requesting payment. Approved items have been inventoried by the Owner's Representative and they are stored in a safe and weather protected manner, and are major items that delay in receiving will adversely affect the construction time schedules. The Owner's Representative will issue a certificate for the certified invoice amount, less five percent (5%) thereof. The Contractor shall be paid monthly as the work progresses, the amount of each such certificate. Final payment shall be made in accordance with E. below.

B. As a basis for determining the amount of monthly payments, the Contractor shall, before commencing the work, submit to the Owner's Representative for approval a detailed statement of all materials and labor included in their original estimate. This statement shall be so arranged that the value of the work as it progresses may be readily determined. Payment for change order work will be made if the change order work is complete and is approved prior to the Owner's Representative issuing the monthly certification of payment. The regular initial schedule of values shall be prepared and submitted by Contractor twenty (20) calendar days in advance of the time the first request for payment is due, allowing sufficient time for review, approval and modifications as may be required prior to use for said first payment. The total sum of the schedule of values shall equal the Contract Price.

C. Acceptance of any work and payments therefore shall be made upon written recommendation of the Owner's Representative and Architect.

D. Payments to the Contractor will be made within 30 days of an approved pay estimate in accordance with Owner's regular approval and accounting procedures, based upon statements or certificates received as issued or approved by the Owner's Representative, including written certification that complete certified payroll records have been, or will be, submitted to the Labor Commissioner as required by the California Labor Code.

E. Thirty-five (35) days after the acceptance of the work by the Owner's Representative and Architect (provided the project has been accepted by the Board of Supervisors), the Contractor shall be entitled to the balance due for the completion and acceptance of the work, provided that all claims for labor and materials have been paid, and that no claims shall have been filed with the County based upon acts or omissions of the Contractor and that no stop notices have been filed.

GC 11. CONFLICTS OR ERRORS

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

B. The Contractor shall not contend that any error, delay or default in their work is due to omission or ambiguity in said plans or specifications.

C. If errors are found in the Construction Documents that can not be termed conflicts (shown, sized or called out differently in different places) the Contractor shall immediately notify the Owner's Representative within 15 calendar days following the discovery of any error so that a change order can be prepared and the item corrected prior to construction.

D. Refer to G.C. 24, Unity of Documents.

GC 12. CHANGES TO PLANS AND SPECIFICATIONS

A. No modification or deviation from plans and specifications will be permitted by the Contractor without prior written consent of Owner. However, within the limits allowed by law, the Contractor agrees that Owner, without invalidating the Contract, may order extra work or make changes by altering, adding to, or deducting from the Work, the contract sum being adjusted accordingly, and that Contractor will

enter into a modification of the original contract to make such changes by means of a written Change Order.

B. Change Orders shall be signed by the Contractor, Architect and authorized representative of the Owner.

C. All such work shall be executed under the conditions of the original contract except that any claim for extension of time caused thereby shall be adjusted at the time of ordering such change. Both parties agree that the credit to, or charge against the Owner shall be determined as follows:

1. In the event that a modification results in a reduction of the amount of labor and material to be supplied by the Contractor, the Owner shall be given a credit equal to the actual value of such labor and materials plus a reasonable amount for the use of tools, materials and overhead and profit; or, in the event that a modification results in an increase in the amount of labor and materials to be supplied by the Contractor, the Owner shall pay the Contractor the actual value of such labor materials and equipment plus not more than 15% which shall cover the use of Contractor's overhead and profit. In no case shall the total of any subcontractor(s) together with the Contractor's overhead, profit, bonds and insurance exceed 15%. All costs shall be included as a lump sum price on change orders.
2. Cost Estimates for all changes shall be submitted by the Contractor to the Owner's Representative for checking by the Owner's Representative and Architect. The Contractor shall submit all Cost Estimates within 15 calendar days following the discovery of any potential change. The Owner's Representative shall render a written decision as to reasonable costs within 15 calendar days of receiving cost estimate unless more time is agreed to by both Contractor and Owner's Representative.
3. Any increases in cost or extension of time shall be approved by the Owner's Representative, Architect and Owner, on a signed change order.
4. In the event that the Contractor, for whatever reason, does not accept the dollar amount of increase or decrease or extension of time to the contract amount in the decisions rendered by the Owner, Contractor shall, upon receiving written order from the Owner, proceed with the work called for in the Change Order on a force account basis. Any claim for dollar increases or extension of time shall be made in writing to the Owner's Representative in accordance with the provisions of GC 51, Claims Procedures.

D. In response to a request for a proposed modification, Contractor shall promptly furnish within 15 calendar days, relevant cost breakdowns, time estimates and other information as may be required to the Owner's Representative.

GC 13. GUARANTEE

A. The Contractor shall be held responsible to make-good any defects due to faulty, improper or inferior workmanship or materials arising or discovered in any part of the Work within one (1) year after the completion and final acceptance of the same by the Owner's Representative, Architect and Owner unless a longer period is called for in the Technical Specification Sections.

B. Acceptance of the Work by the Owner's Representative, Architect or Owner shall in no way absolve the Contractor from the responsibility of complying with the provisions of the plans and specifications and other contract documents, even though deviations may not be discovered within the aforementioned one year period.

C. The bond for faithful performance furnished by the Contractor shall cover such defects and protect the Owner against them and remain in force during the one year guarantee period.

GC 14. INTERPRETATIONS

A. The Contractor shall comply with the obvious intent and meaning of the plans and specifications which shall be construed to include all material, measures and modes or work necessary to complete the work required in a workmanlike manner, in strict accordance with these plans and specifications, and to the satisfaction of the Owner.

B. Should any question arise as to the intent and interpretation of the plans or specifications, the Contractor shall promptly, upon discovery thereof, refer the same in writing to the Owner's Representative, whose decision thereon shall be final.

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

A. The Owner's Representative shall, in all cases, determine whether the amount and quality of the several kinds of work which are to be paid for under the Contract are in accordance with the plans and specifications.

B. The Owner's Representative shall have power to cause all or any part of the work to be expedited with greater diligence when delayed or stopped.

C. When requested by the Owner's Representative, the Architect's decisions in matters relating to artistic effect will be final if consistent with the intent of the Contract Documents.

D. Where not involving a change in the agreed Contract Price or Completion Time, and not inconsistent with the intent of the Contract Documents, the Owner's Representative shall have authority to:
1. Correct any errors or inconsistencies in, and make any deletions from or additions to the drawings and specifications;
2. Order minor changes or adjustments in the work, whether by field order, notations on Contractor's submittals, or other instructions;
3. Order certain portions of the work delayed when particularly involved with or affected by any Change Order in process or being considered by Owner.

E. The Owner's Representative will be the interpreter of the requirements of the Contract Documents and the judge of the performance thereunder by both the Owner and Contractor.

F. The Architect through the Owner's Representative will render interpretations necessary for the proper execution or progress of the Work, with reasonable promptness and within fifteen (15) calendar days.

G. Claims, disputes and other matters in question between the Contractor and the Owner relating to the execution or progress of the Work or the interpretation of the Contract Documents shall be referred to the Owner's Representative for decision which the Owner's Representative will render in writing with a reasonable promptness and within fifteen (15) calendar days.

GC 16. ADMINISTRATION OF THE CONTRACT

A. The Owner's Representative will provide administration of the Contract. Maintenance of the Project records for the contract shall be as prescribed by the Owner's Representative and as hereinafter described.

B. The Owner's Representative will be the representative of the Owner during construction and until final payment is due. The Architect will advise and consult with the Owner's Representative and Owner. The Owner's instruction to the Contractor shall be forwarded through the Owner's Representative. The Owner's Representative will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents, unless otherwise modified by written instrument.

C. The Owner's Representative or Architect will not be responsible for and will not have control or charge of construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the Work, and will not be responsible for the Contractor's failure to carry out the Work in accordance with the Contract Documents. The Owner's Representative or Architect will not be responsible for or have control acts or omissions of the Contractor, Subcontractors, or any of their agents or employees, or any other persons performing any of the Work.

D. The Owner's Representative and Architect shall at all times have access to the Work wherever it is in preparation and progress. The Contractor shall provide facilities for such access so the Owner's Representative and Architect may perform their functions under the Contract Documents.

E. Based on the Owner's Representative and Architect's observations and an evaluation of the Contractor's Applications for Payment, the Owner's Representative will determine the amounts owing to the Contractor and will issue Certificates for Payment in such amounts as provided in GC Article 10.

F. The Owner's Representative shall, upon receipt of a complete submittal from the Contractor, make the submission to the Architect. The Architect shall review and take appropriate action on shop drawings, product data, samples, and other submittals required by the Contract Documents. Such review shall be only for general conformance with the design concept and general compliance with the information given in the Contract Documents. It shall not include review of quantities, dimensions, weights or gauges, fabrication processes, construction methods, coordination with the work of other trades, or construction safety precautions, all of which are the sole responsibility of the Contractor. The Architect's review shall be conducted with reasonable promptness, and within 21 calendar days unless otherwise noted, consistent with sound professional practice. Review of a specific item shall not indicate acceptance of an assembly of which the item is a component. The Architect shall not be required to review and shall not be responsible for any deviations from the Contract Documents not clearly noted by the Contractor, nor shall the Architect be required to review partial submissions or those for which submissions for correlated items have not be received.

G. The Owner's Representative will prepare Change Orders in accordance with GC Article 12.

H. The Contractor shall provide sufficient, safe and proper facilities at all times for the full inspection of the Work by the Architect or other representatives of the Owner, at the project site and at the various other locations where project is being performed.

I. The Owner's Representative and Architect will have authority to reject Work which does not conform to the Contract Documents. Whenever, in their opinion, the Owner's Representative and Architect considers it necessary or advisable for the implementation of the intent of the Contract Documents, the Owner's Representative or Architect will have authority to require special inspection or testing of the Work in accordance with GC Article 31, whether or not such Work be then fabricated, installed or completed. However, the Owner's Representative and Architect's authority to act under this Subparagraph and any decision made by them in good faith to exercise or not to exercise such authority, shall not give rise to any duty or responsibility of the Owner's Representative or Architect to the Contractor, and Subcontractor, any of their agents or employees, or any other person performing any the Work.

J. The duties, responsibilities and limitations of authority of the Owner's Representative as the representative of the Owner during construction as set forth in the Contract Documents will not be modified or extended without written consent of the Owner.

GC 17. NON-CONFORMING WORK

A. The fact that the work and materials have been inspected from time to time and payments on account have been made, shall not relieve the Contractor from the responsibility of replacing and making good any defective work or materials that may be discovered within one year from the date of completion of

the Work by the Contractor and its approval by the Owner's Representative, Architect, and its acceptance by the Owner.

B. Failure of Owner's Representative, Architect or Owner to object to any defects in work or material or variances from the plans and specifications during or after construction shall not be deemed a waiver by Owner, Owner's Representative or Architect of such defects or variances; nor by such failure shall Owner, Owner's Representative or Architect be deemed stopped from requiring Contractor to correct such defects or variances.

C. At Owner's sole option, if Owner prefers to accept non-conforming work, Owner may do so instead of requiring its removal and correction, in which case a Change Order will be issued to reflect an appropriate reduction in the Contract Sum, or if the amount is determined after final payment it shall be paid by the Contractor.

D. Uncovering of Work:

1. If any portion of the Work should be covered contrary to the request of the Owner's Representative, Architect or to requirements specifically expressed in the Contract Documents, it must, if required in writing by the Owner's Representative, be uncovered for their observation and shall be replaced at the Contractor's expense.
2. If any other portion of the Work has been covered which the Owner's Representative or Architect has not specifically requested to observe prior to being covered, the Owner's Representative or Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work be found in accordance with the Contract Documents, the cost of uncovering and replacement shall, by appropriate Change Order, be charged to the Owner. If such Work be found not in accordance with the Contract Documents, the Contractor shall pay such costs unless it be found that this condition was caused by the Owner or a separate contractor as provided in GC 8 above, in which event the Owner shall be responsible for the payment of such costs.

GC 18. OWNERSHIP OF DOCUMENTS

A. All plans and specifications shall remain the property of the Owner and shall be returned to the Owner's Representative or shall be accounted for by the Contractor before the final acceptance of building by the Owner.

B. Documents for this project shall not be used on or for any other work or purposes without express written consent of Owner's Representative, Architect and Owner.

GC 19. DOCUMENTS FURNISHED

A. The Contractor will be supplied ten (10) sets of Contract Documents for use in the Work.

B. Additional sets of Contract Documents may be obtained from the County, at cost, at Contractor's expense.

GC 20. DRAWING DIMENSIONS

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

GC 21. DETAILED DRAWINGS

A. Drawings and details may be furnished to the Contractor as work progresses, showing in more elaboration the work intended to be done and the Contractor shall conform to them as being a part of the Contract.

B. No work shall be performed in advance of the receipt by the Contractor of such detailed drawings, except such work as the Owner's Representative shall order in writing to be done without details. Any complaint as to the character and extent of the details shall be made to the Owner's Representative within ten days after the Contractor has received the same. The Contractor shall notify the Owner's Representative in ample time as to when the Contractor will require these drawings so they may be prepared without causing any delay to the Work.

GC 22. SUBMITTALS

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

B. Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate a material, product or system for some portion of the Work.

C. Samples are physical examples which illustrate materials equipment or workmanship and establish standards by which the Work will be judged.

D. The Contractor shall review, approve and submit, with such promptness as to cause no delay in their own work or in that of any other contractor, copies of all Shop Drawings or Setting Drawings, Schedules for the Work of the various trades and samples of materials and finishes required for the Work, together with information or supporting data as may be required or called for. The Owner's Representative will pass upon them with reasonable promptness in accordance with GC Article 16. The Contractor shall make any corrections required by the Owner's Representative or Architect and resubmit corrected copies.

E. Samples required or called for shall be exactly as specified for and intended to be used in the work; and Shop Drawings shall accurately portray the Work required. Materials, finishes and workmanship shall be equal in every respect to that of the reviewed submittals.

F. Submittals shall be delivered as directed by the Owner's Representative, postage or delivery charges prepaid by the Contractor in all cases. Samples returned upon request from the Contractor shall be returned by collect mail, parcel post or any carrier named by Contractor.

G. The furnishing by the Contractor or the review by the Architect of drawings, samples, schedules or other data shall not relieve the Contractor from responsibility for deviations from drawings or specifications, nor shall it relieve them of responsibility for errors of any sort in shop drawings, schedules or other submittals.

H. By approving and submitting Shop Drawings, Product Data and Samples, the Contractor represents that they have determined and verified all materials, field measurements, and field construction criteria related thereto, or will do so, and that they have checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

I. Each Submittal shall be properly identified as required by the Owner's Representative.

J. Deviations from requirements of Contract Documents, errors, inconsistencies with submittals previously made to or reviewed by Architect, and corrections to dimensions or supporting data shall be clearly identified by the Contractor by notations on the submittals or attached explanations.

K. No portion of the Work requiring submission of a Shop Drawing, Product Data or Sample shall be commenced until the submittal has been reviewed by the Architect as provided in Subparagraph of GC Article 16. All such portions of the Work shall be in accordance with reviewed submittals.

GC 23. SURVEY AND LAYOUT

A. All work pertaining to this Contract shall be laid out on the premises by the Contractor who shall be held responsible for its correctness.

B. The Contractor shall retain and pay for the services of a registered Engineer or licensed surveyor, when applicable, who shall lay out the main lines of the building and other improvements at the site and provide other primary lines, pile locations and levels as may be required.

C. All stakes, benchmarks, survey marks, monuments and other line or level points which have been or may be established in the building or on or about the premises shall be carefully preserved and respected by the Contractor.

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

GC 24. UNITY OF DOCUMENTS

A. The Plans and Specifications are one document and any work shown, required or called for in the one and not in the other, or vice versa, shall be furnished or performed as though it were shown, required or called for in both.

B. The Contractor admits and agrees that the Contract Documents exhibit the intent and purpose of the Owner in regard to the Work, and that they are not complete in every detail and are to be considered as showing the purpose and intent only; and Contractor further agrees to furnish all labor or material for any detail that is necessary to carry out said intent and purpose without extra charge to the Owner.

C. The misplacement, addition or omission of any word, letter or punctuation mark shall in no way change the intent, purpose of meaning or the Plans and Specifications.

D. Any part of the Work or any article or detail pertaining thereto which is not specifically set forth in the Specifications or shown on the Drawings, but which is necessary for the proper completion of the Work, shall be furnished and installed at the Contractor's expense the same as if it had been partly or fully shown or specified. The Contractor shall do and furnish all things necessary to make a complete and workmanlike job in accordance with the intent and purpose of the Contract Documents.

GC 25. INSPECTION BY CONTRACTOR

A. The Contractor shall inspect, review, compare and familiarize himself with the Contract Documents and the premises of the Work, and shall at once report to the Architect, in writing if requested, any error, omission or inconsistency within the documents or between information given and conditions observed or found at the premises.

B. The Contractor shall make a close inspection of all materials as delivered, and shall promptly return all damaged or defective materials without waiting for their rejection by the Owner’s Representative, Project Inspector, or Architect.

C. Before beginning any of the work, the Contractor shall examine all construction and work of other contractors or trades that may affect this work, and to satisfy that everything is in proper condition to receive this work; and shall at once notify the Owner’s Representative, in writing if requested, of any

exception taken to any construction or condition so affecting this work, whether placed under this Contract or other contracts.

D. Failure to file with the Owner's Representative any notice to the contrary shall constitute acceptance by the Contractor of the construction of other contractors or trades as being suitable in all ways to receive their work, except as to defects which later develop in the work of other contractors after the execution of their own work.

E. Contractor's inspection of documents and premises shall include making known to himself the general and particular location, nature and character of the project work, the physical and contractual conditions, provisions and requirements, the nature and extent of work and equipment to be furnished by Owner, and the limitations and various other aspects relative to this project, including all coordination necessary for proper and timely execution of the Work.

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

GC 26. DEVIATION FROM PLANS OR SPECIFICATIONS

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

GC 27. STANDARDS OF MATERIALS

A. Wherever the name or brand of a manufacturer's article is specified herein, it is used as a measure of quality and utility; a standard.

B. If the Contractor desires to use any other brand or manufacturer of equal quality and utility to that specified, Contractor shall make application to the Owner's Representative in writing, and submit samples if requested. Refer to Section 00 22 13, "Supplementary Instructions To Bidders" for substitution request procedures.

GC 28. QUALITY OF MATERIALS AND LABOR

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

GC 29. SUFFICIENT LABOR OR MATERIALS

A. Should the Contractor abandon the Work called for under these specifications, or seek to assign this Contract, or if at any time the Owner's Representative shall be of the opinion and so certify in writing to the Owner that the Contractor is unnecessarily and unreasonably delaying the work, or that the Contractor is willfully violating any of the conditions or provisions of the plans and specifications, or is performing their work in bad faith, the Owner shall, in addition to all other remedies provided by Contract or by law, after seven (7) days written notice to the Contractor, have the power to notify the Contractor to discontinue all work or any part thereof under this Contract; and thereupon, the Contractor shall cease to continue said Work or such part thereof as the Owner may designate, and the Owner shall thereupon have the power to obtain by contract, purchase or hire, such implements, tools, labor or materials by contract or otherwise, as Owner may deem advisable, to work at and be

used to complete the Work herein described, or such part thereof as the Owner's Representative shall certify has not been completed, and to use such material as it may find at the building site. The expenses so incurred in the process shall be deducted by the Owner out of such monies as may either be due or may at any time thereafter become due to the Contractor under and by virtue of these plans and specifications, or any part thereof.

B. If the unpaid balance of the Contract Sum exceeds the cost of finishing the Work, including compensation for the Owner's Representative or Architect's additional services made necessary thereby, such excess shall be paid to the Contractor. If such costs exceed the unpaid balance, the Contractor or their bondsmen shall pay the difference to the Owner on notice to either from Owner. The amount to be paid to the Contractor or to the Owner, as the case may be, shall be certified by the Owner's Representative, upon application, in the manner provided in GC Article 10, and this obligation for payment shall survive the termination of the Contract.

GC 30. OLD MATERIAL

A. Old material shall not be used.

B. Construction materials or other items used or placed in the work later shall be considered old materials and not reused.

GC 31. TESTS

A. Contractor shall comply with the requirements set forth in Division 01, General Requirements Sections.

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

A. The Contractor shall indemnify and save harmless the Owner and authorized persons acting for the Owner against all liability on account of any patent rights, copyrights or trade names which may affect the articles or materials or their application under the Contract.

B. The Contractor shall pay all royalties or other charges that may arise due to methods, types of construction, processes, materials or use of equipment and shall hold the Owner harmless from any claims or charges whatsoever which may arise; and shall furnish written assurance satisfactory to the Owner that such charges have been paid.

GC 33. COMPLIANCE WITH BUILDING LAWS

A. The Contractor shall conform to and abide by all applicable city, county, regional, state and federal building, labor, sanitary, health and safety laws, ordinances, rules and regulations as currently adopted or enforced, including Part 1 & 2 of Title 24, Calif. Code of Regulation and the International Building Code; a copy of Title 24, CCR and the current California Building Code shall be kept at the job site at all times by the Contractor. Such laws and regulations shall be considered a part of these specifications the same as if set forth herein full, and all work hereunder shall be executed in accordance therewith.

B. All work and materials shall be in full accordance with the latest rules and regulations of the State Fire Marshal, the Safety Orders of the Division of Industrial Safety, the National Electric Code, the Uniform Plumbing & Mechanical Codes published by the International Association of Plumbing and Mechanical Officials, and other applicable state laws or regulation including all of Title 24, Calif. Code of Regulation. Nothing in these plans or specifications is to be construed to permit work not conforming to these codes.

GC 34. PERMITS AND LICENSES

A. Unless otherwise provided in the Contract Documents, the Owner shall give all notices and procure and pay for permits and governmental fees, licenses and inspections necessary for the proper execution and completion of the Work which are customarily secured after execution of the Contract and not excluded in Paragraph D below.

B. LICENSES: Professional, trade, business and other licenses required by state statute or local government are entirely the responsibility of the Contractor and Subcontractors, and shall be prerequisite to submitting a bid proposal or performing work on the Project.

C. PERMITS:
1. Permits shall also include any cash deposits, returnable or otherwise, required by authorities having legal jurisdiction to make such demands;
2. Owner reserves the right to cancel and declare null and void the Contract should any legal permit be refused or not issued for any reason;
3. Due to cancellation for said reasons, Owner will not consider any claims by Contractor for loss of anticipated profits; or for work performed or materials procured prior to obtaining all permits required herein.
4. The Contractor shall obtain Encroachment Permits from the City of Eureka, County of Humboldt, and CalTrans as needed.

D. Contractor shall procure and deliver to the Owner's Representative, in forms prescribed and complete with dates and authorized signatures, all certificates of inspection, testing or approvals required of or by State or Civil authorities having legal jurisdiction or any public authority bearing on the performance of the Work.

E. The Contractor shall give all notices and comply with all laws, ordinances, rules, regulations and lawful orders of any public authority bearing on the performance of the Work.

GC 35. TEMPORARY FACILITIES

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

B. The Contractor shall maintain a viable communications system at each site acceptable to the Owner's Representative, and shall maintain the same until the final completion of the Contract and the acceptance of the Work. The Owner's Representative, Architect and Inspector shall have free and unrestricted use of this communications system for all purposes in conjunction with the Work.

C. The Contractor shall provide water closets and urinals for use by their employees and subcontractors and their employees, and in no case shall the permanent plumbing fixtures of buildings on the site be used for this purpose without the written consent of the Owner's Representative.

D. The Contractor and each subcontractor shall furnish, at their own expense, all tools, equipment, appliances, materials, scaffolding or other means necessary for the entire completion of the Work; and shall be responsible for the care and guarding of same.

E. The Contractor and each subcontractor shall erect and maintain where necessary to the progress and completion of the Work, all exterior and interior scaffolding which shall be erected in accordance with the safety rules of the State of California; and use of which shall be unrestricted for all persons performing work on the Project.

F. The Contractor shall pay the cost of all water, gas and electricity used by their employees or subcontractors during the process of the Work, or as required for temporary services or tests and inspections.

G. Also refer to Division 01, General Requirements Sections.

GC 36. LIABILITY FOR ACCIDENTS

A. The Contractor shall be liable for any and all loss, accident, neglect, injury, or damage to person, life or property which may be the result of or may be caused by their building operations or their execution of this Contract, and for which the Owner might be held liable; and shall protect and indemnify the Owner, the Owner's Representative, the Project Inspector, the Architect, and/or any officer, agent or employee of the Owner and hold them harmless in every way from all claims and from all suits or actions at law for damage or injury to persons, life or property that may arise or be occasioned in any way because of their building operations or their execution of this Contract.

B. Safety Precautions and Programs:
1. The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work.

C. The Contractor shall assume the full responsibility for personnel safety on the project and the means and methods of construction that pertain to personnel safety. Contractor is responsible that such means and methods of construction are adequate to provide safety to all personnel while accomplishing all requirements and standards of the Contract Documents. The Owner, Architect, Inspector and/or their representatives have no obligation, responsibility, or jurisdiction over safety or means and methods of construction that pertain to personnel safety on the project.

GC 37. ACCIDENT PREVENTION

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

B. No earth, building, temporary or other structure shall be loaded, used or stressed so as to endanger its safety.

C. In the event of an emergency affecting the safety of persons or property, the Contractor shall act, at their discretion, to prevent threatened damage, injury or loss. Claims by Contractor on account of alleged emergency actions shall be filed in writing with the Owner's Representative.

GC 38. EXISTING PREMISES AND IMPROVEMENTS

A. The Contractor shall care for, preserve and protect existing structures, utilities and other features, fixtures or improvements at the premises, including adjacent or co-terminus properties which are not required to be removed or altered by reason of work under this Contract; and shall, likewise, care for and protect work or improvements newly placed or recently installed at the premises. Any part or portion of said existing or newly placed improvements which are removed, damaged or disturbed because of this work, shall be replaced, cleaned or otherwise returned to the original condition entirely at the expense of the Contractor.

B. The removal and/or replacing of any existing structure, pipe, conduit, pavement or other existing improvement necessary for the proper completion of any work under the Contract shall be performed by the Contractor, and no claim for extra work shall be made on account of such removal and replacement.

C. In case it shall be necessary to remove any telephone, telegraph or electrical power transmission poles, water pipes, electrical conduits, or underground structures of any character, or any portion thereof, the Owner or their agents shall be notified by the Contractor and the Contractor shall make the necessary arrangements for such removal. The right is reserved to the Owner and to gas, water, telephone, telegraph and electrical power transmission companies to enter upon the Work for purpose of making repairs and changes that have become necessary by reason of work related to the Project.

D. The Contractor shall thoroughly investigate all existing poles, wires, pipes and conduits above and below ground and shall provide for the maintenance or replacing of same, in good condition and at no expense to the Owner. Any necessary new or additional pipe or materials shall be furnished by the Contractor at their expense.

E. At the completion of the Work, the Contractor shall furnish the Owner's Representative with a written certificate from the owner of each and all conduits, pipes or structures to the effect that such replacements and maintenance have been satisfactorily performed.

F. The Contractor shall amply protect all work or improvements, set in the building or at the premises, against any possible damage; and shall furnish all necessary building paper, rough boarding or other means or materials necessary therefore.

G. Also refer to Division 01, General Requirements Sections.

GC 39. USE OF PREMISES AND CLEAN-UP

A. During the progress of the Work, materials shall be neatly stacked at such points so as not to interfere with site access and shall be properly cared for and protected against damage by weather or other causes. Project staging and parking area are defined in the plans.

B. In the case where there are several contractors operating at one time, arrangements must be made to allow the joint use of storage space so as to prevent delays in the work and unnecessary inconveniences.

C. At the end of each working day, or as directed by the Owner's Representative, Project Inspector or Architect, the Contractor shall clean the building, premises, streets and adjacent properties of accumulated rubbish, debris, unnecessary appliances or any unused material which may constitute an obstruction to the progress or completion of the Work, whether the same was caused by their work or by the work of other crafts. Failure by the Contractor to maintain the site and building premises in a safe and clean condition will be considered a breach of contract and Contractor agrees to pay Owner for costs to have site cleaned or deduct said costs from any money due the Contractor under the contract.

D. At the completion of the Work, and as one of the requisites thereof, the Contractor shall remove any and all tools, construction equipment, machinery, surplus materials, appliances, rubbish, packing, debris or other extraneous matter of any kind from the building, premises, sidewalks, streets or adjacent premises; Contractor shall go over all of their work and put the same in perfect order and condition and in strict accordance with the terms of the Contract; and shall repair or replace all damaged, broken or stained parts of their work, whether so injured by their workmen or others.

E. No advertising signs of any kind shall be displayed on the building, premises, fences, offices or elsewhere upon the job, except the Project sign as called for in the specifications.

F. At the completion of each phase of work of each kind of work or activity, the areas so used or involved shall be left in a "broom clean" condition daily unless otherwise more particularly required.

GC 40. DIRECTION OF THE WORK

A. The Contractor shall have control or charge over their Subcontractors; shall be responsible to the Owner for the acts and omissions of their employees, subcontractors and their agents and employees,

and other persons performing any of the Work under a contract with the Contractor, and for all orders or instructions from the Owner, Owner's Representative or the Architect.

B. It shall be the Contractor's duty to see that all of the subcontractors commence their work properly at the proper time and carry it on with due diligence as not to cause delay or injury either to work or materials; and that all damage caused by them or their workmen be properly made good by them or by himself at no cost to the Owner.

C. The Contractor shall keep on the Work Site at all times and until the acceptance certificate is issued, a competent Project Manager and Project Superintendent for the purpose of receiving and executing without delay any orders in keeping with the terms of the Contract issued by the Owner, Owner's Representative or Architect. This Superintendent shall have charge of Plans and Specifications kept on the job; shall be instructed to be familiarized closely with all the provisions of the plans and specifications and to follow them in a precise manner.

D. If at any time the Superintendent or workman who shall be employed by the Contractor or any of their Subcontractors shall be declared by the Owner's Representative to be incompetent or unfaithful in executing the work, then the Contractor upon receiving written notice shall, forthwith, dismiss such person and shall not again employ him on any part of the Work.

E. Contractor shall supervise and direct the Work using their best skill and attention, and shall be solely responsible for all construction means, methods, techniques, sequences and procedures and for coordinating all portions of the work under the Contract; except that said responsibilities shall not be construed to permit use of any material, process, method or means if they are deemed unsuitable by Owner's Representative.

F. Processing of Change Orders, Cost Estimates and like administrative matters, shall follow the procedures established and approved by the Owner at commencement of Work under the Contract. Change orders and other forms shall be as approved by the Owner's Representative or otherwise required or directed by Owner. Refer to GC 12.

G. Review of Contract Documents: The Contractor shall carefully study and compare the Contract Documents and shall at once report to the Architect through the Owner's Representative any conflict, error, inconsistency or omission Contractor may discover. Refer to GC 11 A.

H. The Contractor shall not be relieved from their obligations to perform the Work in accordance with the Contract Documents by the activities or duties of the Owner's Representative in their administration of the Contract, or by inspections, tests or approvals required or performed under GC 31, by person other than the Contractor.

I. Progress Schedule:

1. The Contractor shall prepare and submit to the Owner's Representative with copy to the Architect and the Construction Inspector the Contractor's Initial Construction Schedule within ten (10) calendar days after date on the Notice to Proceed. The Contractor's Initial Construction Schedule shall be comprised of either a Detailed Bar Chart, if the contract value is less than one million dollars ($1,000,000), or a Critical Path Method network, if the contract value is one million dollars ($1,000,000) or more. The Contractor's Initial Construction Schedule shall show the dates on which each part or division of the work is expected to be started and completed, and shall show all submittals associated with each work activity, allowing a minimum of twenty one (21) calendar days (per GC 16 F) for the Architect's review of each submittal unless a longer period of time is specified elsewhere in these Contract Documents. The work activities making up the schedule shall be of sufficient detail to assure that adequate planning has been done for proper execution of the work and such that, in the sole judgment of the Owner, it provides an appropriate basis for monitoring and evaluating the progress of the work. The schedule shall show the interdependence of each activity and a single critical path. The Contractor shall also submit a separate progress schedule listing

all submittals required under the contract and when it is anticipated that each submittal will be submitted.

2. The Contractor's Initial Construction Schedule shall show the sequence, duration in calendar days, and interdependence of activities required for the complete performance of all work. The Contractor's Initial Construction Schedule shall begin with the date of issuance of the Notice to Proceed and conclude with the date of final completion.
3. Float, slack time, or contingency within the schedule (i.e., the difference in time between the project's early completion date and the required contract completion date), and total float within the overall schedule, is not for the exclusive use of either the Owner or the Contractor, but is jointly owned by both and is a resource available to and shared by both parties as needed to meet contract milestones and the contract completion date.
4. The Contractor shall not sequester shared float through such strategies as extending activity duration estimates to consume available float, using preferential logic, or using extensive crew/resource sequencing, etc. Since float time within the schedule is jointly owned, no time extensions will be granted nor delay damages paid until a delay occurs which extends the work beyond the Contract completion date. Since float time within the construction schedule is jointly owned, it is acknowledged that Owner caused delays on the project may be offset by Owner caused time savings (i.e., critical path submittals returned in less time than allowed by the contract, approval of substitution requests which result in a savings of time to the Contractor, etc.) In such an event, the Contractor shall not be entitled to receive a time extension or delay damages until all Owner caused time savings are exceeded and the contract completion date is also exceeded.
5. Comments made by the Owner on the Contractor's Initial Construction Schedule during review will not relieve the Contractor from compliance with the requirements of the contract documents. The review is only for general conformance with the scheduling requirements of the contract documents. Upon the Owner's request, the Contractor shall participate in the review of the Contractor's Initial Construction Schedule submissions (including the original submittal, all update submittals, and any re-submittals). The Owner may request the participation of subcontractor in these reviews, as determined necessary by the Owner. All revisions shall be resubmitted within fifteen (15) calendar days after the Owner's review.
6. The submittal of a fully revised and acceptable Contractor's Initial Construction Schedule shall be a condition precedent to the processing of the first monthly payment application.
7. On any project with a construction value equal to or greater than one million dollars ($1,000,000), the Contractor must submit a Critical Path Method (CPM) network. The network shall provide a workable plan for monitoring the progress of all the elements of the work, establish and clearly display the critical elements of the work, forecast completion of the construction, and match the contract duration in time. Exclusive of those activities for submittal review and material fabrication and delivery, activity duration shall not be less than one (1) nor more than thirty (30) calendar days, unless otherwise approved by the Owner. In addition to the detailed network diagram, the Contractor shall submit the following reports with the original submittal and all updates and revisions:

    a. Predecessor/Successor Report or a list showing the predecessor activities and successor activities for each activity in the schedule.
    b. Activity Report sorted by early start or a list showing each activity in the schedule, arranged by early start dates.

8. Regardless of which schedule method the Contractor elects to use in formulating the Contractor's construction schedule, and unless the Owner's Representative in writing each month, specifically waives this requirement, an updated construction schedule shall be submitted to the Owner's Representative five (5) days prior to the submittal of the Contractor's monthly payment request. The submittal of the updated construction schedule which satisfies the requirements of the Contract Documents accurately reflects the status of the work, and incorporates all changes into the schedule, shall be a condition precedent to the processing of the monthly payment application. Updated schedules shall also be submitted at such other times as the Owner may direct. Upon approval of a change order or issuance of a direction to proceed with a change, the approved change shall be reflected in

the next schedule update submittal by the Contractor, or other update submittal approved by the Owner.

9. If completion of any part of the work, the delivery of equipment or materials, or submittal of the Contractor submittals is behind the updated construction schedule and will impact the end date of the work past the contract completion date, the Contractor shall submit in writing, a plan acceptable to the Owner for completing the work on or before the current contract completion date.
10. No time extensions shall be granted nor delay damages paid unless the delay can be clearly demonstrated by the Contractor on the basis of the updated construction schedule current as of the month the change is issued or the delay occurred and which delay cannot be mitigated, offset, or eliminated through such actions as revising the intended sequence of work or other means. Contractor shall submit all disputes or claims under the provisions of GC 51, Claims Procedure, otherwise it shall be waived.
11. As a condition precedent to the release of retained funds, the Contractor shall, after completion of the work has been achieved, submit a final Contractor's construction schedule which accurately reflects the manner in which the project was constructed and includes actual start and completion dates for all work activities on the construction schedule.

J. The Contractor shall forward all communications to the Owner and Architect through the Owner's Representative.

GC 41. CUTTING, FITTING AND PATCHING

A. The Contractor shall do all cutting, fitting and patching of Work that may be required to make its several parts come together properly, and prepare it to join or be joined by the work of other contractors; and Contractor shall make good after them.

B. The Contractor shall not endanger any work by cutting, digging or otherwise; and shall not cut or alter the work of any other contractor without the written consent of the Architect; and shall not cut a beam, timber or support of any kind without the consent of the Architect. Under no circumstances shall any principal brace, timber, truss, support or other structural member be cut or structurally weakened in any way.

C. Where the construction is required to join with or match existing work, it shall be finished exactly similar to that work so as to form complete, unified and finished work.

D. Contractor shall be responsible for and particularly supervise each and every operation and all work which in any way may affect the structural integrity of the various works, including below, or, or above grade structures, and whether for temporary or permanent work.

E. Any cost for repairs or restoration caused by cutting, digging or otherwise due to ill-timed or defective work shall be borne by the Contractor.

F. Also refer to Division 01, General Requirements Sections.

GC 42. RIGHT TO OCCUPY OR USE

A. The Owner reserves the right to occupy or use any part or parts, or the entirety of the building and/or grounds when the Owner deems the same may be safe for use or occupancy.

B. The exercising of this right shall in no way constitute an acceptance of such parts, or any part of the work, nor shall it in any way affect the dates and times when payments shall become due from the Owner to the Contractor, nor shall it in any way prejudice the Owner's right under the Contract or any bonds guaranteeing the same. The Contract shall be deemed completed only when all the Work contracted for shall be duly and properly performed and accepted by the Board of Supervisors.

C. When any part or portion of the Project is to be used or occupied by Owner in advance of final completion and acceptance, and when duly notified by Owner's Representative, the Contractor shall arrange for completion of said portions of the Work the same as required under the Documents for the whole Work, including cleaning and other readying by the date stipulated with such notice.

D. Contractor shall not be held responsible for any damage to the occupied part of the Project resulting from Owner's occupancy.

E. Occupancy by Owner shall not be deemed to constitute a waiver of existing claims on behalf of Owner or Contractor against each other.

F. Use and occupancy by Owner prior to project acceptance shall not relieve Contractor's responsibility to maintain all insurance and bonds required of Contractor under the Contract until the entire Project is completed and accepted by Owner.

G. If after written notification by the Owner of the intent to occupy, the Contractor feels that such occupancy will delay progress of the work or will cause additional expense to the Contractor, Contractor may file a request for an equitable adjustment in Contract Price or Time of Completion, or both, with the Owner's Representative. If the Owner's Representative agrees he will either prepare a written change order for the Owner to sign or advise the Owner to delay occupancy.

GC 43. CHANGE OF CONTRACT TIME & LIQUIDATED DAMAGES

A. Change by Change Order. The contract time may only be changed by change order. A request for an extension or shortening of the contract time shall be based on written notice delivered by the party making the request to County promptly after the occurrence of the event giving rise to the request and stating the general nature of the request. Notice of the extent of the request with supporting data shall be delivered to County and shall be accompanied by the written statement that the adjustment requested is the entire adjustment to which the requesting party has reason to believe it is entitled as a result of the occurrence of said event. No request for an adjustment in the contract time will be valid if not submitted in accordance with the requirements of this paragraph.

B. Contract time may be extended. The contract time will be extended in an amount equal to time lost due to delays beyond the control of Contractor if the request is made therefor as provided in this article. Such delays shall include, but not be limited to, acts of neglect by County or others performing additional work, or to fires, floods, labor disputes, epidemics, abnormal weather conditions or acts of God.

C. Delay and price change. All time limits stated in the contract documents are of the essence. There shall be no adjustment of contract price due to delays for fires, floods, labor disputes, epidemics, abnormal weather conditions or acts of God. The provisions of this Provision shall not exclude recovery for damages (including but not limited to fees and charges of engineers, architects, attorneys and other professionals and court costs) for delay by either party.

D. Delays in completion of work :

1. Notice of delays. Whenever the Contractor foresees any delay in the prosecution of the work, and in any event immediately upon the occurrence of any delay which the Contractor regards as unavoidable, Contractor shall notify County in writing of the probability of the occurrence of such delay and its cause in order that County may take immediate steps to prevent, if possible, the occurrence or continuance of the delay or, if this cannot be done, may determine whether the delay is to be considered avoidable or unavoidable, how long it continues, and to what extent the prosecution and completion of the work are to be delayed thereby. It will be assumed that any and all delays which have occurred in the prosecution and completion of the work have been avoidable delays, except such delays as shall have been called to the attention of County at the time of their occurrence and found by County to

have been unavoidable. The Contractor shall make no requests for extensions of time as to delay not called to the attention of County at the time of its occurrence.

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

E. Extension of time:

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

GC 44. HOURS OF WORK

A. The time of service of any labor, workman or mechanic employed upon any of the Work herein specified, shall be limited and restricted to that allowed by law, and no laborer, workman or mechanic employed upon said Work herein specified shall be required or permitted to labor more than that allowed by law, except in cases of extraordinary emergency caused by fire, military or naval defenses or works in time of war.

B. Within thirty (30) calendar days after any workman is permitted to work over that allowed by law in any one calendar day due to such an extraordinary emergency, the Contractor shall file with the Owner a verified report setting forth the nature of the said emergency, which shall contain the name of said workman and the hours worked by them on said particular day; and failure to file said report within the said thirty day period shall be prima facie evidence that no extraordinary emergency existed.

C. The Contractor and each subcontractor shall keep an accurate record showing the name of and actual hours worked by each worker employed by said Contractor and subcontractor in connection with the work contemplated by this agreement. The record shall be kept open at all reasonable hours to inspection by the Owner or its officers or agents and by the Division of Labor Law Enforcement of the Department of Industrial Relations.

D. The Contractor shall forfeit as a penalty to the Owner twenty-five dollars ($25) for each laborer, workman or mechanic employed in the execution of this Contract by them or by any subcontractor under him, upon any public work herein specified for (a.) each calendar day during which any laborer, workman or mechanic is required or permitted to labor more than that allowed by law; or (b.) each calendar week during which any laborer, workman or mechanic is required or permitted to labor more than that allowed by law of the Labor Code of the State of California. Said sums and amounts which shall have been so forfeited pursuant to the herein paragraph and said provisions of said Labor Code shall be withheld and retained from payments due to the Contractor under this Contract, pursuant to this Contract, and the terms of said Code; but no sum shall be so withheld, retained or forfeited except from the final payment without a full investigation by either the Division of Labor Law Enforcement of the State Department of Industrial Relations or by the Owner.

GC 45. PREVAILING WAGE RATES & PAYROLL RECORDS

A. Prevailing Wage Rates

1. Pursuant to section 1770 and following of the Labor Code of the State of California, the Director of Industrial Relations has ascertained the general prevailing rate of per diem wages and the rates for overtime and holiday work in the locality in which the work is to be performed for each craft, classification or type of worker needed to execute the Contract which will be awarded to the successful bidder, copies of which are on file at Humboldt County Public Works, 1106 Second Street, Eureka, CA 95501, Phone (707) 445-7493 and are available to interested parties on request and by reference are incorporated herein and made a part hereof. Contractor will maintain a copy of prevailing rates and wages on the job site during the contract period.
2. It shall be mandatory upon the Contractor and upon any subcontractor under it, to pay not less than the specified rates to all laborers, workers, and mechanics employed in the execution of the Contract. It is further expressly stipulated that the Contractor shall, as a penalty to the Owner, forfeit not more than $200 for each calendar day, or portion thereof, for paying less than the stipulated prevailing rates for any work done under this contract by Contractor or by any subcontractor under it; and Contractor agrees to comply with all provisions of Section 1775 of the Labor Code.
3. In case it becomes necessary for the Contractor or any subcontractor to employ on the project under this Contract any person in a trade or occupation (except executives, supervisory, administrative, clerical, or other non-manual workers as such) for which no minimum wage rate is herein specified, the Contractor shall immediately notify the Owner, who will promptly thereafter determine the prevailing rate for such additional trade or occupation and shall furnish the Contractor with the minimum rate based thereon. The minimum rate thus furnished shall be applicable as a minimum for such trade or occupation from the time of the initial employment of the person affected and during the continuance of such employment. Each contractor shall file a certified copy of the payroll records with the entity that requested the records within ten (10) days after receipt of a written request.
4. Any copy of records made available for inspection as copies and furnished upon request to the public or any public agency by the Owner, shall be marked or obliterated in such a manner as to prevent disclosure of an individual's name, address, and social security

number. The name and address of the contractor awarded the contract for performing the contract shall not be marked or obliterated.

5. The Contractor shall inform the Owner of the location of the payroll records, including the street address, city and county, and shall, within five working days, provide a notice of any change of location and address.
6. The Prime Contractor shall be responsible for compliance with this section.

B. Payroll Records. The Contractor agrees to comply with all requirements of Section 1776 of the Labor Code, including, without limitation, the following:

1. The Contractor and each subcontractor shall keep an accurate payroll record, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by it in connection with the public work. Each payroll record shall be verified by written declaration, under penalty of perjury, stating both the following:
   a. The information contained in the payroll record is true and correct.
   b. The employer has complied with the requirements of sections 1771, 1811 and 1815 of Labor Code for any work performed by his employees on the project.
2. The above-referenced payroll records shall be certified and shall be available for inspection at all reasonable hours at the principal office of the Contractor on the following basis:
   a. A certified copy of an employee's payroll record shall be made available for inspection or furnished to the employee or their authorized representative on request;
   b. A certified copy of all payroll records shall be made available for inspection or furnished upon request to the Owner, the Division of Labor Standards Enforcement, or the Division of Apprenticeship Standards of the Department of Industrial Relations.
   c. A certified copy of all payroll records shall be made available upon request by the public for inspection or copies thereof made; provided, however, that a request by the public shall be made through either the Owner, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement. If the requested payroll records have not been provided, pursuant to paragraph b. above, the requesting party shall, prior to being provided the records, reimburse the cost of the Contractor, subcontractors, and the entity through which the request was made. The public shall not be given access to the records at the principal office of the Contractor.

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

GC 46. TAXES

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

GC 47. SUBCONTRACTORS

A. In accordance with the provisions of Section 4100 et seq, of the Public Contract Code of the State of California, each bidder for the work herein specified shall set forth in their Bid Proposal the name and location of the place of business of each subcontractor who will perform work or labor or render

service to the General Contractor in or about the construction of the Work or improvements an the amount in excess of one-half (1/2) of one percent (1%) of the General Contractor's total Base Bid; and the portion of the Work which will be done by each subcontractor if the Contract or said Work is awarded to said Bidder.

B. If any General Contractor fails to specify a subcontractor or specifies more than one subcontractor for the same portion of the Work to be performed on the Contract in excess of one-half of one percent of the General Contractor's total Bid, Contractor agrees to perform such portion himself and, if Contractor's Bid is accepted, Contractor shall not be permitted to subcontract that portion of the Work.

C. Should the General Contractor violate any provision of the subletting and subcontracting Fair Practices Act, the Contractor will be deemed in violation of the contract and the Owner may at it's option, (1) cancel the Contract. (2) assess upon the Contractor a penalty in an amount of not more than ten percent (10%) of the amount of the subcontract involved.

D. Prior to the award of the Contract, the Owner's Representative shall notify the successful bidder in writing if the Owner, after due investigation, has reasonable objection to any person or organization on the required list of subcontractors. Failure of the Owner to make an objection to any person or organization on the list prior to the award shall constitute acceptance of such person or organization.

E. The Contractor shall not contract with any subcontractor or any person or organization for any portion of the work who has not been accepted by the Owner. The Contractor will not be required to contract with any subcontractor or person or organization against whom Contractor has a reasonable objection.

F If after the award of the contract, the Owner refuses to accept any person or organization on the required list of subcontractors, the Contractor shall submit an acceptable substitute and the Contract Sum shall be increased or decreased by the difference in cost occasioned by such substitution, and an appropriate Change Order shall be issued; however, no increase in the Contract Sum shall be allowed for any such substitution unless the Contractor has acted promptly and responsively in submitting a name with respect thereto prior to the award.

G. After the award, the Contractor shall resubmit the list of subcontractors, corrected or modified as may be necessary as directed by the Owner.

H. Subcontracting

1. Nothing contained in the Contract Documents shall be construed as creating any contractual relationship between Owner and any subcontractor. The Divisions or Sections of the Specifications, and the divisioning of the Drawings are not intended to control the Contractor in dividing the Work among subcontractors or to limit the Work performed by any trade.
2. The Owner, Owner's Representative or Architect will not undertake to settle any differences between the Contractor and their subcontractors or between subcontractors.
3. The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the work to bind subcontractors to the Contractor by the terms of the General Conditions, and other Contract Documents insofar as applicable to the work of subcontractors; and to give the Contractor the same power as regards terminating any subcontract that the Owner may exercise over the Contractor under any provision of the Contract Documents. The Contractor shall make available to each proposed subcontractor prior to the execution of the Subcontract, copies of the Contract Documents to which the subcontractor will be bound by this Paragraph and identify to the subcontractor any terms and conditions of the proposed Subcontract which may be at variance with the Contract Documents. Each subcontractor shall similarly make copies of such Documents available to their sub-subcontractors.

I. Payments to Subcontractors:

1. Contractor shall pay each subcontractor or supplier upon receipt of payment from Owner, an amount equal to the percentage of completion allowed to Contractor on account of such work

performed or material supplied. Contractor shall also require each subcontractor to make similar payments to their subcontractors or suppliers.

2. Contractor shall pay each subcontractor a just share of any insurance monies received by Contractor when and as applicable, and Contractor shall require each subcontractor to make similar payments to their subcontractors or suppliers.
3. The Owner's Representative may, on request and at their discretion, furnish to any subcontractor, if practicable, information regarding percentages of completion certified to the Owner on account of Work done under the Contract.
4. Neither Owner, Owner's Representative or Architect shall have any obligation to see to the payment of any monies to any subcontractor except as may otherwise be required by law.

GC 48. RECORDS, ACCOUNTS AND SEGREGATED PRICES

A. Contractor agrees to keep one complete set of records and books of accounts, on a recognized cost accounting basis, satisfactory to Owner and Owner's Representative showing all expenditures, of whatever nature, made pursuant to this Contract.

B. Contractor shall furnish such records, information and data as may be reasonably required and shall cooperate with Owner or Owner's Representative in establishing total costs for various major portions of the Work as will be designated by the Owner's Representative.

C. If required for convenience of Owner's accounting, Contractor shall furnish segregated prices for various other portions of the Work. These segregated prices shall be in addition to or separate from the required Schedule of Values.

GC 49. LIABILITY FOR TREES

A. In case of damage to or loss of trees due to carelessness or lack of sufficient protective measures specified, Contractor shall forfeit an amount in proportion to the extent of damage or loss, which shall not be less than Two hundred ($200) dollars nor exceed One Thousand ($1,000) dollars per tree for total loss.

GC 50. LIABILITY FOR SURVEY MARKS

A. In case of damage to, disturbance or removal of survey marks, field markers, monuments, or other survey or layout devices due to carelessness or lack of sufficient protective means, the party responsible for such damage, disturbance or removal shall be liable for the expense to have them replaced and reset in compliance with specified requirements.

GC 51. CLAIMS PROCEDURES

A. Claims defined. For purposes of this paragraph, "claim" shall be defined as set forth in Public Contracts Code Section 20104(b)(2). Claims shall be presented in writing and include the documents necessary to substantiate the claim. Claims must be filed with the designated County representative no later than thirty (30) days after the occurrence of the event giving rise thereto or denial of the change order, whichever occurs last. The form of said claims shall be the same as is required by Government Code Sections 910 and 910.2.

B. Claims under $50,000. If the claim is under $50,000, County shall respond in writing to Contractor within 45 days of receipt of Contractor's claim or may request, in writing, within 30 days of receipt of the claim, any additional documentation supporting the claim or relating to defenses or claims the County may have against the Contractor. If additional information is thereafter required, it shall be requested and provided pursuant to Public Contracts Code Section 20104.2, upon mutual agreement of the County and the Contractor. The County'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.

C. Claims over $50,000. For claims over $50,000 and less than or equal to $375,000, County 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 or claims the County may have against Contractor. If additional information is thereafter required, it shall be requested and provided pursuant to Public Contracts Code Section 20104.2, upon mutual agreement of County and Contractor. The County's written response to the claim, as further documented, shall be submitted to Contractor within 30 days after receipt of the further documentation, or within a period of time no greater than that taken by Contractor in producing the additional information or requested documentation, whichever is greater.

D. Contractor's dispute of response. If Contractor disputes County's written response, or County fails to respond within the time prescribed above, Contractor may so notify County, in writing, either within 15 days of receipt of County's response or within 15 days of County's failure to respond within the time prescribed, respectively, and demand an informal conference to meet and confer with County representatives for settlement of the issues in dispute. Upon such demand, County shall schedule a meet and confer conference within 30 days for settlement of the dispute.

E. Filing of a claim. If following the meet and confer conference the claim or any portion remains in dispute, Contractor may file a claim with the Board of Supervisors pursuant to 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. Pursuant to authority granted by Government Code Section 930.2, all claims filed with the Board of Supervisors pursuant to the Government Code shall be filed within 90 days of the denial of the original claim by the County representative. The running of the period of time within which a claim under the Government Code must be filed shall be tolled by any period of time utilized by the meet and confer conference. Any lawsuit which Contractor intends to bring with respect to any claim filed pursuant to the Government Code which claim has been denied by County must be commenced not later than six months after the recording of the notice of completion or not later than six months after the date final payment is deposited in the mail or personally delivered, whichever date comes first.

F. Documentation in support of a claim. For every claim that Contractor makes, it shall provide the following documentation upon request of County as a condition precedent to consideration of the claim: Contractor's bidding calculations forms, cost estimates, time sheets, trend reports, job cost analysis records, labor records, as-built documents, any other records used by Contractor in arriving at its bid price, and any other documents or records kept by Contractor during the course of construction. In the event that claims are made, Contractor agrees that County shall have the right to conduct a complete audit of the books and records of Contractor relating to this project and any books and records relating to overhead, profit or general office expenses charged to this project.

G. Representative's decision. Where a representative is appointed, the rendering of a decision by the representative with respect to any such claim, dispute or other matter (except any which have been waived by the making or acceptance of final payment) will be a condition precedent to any exercise by County or Contractor of such rights or remedies as either may otherwise have under the Contract Documents or by laws or regulations in respect of any such claim, dispute or other matter.

H. Limitations on Representative's responsibilities. Neither the County representative's authority to act nor any decision made by the representative in good faith either to exercise or not exercise such authority shall give rise to any duty or responsibility of the representative or County to Contractor, any subcontractor, any supplier, or any other person or organization performing any of the work, or to any surety for any of them.

GC 52. ATTORNEY'S FEES

A. Contractor hereby agrees to pay Owner, Owner's Representative and/or Architect a reasonable sum as attorney's fees in all court actions including arbitration brought by either of them against the other or in which they are both plaintiffs or defendants, and also in court actions involving claims of

subcontractors or material suppliers and in actions involving offsetting claims between Contractor and Owner, Owner's Representative or Architect because of any doubts, disputes or actions arising out of this Contract, except in the following cases:

1. When Contractor obtains a favorable net judgment against the Owner, Owner's Representative and/or Architect after consideration of claims and offsets of Owner which are allowed by the court against Contractor for breach of this Contract;
2. When Owner, Owner's Representative and/or Architect is denied a favorable judgment by a court in a suit against Contractor which may be brought by Owner, Owner's Representative or Architect.

END OF SECTION 00 72 00

SECTION 00 73 00 - SUPPLEMENTARY GENERAL CONDITIONS

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SGC 1. GUARANTEE WORK

A. In the event of failure of Contractor to comply with the requirements of any guarantee by this Contract within seven (7) days after being notified in writing, Owner is authorized to proceed to have the defects repaired and made good at the expense of Contractor, who shall pay the costs and charges therefore immediately on demand.

SGC 2. LAWS AFFECTING PUBLIC WORKS

A. Attention to bidders is called to necessity of being familiar with the various Federal, State and Local laws affecting public work, especially, but not limited to, those laws relating to hours of employment, minimum wage rates, payment of wages, sanitary and safety conditions for workmen, workmen's compensation insurance, type and kind of materials that can be used, non-discrimination in employment and affirmative-action programs. Contractor is advised that this project is being paid for by State and local funds. Contractor shall comply with applicable regulations and hold harmless the Owner for their failure to comply. Certain of those provisions may be set forth herein or in the General Construction Contract. The existence of these provisions does not excuse the Contractor from complying with other statutory requirements or provisions which are not set forth in these Contract Documents.

SGC 3. OWNER'S REPRESENTATIVE, INSPECTOR

A. The Owner will employ an "Owner's Representative" and "Inspector". The Inspector will observe the installation of all materials and equipment to be incorporated into the Work and the placing of such materials and equipment to determine in general if the Work is proceeding in accordance with the Contract Documents. On the basis of their observations, the Inspector will keep the Owner's Representative informed as to the progress of the Work and will endeavor to guard the Owner against defects and deficiencies in the Work of the Contractor and subcontractors employed by the Contractor in the prosecution of the Work. The Owner's Representative and Inspector shall not be responsible for means, methods, techniques, sequences or procedures of construction, nor be responsible for the Contractor's failure to carry out the Work in accordance with the Contract Documents.

SGC 4. RESPONSIBILITY FOR COMPLIANCE WITH OSHA

A. All work, materials, work safety procedures and equipment shall be in full accordance with the latest OSHA rules and regulations.

B. Contractor warrants that Contractor and each of their subcontractors shall, in performance of this Contract, comply with each and every compliance order issued pursuant to OSHA and CAL-OSHA. The Contractor assumes full and total responsibility for compliance with OSHA and CAL-OSHA Standards by their subcontractors as well as himself. The cost of complying with any compliance order and/or payment of any penalty assessed pursuant to OSHA and CAL-OSHA shall be borne by the Contractor. Contractor shall save, keep and hold harmless the Owner and all officers, employees and agents thereof from all liabilities, costs or expenses in law or in equity, that may at any time arise or be set up because of Contractor's or subcontractor's non-compliance or alleged non-compliance with OSHA and CAL-OSHA requirements.

C. Nothing contained herein shall be deemed to prevent the Contractor and their subcontractors from otherwise allocating between themselves responsibility for compliance with OSHA and CAL-OSHA requirements; provided, however, that the Contractor shall not thereby be, in any manner whatsoever, relieved of their responsibility to the Owner as herein above set forth.

SGC 5. AS BUILT DRAWINGS

A. The Contractor shall be given an extra set of drawings and specifications which shall be kept at the site of the Work at all times. Exact locations of all pipes and conduits, and all changes in construction and details shall be indicated and dimensioned upon these drawings, and all changes in materials and equipment installed shall be indicated in these specifications. The as-

built drawings shall be current (up-to-date) to qualify for payment; the job Inspector will verify. Upon completion of the Work, the As-Built Drawings shall be prepared by the Contractor and Specifications shall be reviewed by the Owner's Representative and Consultants and returned to the Owner prior to the final payment. The As-Built Drawings shall be neatly drafted on erasable mylar reproducible transparencies, or printed on vellum and submitted as a .dwg file if prepared electronically.

SGC 6. FINAL CERTIFICATES

A. When the Work is ready for acceptance, by the Owner, the Owner's Representative shall so certify in writing to the Owner, indicating substantial completion and that the building can be occupied and used and a Certificate of Acceptance will be issued to the Contractor which will bring their Progress Payment up to ninety-five (95%) percent of the Contract Price, with five (5%) percent to remain in retention until after Notice of Completion, less sums withheld regarding liquidated damages, if any, or any other damages incurred by owner, or other sums withheld pursuant to the terms of this agreement or by law.

B. Notice of Completion will be filed by the Owner after substantial completion and acceptance of the Work by the Board of Supervisors. Providing no stop notices have been filed, thirty-five days after filing of such notice of completion, payment due under the Contract will become due to the Contractor and the Owner's Representative shall so certify to the Owner authorizing the final payment. Such payment may withhold any reasonable sums payable to Contractor for any Work which has not been completed on said date, or that the Owner may have found defective and ordered to be replaced; final payment for withholding to be made when certified by Owner's Representative in writing to Owner.

SGC 7. LIENS AND STOP NOTICES

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

SGC 8. GUARANTEES AND MAINTENANCE MANUALS

A. The Contractor and each subcontractor and each supplier shall provide to the Owner, copies of all maintenance guarantees, maintenance manuals and technical specifications relating to their portion of the Project prior to completion of the Project, and in accordance with the GENERAL REQUIREMENTS, PROJECT CLOSE-OUT.

SGC 9. THE WORK

A. The Work comprises the completed construction required by the Contract Documents and approved change orders and includes all labor necessary to produce such construction, and all materials and equipment incorporated or to be incorporated in such construction.

SGC 10. THE PROJECT

A. The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part.

B. By executing the Contract, the Contractor represents that Contractor has visited the sites, familiarized themselves with the local conditions under which the Work is to be performed, and correlated their observations with the requirements of the Contract Documents.

C. The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work. The Contract Documents are complementary, and what is required by any one shall be as binding as if required by all. Work not covered in the Contract Documents will not be required unless it is consistent therewith and is reasonably inferable therefrom as being necessary to

produce the intended results. Words and abbreviations which have well-known technical or trade meanings are used in the Contract Documents in accordance with such recognized meanings.

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

SGC 11. OWNER

A. The Owner shall forward all instruction to the Contractor through the Owner's Representative.

B. Information or services under the Owner's control shall be furnished by the Owner with reasonable promptness to avoid delay in the orderly progress of the Work.

SGC 12. OWNER'S RIGHT TO STOP THE WORK

A. If the Contractor fails to correct defective Work as required by GC 17, or persistently fails to carry out the Work in accordance with the contract Documents, the Owner, by a written order signed personally or by an agent specifically so empowered by the Owner in writing, may order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of the Owner to stop the Work shall not give rise to any duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity.

SGC 13. OWNER'S RIGHT TO CARRY OUT THE WORK

A. If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within seven (7) calendar days after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, after seven (7) calendar days following receipt by the Contractor of an additional written notice and without prejudice to any other remedy the Owner may have, make good such deficiencies. In such case an appropriate Change Order shall be issued deducting from the payments then or thereafter due the Contractor the cost of correcting such deficiencies, including compensation for the Owner's Representative or Architect's additional services made necessary by such default, neglect or failure. If the payments then or thereafter due the Contractor are not sufficient to cover such amount, the Contractor shall pay the difference to the Owner immediately upon demand.

SGC 14. INDEMNIFICATION

A. To the fullest extent permitted by law, the Contractor shall indemnify, defend and hold harmless the Owner, Owner's Representative, Inspector and the Architect and their agents and employees from and against all claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from the performance of the Work, provided that any such claim, damage, loss or expense is (1) attributable to bodily injury, sickness, disease or death, or the injury to or destruction of tangible property (other than the Work itself) including the loss of use resulting therefrom, and (2) is caused in whole or in part by any negligent act or omission of the Contractor, and subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder; excepting only such claims as are caused by the sole negligence or willful misconduct of the Owner, Owner's Representative, Inspector or Architect. Such obligation shall not be construed to negate, abridge, or otherwise reduce any other right or obligation of indemnity which would otherwise exist as to any party or person described in this paragraph.

B. In any and all claims against the Owner, Owner's Representative, Inspector or the Architect or any of their agents or employees by any employee of the Contractor, any subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligation under this paragraph shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any

subcontractor under Workers' or Workmen's Compensation Acts, disability benefit acts or other employee benefit acts.

C. The obligations of the Contractor under this paragraph shall not extend to the liability of Owner's Representative or the Architect, their agents or employees, arising out of (1) the preparation or approval of maps, drawings, opinions, reports, surveys, change orders, design or specification, or (2) the giving of or the failure to give directions or instruction by the Owner's Representative or the Architect, their agents or employees provided such giving or failure to give is the primary cause of the injury or damage.

SGC 15. COMPLIANCE WITH TITLE 24, CALIFORNIA CODE OF REGULATIONS AND THE INTERNATIONAL BUILDING CODE

A. Governing Codes: Title 24, California Code of Regulations (C.C.R.),latest edition which adopts and amends the International Building Code, latest edition; International Fire Code, latest edition; Uniform Mechanical Code, latest edition; National Electrical Code, latest edition; Uniform Mechanical Code, latest edition; and the Uniform Plumbing Code, latest edition. The project shall also comply with the Americans with Disabilities Act, and the latest editions of associated regulations.

SGC 16. LIABILITY OF CONTRACTOR

A. The Contractor shall do all of the Work and furnish all labor, materials, tools, and appliances, except as otherwise herein expressly stipulated, necessary or proper for performing the Work herein required in the manner and within the time herein specified. The mention of any specific duty or liability imposed upon the Contractor shall not be construed as a limitation or restriction of any general liability or duty imposed upon the Contractor by this contract, said reference to any specific duty or liability being made herein merely for the purpose of explanation.

B. The right of general supervision by the Owner shall not make the Contractor an agent or employee of the Owner, and the liability of the Contractor for all damages to persons or to public or private property arising from the Contractor's execution of the Work shall not be lessened because of such general supervision.

B. Until the completion and final acceptance by the Owner of all of the Work under and implied by this contract, the Work shall be under the responsible care and charge of the Contractor. The Contractor shall rebuild, repair, restore and make good all injuries, damages, re-erections and repairs occasioned or rendered necessary or caused of any nature whatsoever, excepting only acts of God not covered by the all-risk insurance policy called for in Article GC 4 and not other, to all or any portions of the Work except as otherwise expressly stipulated.

SGC 17. NUCLEAR FREE HUMBOLDT COUNTY ORDINANCE COMPLIANCE

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

SGC 18. REQUIRED LISTING OF PROPOSED SUBCONTRACTORS

A. Each proposal shall have listed therein the name, address, description of work and contractor's license number of each subcontractor to whom the bidder proposes to subcontract portions of the work in the amount of 1/2 of one percent of their total bid, in accordance with the Subletting and Subcontracting Fair Practices Act, commencing with Section 4100 of the Public Contract Code and for verification of conformance with Labor Code Sections 1771 and 1725.5. The bidder's attention is invited to other provisions of said Act related to the imposition of penalties for a failure to observe its provisions by using unauthorized subcontractors or by making unauthorized substitutions.

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

C. A sheet for listing the subcontractors, as required herein, is included in the proposal- Please reference Section 00 43 36 “Subcontractor List.”

SGC 19. NONDISCRIMINATION

A. During the performance of this contract, the Contractor and its subcontractors shall not deny the contract's benefits to any person on the basis of religion, color, ethnic group identification, sex, age, physical or mental disability, nor shall they unlawfully discriminate, harass or allow harassment, against any employee or applicant for employment because of sex, race, color, ancestry, religious creed, national origin, disability (including HIV and AIDS), medical condition (cancer), age (over 40), marital status, denial of family care leave and denial of pregnancy disability leave in connection with any program or activity funded in whole or in part by Federal and/or State funds provided through this grant contract.

B. Contractor and all subcontractors shall insure that the evaluation and treatment of their employees and applicants for employment are free from such discrimination and harassment. Contractor and subcontractors shall comply with the provisions of the Fair Employment and Housing Act (Government Code, Section 12990 [a-f] et seq.) and the applicable regulations promulgated thereunder (California Code of Regulations, Title 2, Section 7285.0 et seq.).

C. The applicable regulations of the Fair Employment and Housing Commission implementing Government Code, Section 12990 (a-f), set forth in Chapter 5 of Division 4 of Title 2 of the California Code of Regulations are incorporated into this contract by reference and made a part hereof as set forth in full. Contractor and subcontractors shall give written notice of their obligations under this clause to labor organizations with which they have a collective bargaining or other agreement.

D. Contractor shall comply with all applicable nondiscrimination laws and regulations.

E. The Contractor and all subcontractors shall include the nondiscrimination and compliance provisions of this clause in all contracts and subcontracts to perform work under the contract.

SGC 20. HAZARDOUS WASTE IN EXCAVATION

A. If the Contractor encounters material in excavation which Contractor has reason to believe may be hazardous waste, as defined by Section 25117 of the Health and Safety Code, Contractor shall immediately so notify the Owner’s Representative in writing. Excavation in the immediate area of the suspected hazardous material shall be suspended until the OWNER authorizes it to be resumed. If such suspension delays the current controlling operation, the Contractor will be granted an extension of time by means of a change order.

B. The Owner reserves the right to use other forces for exploratory work to identify and determine the extent of such material and for removing hazardous material from such area.

SGC 21. CONSTRUCTION ACTIVITIES

A. Construction activities at the site shall be as required by the Contractor to complete the project by the prescribed completion date. Contractor must comply with Noise Abatement Provisions.

SGC 22. DISCOVERY OF HUMAN REMAINS OR AN ARCHAEOLOGICAL SITE

A. If during construction activities, human remains or evidence of an archaeological site, including outhouse pits, construction shall be immediately halted and the Owner's Representative notified who will request an evaluation by a qualified archaeologist, approved by the Owner as to whether the discovery constitutes an "important archaeological resource" as defined in Section III, Appendix K of the CEQA Guidelines.

B. If the resource is determined to be important, mitigation shall proceed as outlined by Appendix K of the Guidelines and as recommended by the archaeologist.

SGC 23. CONTRACTOR RESPONSIBILITY AND DEBARMENT

A. A responsible contractor is a contractor who has demonstrated the attribute of trustworthiness, as well as quality, fitness, capacity and experience to satisfactorily perform the contract. It is the County's policy to conduct business only with responsible contractors. (Ord. 2291, § 1, 01/07/2003)

B. The contractor is hereby notified that, in accordance with Title II, Division 14 of the County Code, if the County acquires information concerning the performance of the contractor on this or other contract which indicates that the contractor is not responsible, the County may, in addition to other remedies provided in the contract, debar the contractor from bidding on County contracts for a specified period of time, not to exceed three (3) years, and terminate any or all existing contracts the contractor may have with the County. (Ord. 2291, § 1, 01/07/2003)

C. The County may debar a contractor if the Board of Supervisors finds, in its discretion, that the contractor has done any of the following: (1) violated any term of a contract with the County; (2) committed any act or omission which negatively reflects on the contractor's quality, fitness, or capacity to perform a contract with the County or any other public entity, or engaged in a pattern or practice which negatively reflects on same; (3) committed an act or offense which indicates a lack of business integrity or business honesty; or (4) made or submitted a false claim against the County or any other public entity. (Ord. 2291, § 1, 01/07/2003)

D. If there is evidence that the contractor may be subject to debarment, the department will notify the contractor in writing of the evidence which is the basis for the proposed debarment and will advise the contractor of the scheduled date for a debarment hearing before the CHB (Contractor's Hearing Board). (Ord. 2291, § 1, 01/07/2003)

E. The CHB will conduct a hearing where evidence on the proposed debarment is presented. The contractor and/or the contractor's representative shall be given an opportunity to submit evidence at that hearing. After the hearing, the CHB shall prepare a proposed decision, which shall contain a recommendation regarding whether the contractor should be debarred, and, if so, the appropriate length of time of the debarment. If the contractor fails to avail itself of the opportunity to submit evidence to the CHB, the contractor may be deemed to have waived all rights of appeal. (Ord. 2291, § 1, 01/07/2003)

F. A record of the hearing, the proposed decision and any other recommendation of the CHB shall be presented to the Board of Supervisors. The Board of Supervisors shall have the right to modify, deny or adopt the proposed decision and recommendation of the hearing board. (Ord. 2291, § 1, 01/07/2003)

G. These terms shall also apply to subcontractors and subconsultants of County contractors. (Ord. 2291, § 1, 01/07/2003)

SGC 24. BID PROTEST

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

A. Only a bidder who has actually submitted a Bid Proposal is eligible to submit a bid protest against another bidder. Subcontractors are not eligible to submit bid protests. A bidder may not rely on the bid protest submitted by another bidder, but must timely pursue its own protest.

B. The bid protest must contain a complete statement of the basis for the protest and all supporting documentation. Material submitted after the Bid Protest Deadline will not be considered. The protest must refer to the specific portion or portions of the Contract Documents upon which the protest is based. The protest must include the name, address and telephone number of the person representing the protesting bidder if different from the protesting bidder.

C. A copy of the protest and all supporting documents must also be transmitted by fax or by e-mail, by or before the Bid Protest Deadline, to the protested bidder and any other bidder who has a reasonable prospect of receiving an award depending upon the outcome of the protest.

D. The protested bidder may submit a written response to the protest, provided the response is received by the Department Director before 5:00 p.m., within two (2) working days after the Bid Protest Deadline or after receipt of the bid protest, whichever is sooner (the “Response Deadline”). The response must include all supporting documentation. Material submitted after the Response Deadline will not be considered. The response must include the name, address and telephone number of the person representing the protested bidder if different from the protested bidder.

E. The procedure and time limits set forth in this section are mandatory and are the bidder’s sole and exclusive remedy in the event of bid protest. The bidder’s failure to comply with these procedures shall constitute a waiver of any right to further pursue a bid protest, including filing a Government Code Claim or initiation of legal proceedings.

END OF SECTION 00 73 00

SECTION 01 11 00 - SUMMARY OF WORK

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Contractor’s use of site and premises.

B. County-furnished, Contractor-installed (OFCI) items.

C. County’s occupancy requirements.

D. Specification formats and conventions.

1.2 CONTRACTOR’S USE OF SITE AND PREMISES

A. Vehicle access to Project site shall be held to a minimum. Vehicle access will be on one specific route approved by County; no exceptions will be allowed.

B. Coordinate use of the premises under the direction of the County.

C. Assume full responsibility for the protection and safekeeping of materials, products, and equipment under this Contract, stored on the site.

D. Move any stored materials, products, and equipment under Contractor's control which interfere with the operations of County or a separate contractor.

E. Obtain and pay for the use of additional storage or work areas needed for Contractor’s operations.

F. Contractor shall be aware of and abide by the Humboldt County and local Noise Ordinance and County’s noise prevention requirements. Contractor to verify County’s requirements.

1.3 COUNTY-FURNISHED AND CONTRACTOR-INSTALLED (OFCI) ITEMS

A. County-Furnished and Contractor-Installed (OFCI) Items: As indicated on the Drawings and Technical Specifications.

B. County's Responsibilities:

1. County will furnish products indicated. Schedule relocation of items with County.
2. After relocation, County will inspect delivered items for damage, jointly with Contractor.

C. Contractor's Responsibilities:

1. Contractor is responsible for relocating, storing, unloading, and handling County-furnished items at Project site.
2. Contractor is responsible for protecting County-furnished items from damage during storage and handling, including damage from exposure to the elements.
3. Contractor shall install and incorporate County-furnished items into the Work, as indicated and as required. Work includes providing support systems to receive County's equipment and making plumbing, mechanical, electrical connections, and miscellaneous work items associated with installation of County-furnished items.

4. Contractor shall repair or replace County-furnished items damaged by Contractor's operations, as approved by County in writing.
5. Contractor shall furnish and install fasteners and other accessories, as required for complete installation of County-furnished items.

1.4 COUNTY'S OCCUPANCY REQUIREMENTS

A. Tenant Occupancy: the County's tenants, the Veteran's Groups who currently occupy the building, will continue to occupy a designated area of the Project site, with the exception of areas under construction, during the entire construction period to conduct regularly schedule Veterans meetings and perform regular office functions.

B. Contractor shall provide a temporary accessible 10'x32' conditioned meeting trailer with an interior meeting space and one office for the exclusive use by the Veterans groups during the course of construction. The trailer will be provided with power and communication hookups. Contractor shall also provide one accessible portable toilet and handwashing station adjacent to the meeting trailer. These meeting trailer, toilet & handwashing facilities shall be securely fenced and located on-site throughout construction until such a time as the Veterans Groups may re-occupy the building. The temporary facilities may be moved to other areas on-site during construction to allow for work at different locations on-site.

C. Contractor shall cooperate with County and their tenants to minimize conflicts, and to facilitate County's operations.

D. Contractor shall verify occupancy requirements with County, and schedule the Work to accommodate County's tenant's requirements.

E. Contractor shall maintain access to existing walkways and other adjacent occupied or used facilities. Contractor shall not close or obstruct walkways or other occupied or used facilities without written permission from County and authorities having jurisdiction.

F. Contractor shall provide not less than 72 hours of notice to County of activities that will affect tenant (Veteran's Groups) operations.

1.5 ENVIRONMENTAL MANAGEMENT

A. Spills: Contractor shall clean up all fluid spills caused by leaks in the equipment or generated while Contractor is performing the work under this Contract. Contractor shall provide drip catch pans for all equipment that drips or leaks oils or other fluids. Spills generated by Contractor's operation shall be cleaned up by Contractor at no cost to County.

B. Dust and Noise Control:

1. Precaution shall be exercised at all times to control dust and excessive noise created as a result of any operations during the construction period.
2. If serious problems and/or complaints arise due to airborne dust and excessive noise, and when directed by the County, operations causing such problems shall be temporarily discontinued until a suitable remedy is established. The remedy shall be approved by the County before implementation, and shall be considered part of Contractor's normal effort to maintain safety and cleanliness without cause for further payment.

1.6 MATERIALS AND WORKMANSHIP

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

1.7 ACCIDENT PREVENTION AND PROTECTION OF LIVES AND HEALTH

A. Precaution shall be exercised at all times for protection of all personnel and occupants, including employees of Contractor, County, and property.

B. The California Department of Industrial Relations, Division of Occupational Safety and Health (DOSH, also known as Cal/OSHA) requirements for safety and health protection of workers and public apply. Other requirements not covered by Cal/OSHA, shall be in accordance with U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) requirements.

C. Comply with safety requirements of CCR, Title 8, Division 1, Chapter 4, "Division of Industrial Safety," and Title 8, Division 1, Chapter 3.2, “Cal/OSHA Regulations”; CCR, Title 24, CBC; and other applicable building and construction codes. Machinery, equipment, openings, power lines, and all other safety hazards shall be guarded or eliminated in accordance with safety requirements of Title 8, and Manual of Accident Prevention in Construction published by the Associated General Contractors of America.

1.8 UTILITIES

A. Excavation at the Project site requires a call to Underground Service Alert North (USA North), 811 or by internet at http://usanorth811.org.

1. Contractor shall call USA North at least 7 days prior to commencing excavation work. Obtain a ticket number and confirm service date for marking underground facilities (utilities).
2. Prior to placing the call, Contractor shall mark the outline of excavation with chalk, paint, or stakes, to enable representatives (locators) of USA North members to map the area for existing underground facilities (utilities).

B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by County or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify the County not less than three days in advance of proposed utility interruptions.
2. Obtain County’s written permission before proceeding with utility interruptions.

C. Provide necessary protection to existing utility services and repair work damaged as a result of operations under this Contract.

1.9 PROTECTION OF EXISTING FACILITIES

A. Contractor shall take appropriate measures to prevent damage to existing facilities, site work, landscaping, and adjoining property. Should damage occur, such facilities, site work, landscaping, and property shall be restored to original condition, at no cost to County.

1. Contractor shall arrange for protection of existing buildings at all times. Contractor shall furnish, install, and maintain, necessary barricades, temporary coverings, etc., as required for protection, and remove them at completion of the Work. When all Work is complete,

damaged areas of the premises shall be restored to original undamaged condition that existed prior to installation of temporary protection.

B. Housekeeping: The premises shall be kept in a clean, safe condition at all times. Rubbish shall be removed as fast as it accumulates.

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

1.10 OVERLOADING

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

1.11 MANUFACTURER'S INSTRUCTIONS

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

1.12 RESPONSIBILITY FOR THEFT AND DAMAGE

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

1.13 FIRE PROTECTION

A. Contractor shall at all times maintain good housekeeping practices to reduce the risk of fire and water damage. All scrap materials, rubbish and trash shall be removed daily from jobsite, inside and around the buildings or structures, as applicable, and shall not be scattered on adjacent property.

B. Suitable storage space shall be provided outside immediate building areas during construction for temporary storage of flammable materials and paints, as required by CFC Chapter 14 and NFPA 241. Excess flammable liquids being used inside the building shall be kept in closed metal containers and be removed from the building during unused periods.

C. Contractor shall provide temporary fire extinguishers during construction in accordance with the recommendations of CBC Chapter 33, CFC Chapter 14, and NFPA Bulletins Nos. 10 and 241. However, in all cases a minimum of one fire extinguisher shall be available for use.

D. Under provisions of CFC Chapters 14 and 26, provide a fire extinguisher at each location where cutting, soldering, or welding is being performed. Where electric or gas welding or cutting work is done, interposed shields of noncombustible material shall be used to protect against fire damage due to sparks and hot metal. When temporary heating devices are used, a watchman shall be present to cover periods when other workmen are not on the premises.

1.14 EMERGENCY CONDITIONS

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

B. Immediate action shall be taken by Contractor by whatever means necessary to alleviate the condition and to prevent damage or injury to persons or property. County shall be notified of the existence of such a condition, but shall not be called upon to perform emergency service.

C. County may not respond to the emergency condition, which shall not be used as an excuse by Contractor to neglect immediate action; County will not be responsible or liable for any resulting conditions. Absence of Contractor's Representative during emergency conditions at jobsite shall not relieve Contractor from contractual responsibility of providing an immediate response to the situation, for restoration of conditions to normalcy.

D. If the emergency conditions are not caused by Contractor's fault or neglect, the Contract Sum shall be adjusted to reflect the actual direct field costs of labor and materials to perform and complete emergency measures.

E. The Contract Time shall also be adjusted to reflect the actual direct effect of such actions to the then critical path of the Construction Progress Schedule. The foregoing not withstanding, adjustments of the Contract Sum or the Contract Time for actions taken by Contractor in response to emergency circumstances shall be subject to Contractor's strict compliance with all other applicable provisions of the Contract Documents relating to notices and time for delivery of notices.

1.15 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: The Specifications are organized into Divisions and Sections using the 50-division format and numbering system of CSI "MasterFormat, 2004 Edition.

B. Division 01 Sections govern the execution of the Work of all Sections in the Specifications.

C. Specifications Conventions: Singular words shall be interpreted as plural and plural words shall be interpreted as singular, where applicable, as the context of the Contract Documents indicates.

D. These specifications are written in imperative mood and streamlined form. This imperative language is directed to the Contractor, unless specifically noted otherwise. The words "shall be" are included by inference where a colon (:) is used within sentences or phrases.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 26 00 - MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing the following contract modifications:

1. Request for Information.
2. Field Order.
3. Request for Cost Proposal.
4. Cost Proposal.
5. Change Orders.

1.3 DEFINITIONS

A. Request for Information (RFI)

1. Written request submitted by Contractor to Owner's Representative via the County's online project management system on a form supplied by Owner's Representative requesting clarification, interpretation, or additional information pertaining to Contract Documents.
2. An RFI shall not be used as a vehicle for only confirming or verifying issues.

B. Field Order (FO)

1. Owner's Representative written directives to the Contractor covering a specific aspect of work, signed by the Owner or Owner's lead agency that authorizes changes in the Work to expedite the change order process.

C. Request for Cost Proposal (RFCP)

1. Written request by the Owner's Representative to the Contractor to quote change to Contract Sum and/or Contract Time for proposed change to Contract Document.

D. Cost Proposal (CP)

1. Written request by the Contractor to the Owner's Representative to change Contract Sum and/or Contract Time for proposed change to Contract Document.

E. Change Order (CO)

1. Initiated by the Owner, Contractor, Consultant, Owner's lead agency, or the Owner's Representative and signed by the Owner and Contractor stating their agreement to a change to Contract Documents and adjustment to Sum and/or Contract Time.

1.4 REQUEST FOR INFORMATION (RFI)

A. Submit RFIs numbered in sequential order, reviewed by the Contractor with respect to Contract Documents.

1. Submit RFIs on forms designated by the Owner's Representative.

B. Owner's Representative will monitor the RFI process and responses from the Consultant. The Consultant will receive RFIs only from the Owner's Representative; Consultant will not accept RFIs directly from any other entity.

C. Owner's Representative will receive only legible, properly prepared RFI:

1. Unreadable facsimile machine RFIs, illegibly written RFIs, or RFIs with incomplete information, will be returned promptly without action.
2. RFIs may be transmitted to Owner's Representative by online project management system.
   a. Owner's Representative will forward to Consultant for review, and return response by same method received from Contractor.
3. Consultant will review RFIs with respect to Contract Documents and return response in a timely manner, generally within 7 calendar days, or commensurate with RFI subject.
   a. RFIs marked "URGENT" will take precedence over outstanding RFIs and be answered by Consultant as soon as possible.

D. Contractor being fully familiar with Contract Documents, shall not be relieved of responsibility to coordinate the Work to prevent adverse impact to Project schedule when submitting RFIs to Owner's Representative for clarification or interpretation of Contract Documents, or additional information.

E. If the Contractor believes the scope of work referenced in the RFI has a cost and /or time impact, he will not proceed with the work until either a Field Order or a Change Order has been issued.

1.5 FIELD ORDER (FO)

A. Field Orders may include supplementary or revised Drawings and/or Specification to describe changes to Contract Documents.

B. Field Orders will be executed on forms designated by the Owner's Representative.

C. Field Orders may be generated by the Contractor's written notice submitted on a Cost Proposal form, that an RFI response or other unforeseen condition has changed the Contract cost and /or time, and that schedule impact will result if written directive is not provided in a timely manner.

D. Contractor shall provide an estimate of cost and/or time impact at the time of the request for a Field Order.

E. Owner's Representative will review the request for a Field Order and initiate a written Field Order for authorization by the Owner or Owner's lead agency.

F. If the Field Order is approved by the Owner or Owner's lead agency, Owner's Representative will release the signed Field Order to the Contractor. If rejected, the Contractor is so notified by the Owner's Representative.

1.6 REQUEST FOR COST PROPOSAL (RFCP)

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

1.7 COST PROPOSAL (CP)

A. Contractor shall submit to the Owner's Representative a Cost Proposal for all occurrences the Contractor believes impacts Scope of Work cost and/or time.

1. A Cost Proposal shall be submitted within 15 calendar days of the occurrences.

B. Submit Cost Proposal numbered in sequential order, reviewed by the Contractor with respect to Contract Documents.

1. Submit Cost Proposals on forms designated by the Owner's Representative.

C. All Cost Proposals submitted shall have detailed breakdown for all associated work, cost and/or time.

D. Owner's Representative will solicit and monitor independent cost estimates responses from the Consultant.

E. Owner's Representative shall return Cost Proposal responses and reviews to the Contractor within 15 calendar days following receipt of Cost Proposal.

F. A processed Cost Proposals is informational back-up for a potential Change Order, and not an instruction or authorization to execute a change, or an order to stop Work in progress.

1.8 CHANGE ORDER (CO)

A. Change Orders may be initiated by the Owner, Contractor, Consultant, Owner's lead agency, or the Owner's Representative.

B. Changes to the Project Contract Sum and/or Contract Time listed or indicated in Change Orders shall include or be determined by methods described in the General Conditions.

C. Owner's Representative has responsibility for processing and administering Change Orders for the Project, and will prepare each Change Order using form designated by the Owner's Representative.

D. Contractor shall provide all pricing proposals Cost Proposals for a Change Order. The Consultant shall provide independent cost estimates to Cost Proposals.
   1. Cost differentials between the Contractor's Cost Proposal and the Owner's Representative may negotiate the Consultants cost estimates.
   2. If no agreement is reached, the Owner's Representative may issue a time and material change Order.
      a. Use Daily Force Account Report designated by Owner's Representative.

E. The Contractor, Consultant, Owner's Representative, Owner's lead agency and Owner will sign a fully documented Change Order.

1.9 CORRELATING CHANGE ORDERS WITH OTHER CONTRACT REQUIREMENTS

A. Revise Schedule of Values and Applications for Payment to record each Change Order as a separate item of work with adjustment to Contract Sum and Contract Time.

B. Revise Construction Schedule to reflect each change in Contract Time.

C. Record modifications in Record Documents.

END OF SECTION

SECTION 01 30 00 - ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Coordination of construction operations.

B. Coordination drawings.

C. Field engineering.

D. Preconstruction conference.

E. Progress meetings.

F. Pre-installation conferences.

G. Electronic File Availability

1.2 COORDINATION

A. Coordinate scheduling, submittals and Work of various Sections of the Contract Documents to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. In the event of discrepancy, immediately notify the County. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

C. Verify that utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing operating equipment in service.

D. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for installation of other Work, maintenance work, and repair work.

E. Do not use spray paint or indelible ink markers for layout on concrete floor slabs scheduled to receive sealed concrete, stained concrete, vinyl, linoleum, or rubber flooring.

F. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

G. Coordinate completion and clean up of Work of separate Sections in preparation for Final Completion.

H. After beneficial occupancy of premises by the County, coordinate access to site for correction of defective Work and Work not complying with the Contract Documents, and to minimize disruption of County’s activities.

1.3 COORDINATION DRAWINGS

A. 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.

B. Provide 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:

1. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
2. Indicate required installation sequences.
3. 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 the County for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

C. Sheet Size: Minimum of 8-1/2 by 11 inches but no larger than 24 by 36 inches.

1.4 FIELD ENGINEERING

A. Employ Land Surveyor registered in the State of California and acceptable to the County.

B. Locate and protect survey control and reference points. Promptly notify the County of discrepancies discovered.

C. Control datum for survey is as shown on Drawings.

D. Verify setbacks and easements; confirm Drawing dimensions and elevations.

E. Provide field-engineering services. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.

F. Submit copies of site drawing and certificate signed by Land Surveyor certifying elevations and locations of the Work are in conformance with the Contract Documents.

G. Maintain complete and accurate log of control and survey work as Work progresses.

H. On completion of foundation walls and major site improvements, prepare certified survey illustrating dimensions, locations, angles, and elevations of construction and site work.

I. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

J. Promptly report to the County loss or destruction of reference point or relocation required because of changes in grades or other reasons.

K. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to the County.

1.5 PRECONSTRUCTION MEETING

A. After the award of the contract, a meeting shall be conducted with the Contractor, Project Administrator, Lead Consultant, and the Owner. The purpose of the meeting is to introduce key personnel and to review contract requirements and procedures.

B. Particular emphasis should be on:

1. Functions and authority of personnel
2. Regularly scheduled progress meetings
3. Submittals/shop drawings
4. Requests for Information
5. Field Orders
6. Payment Applications
7. Progress Schedules
8. Safety and Job Site security
9. Change Order procedures
10. Subcontractors
11. Disputes
12. Quality Control
13. Coordination of contractors
14. Access and use of site

1.6 PROGRESS AND SCHEDULE MEETINGS

A. A regularly scheduled weekly progress meeting time will be established at the pre-construction conference.

B. Attendees will include the Owner's Representative, Owner's Project Administrator, the Contractor, and the Lead Consultant. Scheduled invited Attendees will include the Architect and sub-consultants, subcontractors, and other owner personnel.

C. The Project Administrator will prepare an agenda with content lead from the Contractor (which usually is derived from the previous meeting minutes) for discussion at these meetings. The agenda should include a list of outstanding item, which will be reviewed as appropriate. As a minimum the following will be discussed:

1. Construction Status
2. Schedule
    a. Critical Path Activities
    b. Job site problems and conflicts
    c. Upcoming Activities
    d. Completion Date
    e. Time Extension Requests
3. Submittals/shop drawings

4. Requests for Information
5. Field Orders
6. Cost Proposals
7. Change Orders
8. Safety and Security
9. Claims
10. Quality Control

D. The Project Administrator will record and distribute minutes of the meeting to all attendees in a timely manner in order to allow review before the next regularly scheduled meeting.

E. In addition to the ongoing items of discussion listed above, time should be reserved to review any unresolved issues. Any representative attending the meeting may introduce these. Control logs for RFI's, submittals, and Cost Proposals should be discussed in the meeting.

1.7 PAY REQUEST MEETINGS

A. A regularly scheduled monthly meeting to review the pay request will be established as the 25th of the month.

B. Attendees will include the Owner's Representative and the Contractor. Scheduled invited attendees will include the Lead Consultant, Architect and consultants, subcontractors, and other owner personnel.

1.8 PREINSTALLATION AND SPECIAL MEETINGS

A. During the course of the project it will be necessary to schedule additional meetings. When a special meeting is required, the Project Administrator will coordinate time and place for all required attendees. The meeting minutes will be as follows:

a. Project:
b. Contract:
c. Purpose:
d. Date:
e. Time:
f. Attendees:
g. Minutes:

B. The Project personnel requesting the meeting is responsible for recording and distributing minutes of the meeting to all attendees in a timely manner. In addition, the meeting minute's author will be responsible for following-up all action assignments from the meeting.

1.9 UTILITIES AND IRRIGATION LINES

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

1.10 COMPLIANCE WITH CODE OF REGULATIONS

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

1.11 PROJECT COORDINATION

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

1.12 INTEGRATING EXISTING WORK

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

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 32 16 - CONSTRUCTION SCHEDULES

PART 1 GENERAL

1.1 SUMMARY

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

1.2 DESCRIPTION

A. Requirements for CPM scheduling are included to insure adequate planning and execution of the Work and to assist the County in evaluating progress of the Work economically and chronologically.

B. The Contractor shall be solely responsible for establishing the schedule for the Work and shall be responsible for such schedule to be consistent with meeting the contract milestone, intermediate milestones, and completion dates as established by the County.

1. The Contractor shall develop a CPM Schedule demonstrating fulfillment of all contract requirements. The project schedule shall be kept current to be utilized for scheduling, coordinating, monitoring work progress, and for preparation of the monthly payment application for payment under this Contract including all Work of Subcontractors and equipment and material suppliers.

2. Schedule shall include activities pertaining to long lead delivery items, fabrication items and submittal of shop drawings and product samples, and any items critical to maintaining all activities in the CPM.

C. Contractor shall designate a scheduler who is trained and experienced in compiling construction scheduling data, in analyzing scheduling data by use of CPM, and in the preparation and issuance of periodic reports as required herein. The Contractor's Scheduling Representative shall have direct control and complete authority to act on behalf of the Contractor in fulfilling all project schedule requirements.

1.3 QUALITY ASSURANCE

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

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

1.4 INITIAL CONSTRUCTION SCHEDULE

A. Pre-Construction Scheduling Conference: The Contractor and County shall conduct a pre-construction scheduling conference with the Contractor’s Project Manager and Construction Scheduler within five calendar days of the Notice to Proceed.

1. The Contractor shall submit a general time-scaled logic diagram displaying the major activities and sequence of planned operations and shall be prepared to discuss the proposed work plan and schedule methodology that comply with the requirements of these

special provisions . Contractor shall submit the alphanumeric coding structure and the activity identification system for labeling the Work activities.

2. The County will review the logic diagram, coding structure, and activity identification system, and provide required baseline schedule changes to the Contractor for implementation.

B. Within 10 calendar days after Notice to Proceed and prior to submission of the first payment request, the Contractor shall submit to the County an Initial Construction Schedule – two hard copies and an electronic copy. The Initial Construction Schedule shall reflect the following information:

1. Procurement, submittals, construction drawings, shop drawings, approvals, fabrication and delivery of all major and long lead equipment and material items.
2. Work expected to occur within the first 90 calendar days of the project, consistent with meeting all established milestone and completion dates.
3. The Initial Schedule shall be descriptive of the work to be performed so that the Contractor and County can easily monitor progress of the Work. All work activities shall be cost loaded and will be the basis for payment during the beginning months of the project. All activities shall be coded to align with the approved Schedule of Values.

C. Within 15 calendar days after receipt of the Initial Construction Schedule, the County will notify the Contractor of the approval or disapproval of the Initial Construction Schedule. In the event of disapproval, the Contractor shall resubmit the schedule within seven calendar days. No progress payments will be made for work in progress or completed until the Initial Construction Schedule is accepted.

1.5 CONSTRUCTION SCHEDULE

A. The CPM Schedule to be prepared by the Contractor pursuant to this section will be a part of a total system for scheduling, reporting work progress, and preparing the monthly payment application.

1. Within 30 calendar days after the Notice to Proceed, the Contractor shall submit to the County the complete project schedule. In the event the complete project schedule is disapproved, the Contractor shall resubmit a corrected schedule within 15 calendar days after the notice of disapproval is received by the Contractor.
2. Should the Contract Schedule not be accepted within 90 calendar days after Notice to Proceed, the Contractor may be due provisional progress payments(s) on work performed, based on the Initial Construction Schedule. It is the responsibility of the Contractor to reconcile such cost information and payments with the Contract Schedule. However, no payment shall be approved after the 90 calendar day period, until the Contract Schedule has been accepted by the County.
3. All activities in the Official Contract Schedule shall have sufficient code structure to enable a sort by activity code, or "rollup" of the activities in the form of a Summary Schedule. The code structure will allow sufficient sorting capabilities to group by: responsibility (by subcontractor), location (building, floor, area, etc.), type (submittal, approval, change, etc), milestones, CSI division, etc.
4. The approved Initial Construction Schedule shall be incorporated into the final Contract Schedule and shall represent the initial 90 calendar days of the Contract Schedule.
5. The Schedule shall be a cost, and manpower resource-loaded CPM schedule. Mobilization (not to exceed 1/2 of 1 percent), bond, insurance and demobilization (equivalent to the

mobilization amount) costs shall be shown separately; however, other general requirement costs, overhead, profit, etc., shall be prorated throughout all the activities. The cost-loaded activities of the Initial Contract Schedule shall be from the Schedule of Values line items and shall be the basis for establishing the distribution of costs within the Schedule of Values. Costs relating to each activity shall be distributed evenly over the duration of the activity.

6. The initial submittal of the Contract Schedule shall not reflect contract changes or delays. These changes shall be added within the first Schedule Revision.
7. The Contract Schedule shall include, in addition to construction activities, the following:
   a. The submittal and approval of construction drawings, shop drawings and materials, the procurement, fabrication, delivery, and testing of major materials and equipment, and their installation and testing.
   b. Include activities/task items for “Pre-Installation Meetings” as required by the Specs to precede work.
   c. Contract requirement dates of all or parts of the Work will be shown including all activities of the County that affect the progress of the Work.
   d. Activities of completed work ready for use by next trade, etc.
   e. Activities relating to different areas of responsibility, such as sub-contracted work which is distinctly separate from that being done by Contractor directly.
   f. Different categories of work as distinguished by craft or crew requirements.
   g. Different categories of work as distinguished by materials.
   h. Distinct and identifiable subdivisions of work such as structural excavation, structural slabs, masonry walls, beams, columns, etc.
   i. Location of work within the project that necessitates different times or crew to perform.
   j. Outage schedules of limiting times that existing utility services may be interrupted to construct the Project.
   k. Items listed separately in Schedule of Values for payment purposes. All activities shall be coded to align with the approved Schedule of Values.
   l. Acquisition and installation of equipment and materials supplied and/or installed by County or separate contractors.
   m. Material stored on site.
8. Major Equipment/Materials: For all major equipment and materials fabricated or supplied for Project, Construction Schedule shall show a sequence of activities including:
   a. Preparation of shop drawings and sample submissions.
   b. Time required to obtain special inspection certifications and additional permits or certifications that may be required for specific tasks and/or systems.
   c. Review of shop drawings and samples.
   d. Shop fabrication, delivery, and storage.
   e. Erection or installation.
   f. Test of equipment and materials.
   g. Required dates of completion.

9. Early Completion: Include in Construction Schedule an early completion date for the Project that is no earlier than Project's required date of completion.
10. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
11. Construction activities are to be delineated separately for off-site sewer, site development, earthwork, utilities, and like work.
12. The time-scaled logic diagrams shall clearly indicate any work that is planned to be accomplished on a work schedule other than eight hours per day and 40 hours per week.
13. The CPM schedule shall show the order in which the Contractor proposes to carry out the Work with logical links between time-scaled work activities, and calculations made using the CPM to determine the controlling operation(s). The Contractor is responsible for assuring that all activity sequences are logical and that each schedule shows a coordinated plan for complete performance of the Work.
14. The basic concept of CPM time-scaled logic diagramming will be followed to show how the start of a given activity is dependent on the completion of preceding activities and its completion restricts the start of following activities. The diagrams shall show a continuous flow from left to right with no right to left sequences. The CPM schedule shall be based on early start and early finish dates of activities, and clearly show the primary paths of criticality using time scaled logic graphical presentation.
15. The number of activities shall be sufficient to assure adequate planning of the project, to permit monitoring and evaluation of progress, and to do an analysis of time impacts. Schedule activities shall include the following:
    a. A clear and legible description.
    b. Start and finish dates
    c. A duration of not less than one working day, except for event activities, nor more than 15 working days in duration, except for passive activities such as concrete curing, or as otherwise authorized by the Project Manager, for any operation. All Humboldt County recognized holidays and non-working days shall be identified by way of calendar designations.
    d. At least one predecessor and one successor is required for each activity, except for the project start and finish milestones.
    e. All required constraints.
    f. Codes for responsibility, stage, work shifts, location, and contract pay items.
16. All activities shall be linked by realistic logical relationships only. Other type of relationships shall be permitted but shall be minimized (including, but not limited to: start-to-start, finish-to-finish, and start-to-finish relationships).
17. The Schedule shall include the entire scope of work and show how the Contractor plans to complete the Work. The schedule shall show the activities that define the critical path. Multiple critical paths will not be accepted. A total of no more than 25 percent of the baseline schedule activities shall be critical or near critical, unless otherwise authorized by the County. Near critical is defined as float less than 10 days.
18. The Official Contract Schedule shall not extend beyond the number of calendar days specified in the Contract. The baseline schedule shall have a data date of the first working day of the contract and not include any completed work to date. The baseline schedule shall not attribute negative float or negative lag to any activity.

19. The following information will be provided in a report for each network activity:
    a. Data Date
    b. Activity number and description.
    c. Activity duration in work days.
    d. Activity cost. The Contract Price shall be broken down with the appropriate values distributed to the network diagram activities, coded to align with the approved Schedule of Values.
    e. Working activities and General Conditions activities shall be identified separately.
    f. Activity predecessors and successors.
    g. Activity codes
    h. Activity logic ties.
    i. Scheduled, or actual and remaining durations (work days) for each activity.
    j. Earliest Start and Earliest Finish Dates (calendar).
    k. Actual Start and Actual Finish Dates (calendar).
    l. Latest Start and Latest Finish Dates (calendar).
    m. Free Float and Total Float (work days)
    n. Percentage of activity complete and remaining duration for incomplete activities.
    o. Lags.
    p. Required Constraints.
20. In addition to the information above, identify the adverse weather days anticipated per each month. Meteorological data for the area shall be based on historical information. An “Adverse Weather Day” will be days exceeding the average number of days per month when precipitation exceeds 0.1 inches based on NOAA Data.
21. Schedule review by the County and its agents is limited to ensuring the logic of sequencing is reasonable and Contractor has demonstrated ability to meet contractual milestone and completion dates. Acceptance of schedule shall not be construed as direction from the County to Contractor on how to schedule the Work.
22. Subsequent to acceptance of the contract (baseline) schedule, the Contractor will provide four copies of the network diagrams, plus four copies of all supporting documents (Contract Price, Schedule of Values, breakdown, etc.), as well as electronic copies of the network diagrams and supporting documents. Monthly update data will be submitted in the same form and numbers. Size of network diagrams shall be on sheets 34-inch x 44-inch, and include a title block, timeline, and run date on each page, as approved by the County.
23. After Completion and Acceptance of the Official Contract Schedule, the Contractor will provide computer reports and weekly and monthly reports thereafter.
24. Adverse weather will not be considered as a reason for delay, unless the number of days per a specific month exceed the normal adverse weather days of that month.

1.6 UPDATE SCHEDULES

A. The Contractor shall submit an Update Schedule – hard copy and electronic copy -- and meet with the County to review progress, before the first day of each month, beginning one month after the Baseline Schedule is accepted. The Contractor shall allow 1 week for the County to

review the updated schedule and all supporting data, except that the review period shall not start until the previous month's required schedule is accepted.

1. The Update Schedule shall have a data date of the end of the month or other date established by the County. The Update Schedule shall show the status of work actually completed to date and the Work yet to be performed as planned. Actual activity start dates, percentage complete, and finish dates shall be shown. Actual durations for work that has been completed shall be shown on the Update Schedules for when the work actually occurred, including submittal reviews and contractor re-submittal times.
2. The Contractor may include modifications such as adding or deleting activities or changing activity constraints, durations, or logic that do not: (1) alter the critical path(s) or near critical path(s), or (2) extend the schedule completion date compared to that shown on the current accepted schedule. The Contractor shall provide a narrative in writing that states the reasons for any changes to the planned work. If any proposed changes in planned work will result in (1) or (2) herein, then Contractor shall submit a time impact analysis as described herein.
3. Any request for an adjustment of the Contract Time for completion submitted by Contractor for changes or alleged delays shall be accompanied by a complete Time Impact Analysis, (TIA), which shall be submitted for review within 15 days after the initial request for time by Contractor, or the impacting incident, whichever comes first.
4. Schedule Reports: Initial and subsequent Update Schedule Reports will contain the following minimum information for each activity and shall be produced at a minimum of once a month:
    a. Data date
    b. Activity Number and Description;
    c. Predecessor and successor activity numbers and descriptions;
    d. Activity Codes;
    e. Scheduled, or actual and remaining durations for each activity;
    f. Earliest start and finish (calendar) dates;
    g. Actual start and finish (calendar) dates;
    h. Latest start and finish (calendar) dates;
    i. Free and total float (work days)
    j. Percentage of each activity completed and remaining duration for incomplete activities as of each report;
    k. Remaining float/days behind schedule;
    l. Responsibility for activity;
    m. Current status of activity as compared to baseline schedule.
5. Cost Reports: Initial and subsequent update Cost Reports will include the following information for each activity, sorted by trade activity:
    a. Activity Number and Description;
    b. Activities coded to approved Schedule of Values.
    c. Percentage of value of Work in place against total value;
    d. Total cost of each activity;

e. Value of Work in place since last report;

f. Value of Work in place to date;

g. Value of incomplete Work.

6. Narrative Reports: Monthly Narrative Reports shall contain the following information for each monthly update:
   a. Description of overall project status
   b. Description of problem areas (referenced to pending change orders as appropriate)
   c. Current and anticipated delays not resolved by approved change order, including:
      1) Cause of the delay
      2) Corrective action and schedule adjustments to correct the delay
      3) Known or potential impact of the delay on other activities and milestones.
      4) Changes in the construction sequence
   d. Pending items and status thereof, including but not limited to:
      1) Pending Change Orders
      2) Time Extension Requests
      3) Other Issues relating to Contract Time
   e. Contract Completion Date status:
      1) If ahead of schedule, the number of calendar days ahead
      2) If behind schedule, the number of calendar days behind.
7. Three-Week Window: Weekly, for the progress meeting, the Contractor shall produce a three-week window of the current schedule, indicating activities scheduled for the current and following two week period.
8. Payment Progress Reporting: County and Contractor shall select a specified time for updating the Project Schedule at the jobsite each month.
   a. The County and Contractor and his/her designated scheduling representatives will attend the meeting to review the project progress.
   b. The schedule shall be the basis for monthly pay requests derived from the joint review of the cost loaded schedule.
   c. All progress and status information provided by the Contractor shall clearly define the reporting period for which the status is provided.
9. At the monthly progress review meeting, the Contractor will provide "actual start" and "actual completion" dates for activities that were started or completed during the reporting period. The Contractor and the Project Manager will agree upon and assign percent complete values to activities in progress. In the event of a disagreement, the Project Manager shall make the final decision as to percent completion of each activity.
10. After joint review, the County will process the Contractor's pay request based on progress from the schedule.
    a. Payment to the Contractor shall be made from the progress reflected by the Interim or the Contract Schedule.

11. Time is of the essence: Whenever it becomes apparent from the current monthly progress review that phases of Work or the Contract Completion Date will not be met, through no fault of the County, the Contractor will take the following actions with no change in the contract amount:
    a. Increase construction manpower to eliminate any adverse backlog of work.
    b. Increase the number of working hours per shift, shifts per day, working days per week, the amount of construction equipment, or any combination of the foregoing to eliminate the adverse backlog of Work.
12. The Schedule as accepted by the County will be an integral part of the Contract, and will establish interim Contract Completion Dates or milestone dates for the various activities.
13. Delays of any non-critical Work shall not be the basis for an extension of Contract Time.
14. FLOAT TIME; Float is defined as the time that a non-critical Work activity can be delayed or extended without delaying the scheduled completion of milestones specified in this Section or the scheduled completion date of the Work, or both. Float time is not for the exclusive use or benefit of either County or Contractor. Neither Contractor nor County shall have an exclusive right to the use of float. Contractor is to document the effect on the updated Contract Schedule whenever float has been used. However, if float time associated with any chain of activities is expended but not exceeded by any actions attributable to the County, the Contractor will not be entitled to any extension of Contract time.
15. The contractor shall not sequester float through strategies; including extending activity duration estimates to consume available float, using preferential logic, using extensive or insufficient crew/resource loading, special lead/lag logic restraints or imposed dates. Use of float time disclosed or implied by the use of alternate float suppression techniques shall be shared to the benefit of both the County and Contractor.
16. Should any activity fall 14 calendar days or more behind the Contract Schedule accepted by the County, the County will have the right to order the Contractor to expedite completion of that activity using whatever means are appropriate and necessary, without additional compensation to the Contractor.
17. Should any activity fall 21 or more calendar days behind the Official Contract Schedule approved by the County, through no fault of the County, the County will have the right to perform the activity or have the activity performed by whatever method the County deems appropriate. All costs incurred by the County in connection with expediting such activity under this subsection shall be reimbursed promptly to the County by the Contractor.
18. It is expressly understood and agreed that the failure by the County to either order the Contractor to expedite an activity or to expedite the activity by other means, pursuant to the two preceding paragraphs, shall not be considered precedent setting with respect to any other activities which may fall behind the Official Contract Schedule approved by the County; nor will it relieve the Contractor from completion of the Work in accordance with the Official Contract Schedule and the Contract Completion Date.
19. County's acceptance of, or its review of, comments about any schedule or scheduling data shall not relieve the Contractor from its sole responsibility to plan for, perform, and complete the Work within the Contract Time. Acceptance of or review of comments about any schedule shall not transfer responsibility for any schedule to County nor imply their agreement with (1) any assumption upon which such schedule is based, or (2) any matter underlying or contained in such schedule.

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

B. Schedule Revisions

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

C. Time Impact Analysis (TIA):

1. The Contractor shall submit a written time impact analysis (TIA) – hard copy and electronic -- to the Project Manager with each request for adjustment of contract time, or when the Contractor or Project Manager consider that an approved or anticipated change may impact the critical path or contract progress.
2. The TIA shall illustrate the impacts of each change or delay on the current schedule completion date or internal milestone, as appropriate. The analysis shall use the accepted schedule that has a data date closest to and prior to the event. If the Project Manager determines that the accepted schedule used does not appropriately represent the conditions prior to the event, the accepted schedule shall be updated to the day before the event being analyzed. The TIA shall include an impact schedule developed from incorporating the event into the accepted schedule by adding or deleting activities, or by changing durations or logic of existing activities. If the impact schedule shows that incorporating the event modifies the critical path and scheduled completion date of the Official Contract Schedule, the difference between scheduled completion dates of the two schedules shall be equal to the adjustment of contract time. The Project Manager may construct and utilize an appropriate project schedule or other recognized method to determine adjustments in contract time until the Contractor provides the TIA.
3. The Contractor shall submit a TIA in duplicate within seven calendar days of receiving a written request for a TIA from the County. The Contractor shall allow the County 14 calendar days after receipt to accept or reject the submitted TIA. All approved TIA schedule changes shall be shown on the next update schedule.
4. If a TIA submitted by the Contractor is rejected by the County, the Contractor shall meet with the County to discuss and resolve issues related to the TIA. If agreement is not reached, the Contractor will be allowed 20 calendar days from the meeting to give notice of potential claim, as noted in Section 00 72 00- General Conditions GC 51.. The Contractor shall only show actual as-built work, not unapproved changes related to the TIA, in subsequent update schedules. If agreement is reached at a later date, approved TIA schedule changes shall be shown on the next updated schedule. The County will withhold remaining payment on the schedule contract item if a TIA is requested by the County and

not submitted by the Contractor within 21 calendar days. The schedule item payment will resume on the next payment application after the requested TIA is submitted. No other contract payment will be retained regarding TIA submittals.

1.7 RECOVERY SCHEDULE

A. General: Should updated Construction Schedule show Contractor to be 15 or more calendar days behind schedule at any time during construction, Contractor will prepare Recovery Schedule displayed on CPM schedule, at no additional costs to County. Prepare Recovery Schedule to show plan for returning to original schedule as expeditiously as possible, and in a manner that complies with paragraph 1.7 Update Schedules, requirements.

B. Schedule Preparation: Within three calendar days after notice from the County, prepare and submit to the County a Recovery Schedule, incorporating best available information from Subcontractors and others which will permit return to Construction Schedule at earliest possible time. Prepare Recovery Schedule to same level of detail as Construction Schedule and for maximum duration of one month.

C. Schedule Review: Within seven calendar days after notice from County, participate in conference with County to review and evaluate Recovery Schedule. Submit revisions necessitated by review for County's acceptance within four calendar days of conference. Use accepted Recovery Schedule for its planned duration as basis for return to Construction Schedule.

D. Schedule Assessment: Seven days prior to expiration of Recovery Schedule, confer with the County to assess effectiveness of Recovery Schedule. As a result of this conference, the County will direct Contractor as follows:

1. Behind Schedule: If the County determines Contractor is still behind schedule, the County will direct Contractor to prepare another Recovery Schedule for subsequent pay period.
2. On Schedule: If County determines Contractor has successfully complied with provisions of Recovery Schedule, the County will direct Contractor to return to use of Construction Schedule.

1.8 FINAL UPDATE SCHEDULE

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

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

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

1.2 DESCRIPTION

A. Types of SUBMITTALS: Submittal procedures specified in this section include construction progress schedules, shop drawings, product data, samples, and manufacturer's installation instructions.

B. Intent: Architect's review of shop drawings is intended to be a preview of what the Contractor intends to provide, and will function as an effort to foresee unacceptable materials or assemblies and to avoid the possibility of their rejection at the Project Site. Architect will review submittals only for conformance with the design concept of the Project and with the information given in the Contract Documents.

C. The Architect’s review of shop drawings will be general and shall not be construed:
   1. As permitting departure from the Contract requirements except as otherwise provided for under "substitution" provisions of Section 01 60 00;
   2. As relieving Contractor of responsibility for omissions or errors, including details, dimensions, materials, etc.;
   3. That review of a separate item indicates acceptance of an assembly in which the item functions. Architect will only review acceptance of an assembly in which the item functions. Architect will only review submittals required by Contract Documents for conformance with design concept of the Project and with the information given in the Contract Documents.

1.3 GENERAL SUBMITTAL PROCEDURES

A. Submittals shall be classified as either electronic or physical. Procedures for each type of submittal, as described below, shall be followed.

B. Transmit each submittal with “Submittal Transmittal” form supplied by County.

C. Number each submittal sequentially with a decimal for resubmittals. Also include in the submittal number the specification section number as a suffix (ie. 2.01-07 81 16).

D. Identify Project, Contractor, Subcontractor or supplier; pertinent Drawing sheet and detail number(s), and specification Section number, as appropriate.

E. Apply Contractor's stamp and signature or initial (electronically or physically) certifying that review, verification of Products required, field dimensions, adjacent construction Work, and

coordination of information, is in accordance with the requirements of the Work and Contract Documents.

F. Unless otherwise authorized by the Architect, all of the submittals required by a specification section shall be submitted together at the same time. Electronic submittals of product data, shop drawings, etc. may be submitted ahead of physical color samples with approval of the Engineer. Submittals that do not include all required submittals for a given specification section will be returned without review.

G. Schedule submittals to expedite the Project, and deliver to Owner's Representative. Coordinate submission of related items.

H. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.

I. Substitutions must be submitted according to Section 01 60 00. Substitutions submitted without following this procedure will be rejected.

J. Provide space for Contractor and Architect review stamps.

K. Revise and resubmit submittals as required, identify all changes made since previous submittal.

L. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.

1.4 ELECTRONIC SUBMITTAL PROCEDURES

A. Construction Progress Schedules, Product Data, Shop Drawings, and Manufacture's Installation Instructions shall be submitted electronically.

B. Electronic submittals shall be emailed or uploaded to County's Project Administrator in full size PDF format. Do not reduce Shop Drawings from original sheet size.

C. PDF copy of electronic submittals will be returned to the Contractor. Contractor may distribute submittals to the concerned parties electronically or physically. Any printing costs for physical distribution of submittals shall be borne by the Contractor. The Architect will not print copies for distribution.

D. Follow all General Submittal Procedures as described above.

1.5 PHYSICAL SUBMITTAL PROCEDURES

A. Samples, Color Charts, and Agency Deferred Approvals shall be physical submittals. Construction Progress Schedules, Product Data, Shop Drawings and Manufacturer's Installation Instructions may, with the County's approval, be physical submittals.

B. The County will retain a minimum of three samples, submit the number that will be needed by contractor plus three.

C. Follow all General Submittal Procedures as described above.

1.6 CONTRACTOR RESPONSIBILITIES

A. Review shop drawings, product data and samples prior to submission.

B. Determine and verify:
   1. Field measurements.
   2. Field construction criteria.

3. Catalog numbers and similar data.
4. Conformance with specifications.
5. Conformance with applicable codes.

C. Submittals giving inadequate indication of contractor review and approval will be returned without review, for resubmission.

D. Coordinate each submittal with requirements of the Work and of the Contract Documents.

E. Notify the Architect in writing, at time of submission, of any deviations in the submittals from requirements of the Contract Documents.

F. Begin no fabrication or construction activity that requires submittals until return of submittals with Architect's stamp and initials or signature indicating finish review.

G. After Architect’s final review, distribute copies.

1.7 SHOP DRAWINGS

A. Submit electronically.

B. After review and distribution in accordance with Submittal Procedures, retain one copy of all reviewed shop drawings at the job and label them "PROJECT RECORD" as described in Section 01 77 00 Contract Closeout.

1.8 PRODUCT DATA

A. Submit electronically.

B. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to this Project.

C. After review, distribute in accordance with Submittal Procedures and provide copies for Record Documents as described in Section 01 77 00.

D. Show dimensions and clearances required.

1.9 SAMPLES

A. Submit samples to illustrate functional and aesthetic characteristics of the Product, with integral parts and attachment devices. Provide units identical with final condition of proposed materials or products for the work. Coordinate sample submittals for interfacing work.

B. Submit samples of finishes from the full range of manufacturers' standard colors textures, and patterns for Architect’s selection.

C. Include identification on each sample, with full Project information.

D. Submit the number or samples specified in individual specification Sections; three of which will be retained by Engineer.

E. Reviewed samples which may be used in the Work are indicated in individual specification Sections.

1.10 MANUFACTURER'S INSTRUCTIONS

A. Submit manufacturers' instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, electronically.

B. Identify conflicts between manufacturers' instructions and Contract Documents.

1.11 MANUFACTURER'S CERTIFICATES

A. When specified in individual specification Sections, submit manufacturers' certificate electronically.

B. Contractor/Subcontractor Warranty form for the work of the particular spec section, completed except for signature. The Effective Date of warranty shall reference the date to be established as Final Acceptance.

1.12 DEFERRED AGENCY APPROVALS

A. The General Contractor shall submit, or cause to be submitted by Subcontractors, within 60 days of contract signing, all required deferred approvals. The General Contractor or Subcontractors shall complete all deferred approval packages, including design and engineering calculations, in a manner acceptable to the agency requiring such submittal. The General Contractor shall within 15 days of contract signing, develop a schedule of critical dates of deferred approval acceptance by the reviewing agency. These critical dates shall be reflected in the required project schedule and all deferred approvals submitted within 45 days of schedule submittal.

B. For all deferred items, it is the responsibility of the contractor to see that all submittals are stamped and signed by a California licensed design professional (an architect or PE is acceptable). The County and Architect will then review the submittal and if the design is acceptable provide a Statement of General Conformance that the submittal conforms to the design intent. Neither the Project’s Architect or any of its consulting engineers will stamp and sign these deferred approval submittals other than with the standard shop drawing stamp. It is the responsibility of the manufacturing entity to procure necessary stamps and signatures from its own design professionals.

C. All Deferred Approvals shall be submitted by the County to all required permitting agencies. If the Contractor fails to provide a required submittal, the Owner may elect to engage the design team or additional consultants to produce these and back charge the General Contractor for the cost and any schedule impact this may cause.

1.13 ACTION ON SUBMITTALS

A. The County will review each submittal, mark with a "Review Code" and where possible, return within a reasonable period of time from date of receipt. Where submittal must be held for coordination, Contractor will be so advised without delay. Action markings shall be interpreted as follows:

1. No Exceptions Noted
2. Implement Exceptions Noted
3. Revise and Resubmit
4. Rejected
5. Cancelled

PART 2 PRODUCTS (NOT USED)

PART 2 - PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 35 91 - HISTORIC TREATMENT PROCEDURES

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 general protection and treatment procedures for entire Project and the following specific work:
   1. Historic removal, dismantling, and reinstallation
   2. Historic restoration of decorative painting
   3. Historic restoration of decorative plaster

B. Related Requirements:
   1. Division 09 Section 09 94 00 "Conservation of Decorative Painting" for specific requirements for conservation and repainting of decorative paint finishes.

1.3 DEFINITIONS

A. Consolidate: To strengthen loose or deteriorated materials in place.

B. Dismantle: To disassemble and detach items by hand from existing construction to the limits indicated, using small hand tools and small one-hand power tools, so as to protect nearby historic surfaces; and legally dispose of dismantled items off-site, unless indicated to be salvaged or reinstalled.

C. Existing to Remain: Existing items that are not to be removed or dismantled.

D. Historic: Spaces, areas, rooms, surfaces, materials, finishes, and overall appearance which are important to the successful rehabilitation, restoration, and reconstruction as determined by Architect. Designated historic spaces, areas, rooms and surfaces are indicated on Drawings and scheduled in this Section.

   1. **Restoration Zones**: Areas of greatest architectural importance, integrity, and visibility; to be preserved and restored to the original, circa 1931, design and finish as shown on Drawings:
   2. **Renovation Zones**: Areas of significant architectural importance, integrity, and visibility; to be preserved and restored consistent with the remaining historic fabric and to the extent shown on Drawings:
   3. **Alteration Zones**: Areas of slight architectural importance, integrity, and visibility; to leave any remaining original fabric untouched insofar as is consistent with accommodating modern uses for the building as shown on Drawings:

E. Match: To blend with adjacent construction and manifest no apparent difference in material type, species, cut, form, detail, color, grain, texture, or finish; as approved by Architect.

F. Reconstruct: To remove existing item, replicate damaged or missing components, and reinstall in original position.

G. Refinish: To remove existing finishes to base material and apply new finish to match original, or as otherwise indicated.

H. Reinstall: To protect removed or dismantled item, repair and clean it as indicated for reuse, and reinstall it in original position, or where indicated.

I. Remove: Specifically for historic spaces, areas, rooms, and surfaces, the term means to detach an item from existing construction to the limits indicated, using hand tools and hand-operated power equipment, and legally dispose of it off-site, unless indicated to be salvaged or reinstalled.

J. Repair: To correct damage and defects, retaining existing materials, features, and finishes while employing as little new material as possible. Includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials.

K. Replace: To remove, duplicate, and reinstall entire item with new material. The original item is the pattern for creating duplicates unless otherwise indicated.

L. Replicate: To reproduce in exact detail, materials, and finish unless otherwise indicated.

M. Reproduce: To fabricate a new item, accurate in detail to the original, and in either the same or a similar material as the original, unless otherwise indicated.

N. Restore: To consolidate, replicate, reproduce, repair, and refinish as required to achieve the indicated results.

O. Retain: To keep existing items that are not to be removed or dismantled.

P. Reversible: New construction work, treatments, or processes that can be removed or undone in the future without damaging historic materials unless otherwise indicated.

Q. Salvage: To protect removed or dismantled items and deliver them to Owner ready for reuse.

R. Stabilize: To provide structural reinforcement of unsafe or deteriorated items while maintaining the essential form as it exists at present; also, to reestablish a weather-resistant enclosure.

S. Strip: To remove existing finish down to base material unless otherwise indicated.

1.4 MATERIALS OWNERSHIP

A. Historic items, relics, and similar objects including, but not limited to, commemorative plaques and tablets, tiled water fountains**,** and other items of interest or value to Owner that may be encountered during removal and dismantling work remain Owner's property. Carefully dismantle and salvage each item or object.

B. Coordinate with Owner's Architect, who will establish special procedures for dismantling and salvage of items including, but not limited to the following.

1. Existing water fountains with tiled surrounds to be carefully removed, relocated and reinstalled as complete assemblies. Extreme care shall be taken to protect existing tilework and fountain in the relocation and reinstallation process. Any damage to the tile surround and water fountains shall be repaired by Contractor.
2. Precast concrete crenellations at top of tower: Several of these have become detached, or are loosely remaining in place. Carefully dismantle, clean, and securely reinstall as needed. Take castings of these and any other decorative concrete relief work that may be damaged during the course of repair. Replace in kind if damaged beyond repair.
3. Cast metal plaques attached to interior walls shall be carefully removed, safely stored, and reinstalled at location designated by owner prior to completion. Each plaque shall be photographed in place prior to removal.

1.5 INFORMATIONAL SUBMITTALS

A. Construction Schedule for Historic Treatments: Indicate for entire Project the following for each activity to be performed in historic spaces, areas, and rooms, and on historic surfaces:

1. Detailed sequence of historic treatment work, with starting and ending dates, coordinated with Contractor’s other known work in progress.
2. Utility Services: Indicate how long utility services will be interrupted. Coordinate shutoff, capping, and continuation of utility services if required to perform the work.
3. Use of elevator and stairs.
4. Equipment Data: List gross loaded weight, axle-load distribution, and wheel-base dimension data for mobile and heavy equipment proposed for use. Do not use such equipment without Contractor's professional engineer's certification that the structure can support the imposed loadings without damage.

B. Qualification Data: For historic treatment specialist.

C. Preconstruction Documentation: Provide photographs and show preexisting conditions of area of work, adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by Contractor's historic treatment operations.

D. Historic Treatment Program: Submit before work begins.

E. Fire-Prevention Plan: Submit before work begins.

F. Inventory of Salvaged Items: After removal or dismantling work is complete, submit a list of items that have been salvaged.

1.6 QUALITY ASSURANCE

A. Historic Treatment Specialist Qualifications: An experienced firm regularly engaged in historic treatments similar in nature, materials, design, and extent to this work as specified in each section, and that has completed a minimum of five recent projects with a record of successful in-service performance that demonstrate the firm's qualifications to perform this work.

1. Field Supervisor Qualifications: Full-time supervisors experienced in historic treatment work similar in nature, material, design, and extent to that indicated for this Project. Supervisors shall be on Project site during times that historic treatment work is in progress. Supervisors shall not be changed during Project except for causes beyond the control of the specialist firm.

2. Worker Qualification: Persons who are experienced in historic treatment work of types they will be performing.

B. Historic Treatment Program: Prepare a written plan for historic treatment for whole Project, including each phase or process and protection of surrounding materials during operations. Describe in detail materials, methods, and equipment to be used for each phase of work. Show compliance with indicated methods and procedures specified in this and other Sections.

1. Dust and Noise Control: Include locations of proposed temporary dust- and noise-control partitions and means of egress from occupied areas coordinated with continuing on-site operations and other known work in progress.
2. Debris Hauling: Include plans clearly marked to show debris hauling routes, turning radii, and locations and details of temporary protective barriers.

C. Fire-Prevention Plan: Prepare a written plan for preventing fires during the Work, including placement of fire extinguishers, fire blankets, rag buckets, and other fire-prevention devices during each phase or process. Coordinate plan with Owner's fire-protection equipment and requirements. Include each fire watch's training, duties, and authority to enforce fire safety.

D. Regulatory Requirements: Comply with notification regulations of authorities having jurisdiction before beginning removal and dismantling work. Comply with hauling and disposal regulations of authorities having jurisdiction.

E. Standards: Comply with ANSI/ASSE A10.6.

F. Historic Treatment Preconstruction Conference: Conduct conference at Project site.

1. General: Review methods and procedures related to historic treatment including, but not limited to, the following:

a. Review manufacturer's written instructions for precautions and effects of historic treatment procedures on materials, components, and vegetation.
b. Review and finalize historic treatment construction schedule; verify availability of materials, equipment, and facilities needed to make progress and avoid delays.
c. Review qualifications of personnel assigned to the work and assign duties.
d. Review material application, work sequencing, tolerances, and required clearances.
e. Review areas where existing construction is to remain and requires protection.

2. Removal and Dismantling:

a. Inspect and discuss condition of construction to be removed or dismantled.
b. Review requirements of other work that relies on substrates exposed by removal and dismantling work.

1.7 STORAGE AND PROTECTION OF HISTORIC MATERIALS

A. Salvaged Historic Materials:

1. Clean only loose debris from salvaged historic items unless more extensive cleaning is indicated.
2. Pack or crate items after cleaning; cushion against damage during handling. Label contents of containers.

3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area off-site designated by Owner.
5. Protect items from damage during transport and storage.

B. Historic Materials for Reinstallation:

1. Repair and clean historic items as indicated and to functional condition for reuse.
2. Pack or crate items after cleaning and repairing; cushion against damage during handling. Label 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 unless otherwise indicated. Provide connections, supports, and miscellaneous materials to make item functional for use indicated.

C. Existing Historic Materials to Remain: Protect construction indicated to remain against damage and soiling from construction work. Where permitted by Architect, items may be dismantled and taken to a suitable, protected storage location during construction work and reinstalled in their original locations after historic treatment and construction work in the vicinity is complete.

D. Storage and Protection: When taken from their existing locations, catalog and store historic items within a weathertight enclosure where they are protected from wetting by rain, snow, condensation, or ground water, and from freezing temperatures.

1. Identify each item with a nonpermanent mark to document its original location. Indicate original locations on plans elevations, sections, or photographs by annotating the identifying marks.
2. Secure stored materials to protect from theft.

1.8 PROJECT CONDITIONS

A. General Size Limitation in Historic Spaces: Materials, products, and equipment used for performing the Work and for transporting debris, materials, and products shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, including temporary protection, by 12 inches or more.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

1. Before removal and dismantling, Owner will remove the following items:

a. Furniture & other loose tenant-owned items.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with removal and dismantling work.

D. Hazardous Materials: Hazardous materials are present in construction affected by removal and dismantling work. A report on the presence of hazardous materials is contained in Appendix A “Specifications for Asbestos Abatement and Paint Disturbance” for review and use. Examine report to become aware of 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. If unanticipated asbestos is suspected, stop work in the area of potential hazard, shut off fans and other airhandlers ventilating the area, and rope off area until the questionable material is identified. Re-assign workers to continue work in unaffected areas. Resume work in the area of concern after safe working conditions are verified.

E. Storage or sale of removed or dismantled items on-site is not permitted unless otherwise indicated.

PART 2 - PRODUCTS - (Not Used)

PART 3 - EXECUTION

3.1 HISTORIC REMOVAL AND DISMANTLING EQUIPMENT

A. Removal Equipment: Use only hand-held tools except as follows or unless otherwise approved by Architect on a case-by-case basis:

1. Light jackhammers are allowed subject to Architect's approval.
2. Large air hammers are not permitted.

B. Dismantling Equipment: Use manual, hand-held tools, except as follows or otherwise approved by Architect on a case-by-case basis:

1. Hand-held power tools and cutting torches are permitted only as submitted in the historic treatment program. They must be adjustable so as to penetrate or cut only the thickness of material being removed.
2. Pry bars more than 18 inches long and hammers weighing more than 2 lb are not permitted for dismantling work.

3.2 EXAMINATION

A. Preparation for Removal and Dismantling: Examine construction to be removed or dismantled to determine best methods to safely and effectively perform removal and dismantling work. Examine adjacent work to determine what protective measures will be necessary. Make explorations, probes, and inquiries as necessary to determine condition of construction to be removed or dismantled and location of utilities and services to remain that may be hidden by construction that is to be removed or dismantled.

1. Verify that affected utilities have been disconnected and capped.
2. Inventory and record the condition of items to be removed and dismantled for reinstallation or salvage.
3. Before removal or dismantling 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.

B. Survey of Existing Conditions: Record existing conditions by use of measured drawings and preconstruction photographs.

C. Perform surveys as the Work progresses to detect hazards resulting from historic treatment procedures.

3.3 PROTECTION, GENERAL

A. Comply with temporary barrier requirements in Division 01 Section "Temporary Facilities and Controls."

B. Ensure that supervisory personnel are on-site and on duty when historic treatment work begins and during its progress.

C. Protect persons, motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm resulting from historic treatment procedures.

1. Use only proven protection methods, appropriate to each area and surface being protected.
2. Provide barricades, barriers, and temporary directional signage to exclude public from areas where historic treatment work is being performed.
3. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during course of historic treatment work.
4. Contain dust and debris generated by removal and dismantling work and prevent it from reaching the public or adjacent surfaces.
5. Provide shoring, bracing, and supports as necessary. Do not overload structural elements.
6. Protect floors and other surfaces along haul routes from damage, wear, and staining.

D. Temporary Protection of Historic Materials:

1. Protect existing historic materials with temporary protections and construction. Do not deface or remove existing materials.
2. Do not attach temporary protection to historic surfaces except as indicated as part of the historic treatment program and approved by Architect.

E. Comply with each product manufacturer's written instructions for protections and precautions. Protect against adverse effects of products and procedures on people and adjacent materials, components, and vegetation.

F. Utility and Communications Services:

1. Notify Owner, Architect, authorities having jurisdiction, and entities owning or controlling wires, conduits, pipes, and other services affected by the historic treatment work before commencing operations.
2. Disconnect and cap pipes and services as required by authorities having jurisdiction, as required for the historic treatment work.

G. Existing Drains: Prior to the start of work in an area, test drainage system to ensure that it is functioning properly. Notify Architect immediately of inadequate drainage or blockage. Do not begin work in an area until the drainage system is in working order.

1. Prevent solids such as stone or mortar residue from entering the drainage system. Clean out drains and drain lines that become sluggish or blocked by sand or other materials resulting from historic treatment work.
2. Protect drains from pollutants. Block drains or filter out sediments, allowing only clean water to pass.

H. Existing Roofing: Prior to the start of work in an area, install roofing protection.

3.4 PROTECTION DURING APPLICATION OF CHEMICALS

A. Protect motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm or damage resulting from applications of chemical cleaners and paint removers.

B. Cover adjacent surfaces with protective materials that are proven to resist chemicals selected for Project unless chemicals being used will not damage adjacent surfaces as indicated in historic treatment program. Use covering materials and masking agents that are waterproof, UV resistant, and will not stain or leave residue on surfaces to which they are applied. Apply protective materials according to manufacturer's written instructions. Do not apply liquid masking agents or adhesives to painted or porous surfaces. When no longer needed, promptly remove protective materials staining.

C. Do not apply chemicals during winds of sufficient force to spread them to unprotected surfaces.

D. Neutralize and collect alkaline and acid wastes and legally dispose of off Owner's property.

E. Collect and dispose of runoff from chemical operations by legal means and in a manner that prevents soil contamination, soil erosion, undermining of paving and foundations, damage to landscaping, or water penetration into building interior.

3.5 PROTECTION FROM FIRE

A. General: Follow fire-prevention plan and the following.

1. Comply with NFPA 241 requirements unless otherwise indicated. Perform duties entitled "Owner's Responsibility for Fire Protection."
2. Remove and keep area free of combustibles including, rubbish, paper, waste, and chemicals, except to the degree necessary for the immediate work.

    a. If combustible material cannot be removed, provide fire blankets to cover such materials.

3. Prohibit smoking by all persons within Project work and staging areas.

B. Heat-Generating Equipment and Combustible Materials: Comply with the following procedures while performing work with heat-generating equipment or highly combustible materials, including welding, torch-cutting, soldering, brazing, paint removal with heat, or other operations where open flames or implements utilizing high heat or combustible solvents and chemicals are anticipated:

1. Obtain Owner's approval for operations involving use of open-flame or welding or other high-heat equipment. Notify Owner at least 24 hours before each occurrence, indicating location of such work.
2. As far as practical, restrict heat-generating equipment to shop areas or outside the building.
3. Do not perform work with heat-generating equipment in or near rooms or in areas where flammable liquids or explosive vapors are present or thought to be present. Use a combustible gas indicator test to ensure that the area is safe.
4. Use fireproof baffles to prevent flames, sparks, hot gases, or other high-temperature material from reaching surrounding combustible material.

5. Prevent the spread of sparks and particles of hot metal through open windows, doors, holes, and cracks in floors, walls, ceilings, roofs, and other openings.
6. Fire Watch: Before working with heat-generating equipment or highly combustible materials, station personnel to serve as a fire watch at each location where such work is performed. Fire-watch personnel shall have the authority to enforce fire safety. Station fire watch according to NFPA 51B, NFPA 241, and as follows.

    a. Train each fire watch in the proper operation of fire-control equipment and alarms.
    b. Prohibit fire-watch personnel from other work that would be a distraction from fire-watch duties.
    c. Cease work with heat-generating equipment whenever fire-watch personnel are not present.
    d. Have fire watch perform final fire-safety inspection each day beginning no sooner than 30 minutes after conclusion of work at Project site to detect hidden or smoldering fires and to ensure that proper fire-prevention is maintained.
    e. Maintain fire-watch personnel at Project site until 60 minutes after conclusion of daily work.

C. Fire Extinguishers, Fire Blankets, and Rag Buckets: Maintain fire extinguishers, fire blankets, and rag buckets for disposal of rags with combustible liquids. Maintain each as suitable for the type of fire risk in each work area. Ensure that nearby personnel and the fire watch are trained in fire-extinguisher and blanket operation.

D. Sprinklers: Where sprinkler protection exists and is functional, maintain it without interruption while operations are being performed. If operations are performed close to sprinklers, shield them temporarily with guards.

1. Remove temporary guards at the end of work shifts, whenever operations are paused, and when nearby work is completed.

3.6 GENERAL HISTORIC TREATMENT

A. Ensure that supervisory personnel are present when historic treatment work begins and during its progress.

B. Halt the process of deterioration and stabilize conditions unless otherwise indicated. Perform work as indicated on Drawings. Follow the procedures in subparagraphs below and procedures approved in historic treatment program:

1. Retain as much existing material as possible; repair and consolidate rather than replace.
2. Use additional material or structure to reinforce, strengthen, prop, tie, and support existing material or structure.
3. Use reversible processes wherever possible.
4. Use historically accurate repair and replacement materials and techniques unless otherwise indicated.
5. Record existing work before each procedure (preconstruction) and progress during the work with digital preconstruction documentation [**photographs**] [**or**] [**video recordings**]. Comply with requirements in Division 01 Section "Photographic Documentation."

C. Notify Architect of visible changes in the integrity of material or components whether due to environmental causes including biological attack, UV degradation, freezing, or thawing; or due to structural defects including cracks, movement, or distortion.

1. Do not proceed with the work in question until directed by Architect.

D. Where missing features are indicated to be repaired or replaced, provide features whose designs are based on accurate duplications rather than on conjectural designs, subject to approval of Architect.

E. Where Work requires existing features to be removed or dismantled and reinstalled, perform these operations without damage to the material itself, to adjacent materials, or to the substrate.

F. Identify new and replacement materials and features with permanent marks hidden in the completed work to distinguish them from original materials. Record a legend of identification marks and the locations of the items on record Drawings.

3.7 HISTORIC REMOVAL AND DISMANTLING

A. General: Have removal and dismantling work performed by a qualified historic removal and dismantling specialist. Ensure that historic removal and dismantling specialist's field supervisors are present when removal and dismantling work begins and during its progress.

B. Perform work according to the historic treatment program.

1. Provide supports or reinforcement for existing construction that becomes temporarily weakened by the work, until the work is completed.
2. Perform cutting by hand or with small power tools wherever possible. Cut holes and slots neatly to size required, with minimum disturbance of adjacent work.
3. Do not operate air compressors inside building, unless approved by Architect in each case.
4. Do not drill or cut columns, beams, joints, girders, structural slabs, or other structural supporting elements, without having Contractor's professional engineer's written approval for each location before such work is begun.
5. Do not use explosives.

C. Water-Mist Sprinkling: Use water-mist sprinkling and other wet methods to control dust only with adequate, approved procedures and equipment that ensure that such water will not create a hazard or adversely affect other building areas or materials.

D. Unacceptable Equipment: Keep equipment that is not permitted for historic removal or dismantling work away from the vicinity where such work is being performed.

E. Removing and Dismantling Items on or near Historic Surfaces:

1. Use only dismantling tools and procedures within 12 inches historic surface. Do not use pry bars. Protect historic surface from contact with or damage by tools.
2. Unfasten items to be removed, in the opposite order from which they were installed.
3. Support each item as it becomes loosened to prevent stress and damage to the historic surface.
4. Dismantle anchorages.

F. Steelwork:

1. Expose structural steel for examination by Architect and Contractor's professional engineer before proceeding with removal or dismantling.
2. If distress in structure is apparent during performance of the work, stop removal or dismantling and take immediate precautionary measures to ensure safety of the structure. Inform Architect of the problem, steps taken, and proposed corrective actions.

3. Brace and support structural steel being removed and remaining during removal and dismantling.
4. Concrete-Encased Steel: Where steel is known to be encased by concrete being removed, saw cut with blades that will cut no deeper than the thickness of the concrete cover with an adequate margin for error in the location of the steel. Isolate sections of concrete by saw cutting before beginning removal.

G. Loose Plaster: Identify loose, non-historic plaster and separate it from its substrate by tapping with a hammer and prying with a chisel or screwdriver. Do not use pry bars. Leave sound, firmly adhered plaster in place. Do not damage, remove, or dismantle historic plasterwork except where indicated or where it is an immediate hazard to personnel and as approved by Architect.

H. Anchorages:

1. Remove anchorages associated with removed items.
2. Dismantle anchorages associated with dismantled items.
3. In non-historic surfaces, patch holes created by anchorage removal or dismantling according to the requirements for new work.
4. In historic surfaces, patch or repair holes created by anchorage removal or dismantling according to Section specific to the historic surface being patched.

3.8 HISTORIC TREATMENT SCHEDULE

A. Spaces, areas, rooms, and surfaces requiring special care and treatment to ensure successful rehabilitation are indicated on Drawings and generally described below with levels of treatment per Paragraph 1.3 D above.

1.	Exterior façades of building	Renovation Zone
2.	Basement Floor spaces:	Alteration Zone
3.	First Floor spaces including:	
a.	101. Lobby	Renovation Zone
b.	105 Men’s Toilet	Renovation Zone
c.	108. Bar	Renovation Zone
d.	110. Men’s Lounge	Renovation Zone
e.	111. Memorial Hall	Renovation Zone
f.	112. Meeting Room	Alteration Zone
g.	114. Ladies Lounge	Alteration Zone
h.	Other First Floor spaces	Alteration Zone
4.	Mezzanine Floor spaces including:	
a.	203. Atrium	Restoration Zone
b.	Other Mezzanine Floor Spaces	Alteration Zone

END OF SECTION 01 35 91

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. References.

B. Quality assurance.

C. Tolerances.

D. Labeling.

E. Seismic Considerations.

F. Field samples.

G. Testing and inspection laboratory services.

H. Manufacturers' field services and reports.

1.2 REFERENCES

A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard by date of issue current on date for receiving bids, except where specific date is established by code.

C. Obtain copies of standards where required by product specification Sections.

D. When specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.

E. Neither contractual relationships, duties, nor responsibilities of parties in Contract nor those of Engineer or Architect shall be altered from Contract Documents by mention or inference otherwise in reference documents.

F. Contractor shall be responsible for being current and knowledgeable in building codes applicable to all trades under his direction.

G. Provide all work and materials in full accordance with the latest Rules and Regulations of the CCR, Title 24, CBC, California Mechanical Code, California Plumbing Code, California Electrical Code, California Fire Code, Title 19, Division 1, State Fire Marshal; applicable requirements of Title 8, Division 1, Department of Industrial Relations; and other applicable laws or regulations. Nothing in Drawings and Specifications shall be construed to permit work not conforming to these Codes.

H. Furnish additional material and labor as required to comply with applicable Rules and Regulations.

1.3 QUALIFICATIONS

A. General: Qualifications paragraphs in this Subsection establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product, that are similar to those indicated for this Project in material, design, and extent.

E. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

F. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated; 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 National Voluntary Laboratory Accreditation Program (NVLAP) by National Institute of Standards and Technology (NIST).

1.4 QUALITY ASSURANCE

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions and workmanship, to produce Work of specified quality.

B. Comply fully with manufacturers' instructions, including each step in sequence.

C. When manufacturers' instructions conflict with the Contract Documents, request clarification from Engineer before proceeding.

D. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Work shall be performed by persons qualified to produce workmanship of specified quality.

F. Verify field measurements are as indicated on Shop Drawings or as instructed by manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

H. Contractor's Line of Authority: Contractor shall provide one person who shall be both knowledgeable and responsible for all work to be performed on this project at all times during normal work hours. In Contractor's absence, Contractor's appointed representative shall be responsible for all directions given him and said directions shall be binding as if given to Contractor. Contractor's representative shall be responsible to coordinate all work to be performed.

I. Shop and field work shall be performed by mechanics skilled and experienced in the fabrication and installation of the work involved. All work on this project shall be done in accordance with the best practices of the various trades involved and in accordance with Drawings, accepted shop drawings, and Specifications.

J. All work shall be erected and installed plumb, level, square and true and in proper alignment and relationship to the work of other trades. All finished work shall be free from defects. Engineer reserves the right to reject any materials and workmanship that are not considered to be up to the highest standards of the various trades involved. Such inferior material or workmanship shall be replaced at no cost to County.

K. All work shall be installed by knowledgeable installers and defined "Eligible" by the specified materials manufacturers. Specifications and recommendations of the manufacturer, whose materials are used, shall be strictly adhered to during application or installation of materials.

L. Any additional work beyond that specified or illustrated, or any modification thereto, that is necessary for the furnishing of warranty shall be provided by Contractor at no cost to County.

1.5 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. When manufacturers' tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

1.6 LABELING

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

B. Label Information: Include manufacturer's or fabricator's identification, approved agency identification, and the following information, as applicable, on each label.

1. Model number.
2. Serial number.
3. Performance characteristics.

1.7 SEISMIC CERTIFICATION OF NONSTRUCTURAL COMPONENTS

A. The manufacturer of each designated seismic system components subject to the provisions of ASCE 7 Section 13.2.2 shall test or analyze the component and its mounting system or anchorage and submit a certificate of compliance for review and acceptance by the registered design professional responsible for the design of the designated seismic system and for approval by the building official in accordance with 2010 CBC, Chapter 17 “Structural Tests and Special Inspections”, Section 1708.4 “Seismic Certification of Nonstructural Components.”

1.8 CONFLICTING REQUIREMENTS

A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Engineer for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Engineer for a decision before proceeding.

1.9 FIELD SAMPLES

A. Install field samples at the site as required by individual specifications Sections for review.

B. Acceptable samples represent a quality level for the Work.

C. Where field sample is specified in individual Sections to be removed, clear area after field sample has been accepted by Architect.

1.10 INSPECTION AND TESTING LABORATORY SERVICES

A. County will select and pay for the services of an independent Inspection/Testing Laboratory to perform inspections and testing.

1. Special Inspector: As required by 2010 CBC including Chapter 17 “Structural Tests and Special Inspections.”

a. Special Inspection: As defined in CBC Chapter 17, Section 1704 “Special Inspections.”

B. Inspection/Testing Laboratory will perform inspections, tests, and other services specified in individual specification Sections and as required by Engineer.

1. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to National Bureau of Standards or accepted values of natural physical constants.

C. Reports will be submitted by inspection/Testing Laboratory to Architect, Engineer, and Contractor, indicating observations and results of tests and indicating compliance or non-compliance with the Contract Documents.

D. Cooperate with Inspection/Testing Laboratory; furnish samples of materials, design mix, equipment, tools, storage and assistance as requested.

1. Notify Engineer, and Inspection/Testing Laboratory 24 hours prior to expected time for operations requiring services.
2. Make arrangements with Inspection/Testing Laboratory and pay for additional samples and tests required for Contractor's use.

E. The Inspection/Testing Laboratory shall perform inspection of work to determine conformance with these Standards.

1. Request for inspection shall be made to the office of the Inspection/Testing Laboratory a minimum of 24 hours in advance of the time the inspection is desired.
2. Underground work shall not be backfilled or covered until an inspection by the Inspection/Testing Laboratory has been completed and the work approved. Any work that is covered without inspection shall be uncovered at Contractor's expense, for completion of inspection work.
3. The Inspection/Testing Laboratory shall have access to the Work at all times and shall be furnished every reasonable facility for ascertaining that the work done, materials used and workmanship performed are in accordance with the requirements of these Standards.
4. Inspection of the Work shall not relieve Contractor of any of his obligations to satisfactorily perform the Work in accordance with requirements of Contract Documents.

F. Retesting or reinspection required because of non-conformance to specified requirements shall be performed by the same Inspection/Testing Laboratory. Payment for retesting will be charged to Contractor by deducting inspection or testing charges from the Contract Sum.

G. If the Work to be tested or inspected is not ready or sufficiently completed to allow the test/inspection service to complete required test(s)/inspection(s), costs and expenses of the test/inspection service to return to the Site or fabrication facility to perform/complete required test(s)/inspection(s) shall be charged to Contractor by deducting such costs and expenses from the Contract Sum.

H. All Samples, specimens and tests shall be prepared and accomplished by a properly qualified person or testing laboratory, selected by County, who shall furnish County, Architect, Engineer, and Contractor with test reports, including test results, and stating that they were prepared in accordance with the specified provisions. All tests as well as sampling and preparation of samples shall be in accordance with applicable ASTM and other specified standards.

1.11 MANUFACTURERS' FIELD SERVICES AND REPORTS

A. When specified in individual specification Sections, material and product suppliers, and manufacturers shall provide qualified personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, testing, adjusting, and balancing of equipment, as applicable, and to initiate instructions when necessary.

B. Submit qualifications of qualified personnel to Engineer at least thirty days in advance of required observations.

C. Qualified personnel shall report observations, site decisions, and supplemental instructions given to applicators and installers, and description of work installed contrary to manufacturers' written instructions, as applicable.

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

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify and ensure that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

B. Verify and ensure that existing substrate is capable of structural support and attachment of new Work being applied or attached.

C. Examine and verify specific conditions described in individual specification Sections.

D. Verify utility services are available, of correct characteristics, and in correct locations.

3.2 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

END OF SECTION

SECTION 01 42 00 - REFERENCES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Reference Standards.

B. Definitions.

C. Abbreviations and Acronyms.

1.2 REFERENCES

A. General: References are made throughout the Specification to various codes, reference standards, practices and requirements for materials, work quality, installation, inspections and tests which are published and issued by government agencies, professional and trade organizations, societies, associations and testing agencies. References to these publications are made by acronyms or abbreviations as listed in this Section.

B. Obtain copies of reference standards, manuals and codes directly from publication sources as needed for proper performance and completion of the Work.

C. Standards, manuals and codes referenced in the Specifications form part of these Specifications to the extent referenced. No provisions of any such standard, specification, manual, or code or instruction shall be effective to change the duties and responsibilities of County, Architect, or Contractor; any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents; nor shall it be effective to assign to County

D. , Architect or any of Architect's consultants, agents, or employees, a duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

E. Reference to standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual unless noted otherwise.

1.3 DEFINITIONS

A. General: Words and abbreviations used in the Specifications are given meaning as defined in "The American Heritage Dictionary of the English Language" and as commonly used and accepted in the construction industry. Abbreviations and symbols used on Drawings are identified on Drawings.

B. Words and Terms: The following words and terms used in the Specifications shall mean as indicated.

1. Accepted Equal: Reviewed and accepted by the County as being equal in quality, utility, and appearance.
2. Approved: As accepted by the County.
3. Words and terms "or Approved Equal" and "or Equal" used in the Specifications shall have the same meaning as "Accepted Equal."

4. Contractor Shall: To be concise; sentences, statements, and clauses used in the Specifications exclude any form of the verb “shall”, which is normally expressed in a verb phrase with verbs such as “furnish”, “install”, “provide”, “perform”, “construct”, “erect”, “comply”, “apply”, “submit”, etc. Any such sentences, statements, and clauses are to be interpreted to include applicable form of phrase “Contractor shall”.
5. Furnish: Supply and deliver to Project site, ready for installation; unload and inspect for damage.
6. Install: Anchor, fasten, or connect in place and adjust for use; place or apply in proper position and location; establish in place for use or service including all necessary labor, tools, equipment, and implements necessary to perform work indicated, ready for operation or use.
7. Observe: Used in reference to Architect means to become familiar with the process and quality of the Work and to determine if the Work is proceeding in general accordance with the Contract Documents based on what is plainly visible at the construction site, without removal of its materials or other construction that is in place.
8. Products: New material, machinery, components, equipment, fixtures, and systems forming the Work, but does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work.
9. Provide: Furnish and install all items necessary to complete work, ready for operation or use.

1.4 CODES, REGULATIONS, GOVERNING AGENCIES

A. California Code of Regulations.
   1. Title 8, Division 1, Chapter 3.2 – California Occupational Safety and Health Regulations (Cal/OSHA).
   2. Title 8, Division 1, Chapter 4, Subchapter 4 – Construction Safety Orders.
   3. Title 8, Division 1, Chapter 4, Subchapter 6 – Elevator Safety Orders
   4. Title 19, Division 1 – Regulations of the State Fire Marshal (SFM).
   5. Title 24 – California Building Standards Code (CBSC).
      a. Part 1 – California Administrative Code (CAC).
      b. Part 2 – California Building Code (CBC).
      c. Part 3 – California Electrical Code (CEC).
      d. Part 4 – California Mechanical Code (CMC).
      e. Part 5 – California Plumbing Code (CPC).
      f. Part 6 – California Energy Code.
      g. Part 7 – California Elevator Safety Construction Code.
      h. Part 8 – California Historical Building Code.
      i. Part 9 – California Fire Code.
      j. Part 10 – California Existing Building Code.
      k. Part 11 – California Green Building Standards Code.
      l. Part 12 – California Referenced Standards Code.

B. California Department of Transportation (Caltrans).

C. California Department of General Services (DGS).

D. California Environmental Protection Agency (Cal/EPA).
   1. California Air Resources Board (ARB).
   2. California State Water Resources Control Board (SWRCB).
   3. Department of Pesticide Regulation (DPR).

E. Code of Federal Regulations (CFR) Title 28, Part 36 – ADA Standards for Accessible Design, Appendix A – ADA Accessibility Guidelines (ADAAG) for Buildings and Facilities.

F. Occupational Safety and Health Act (OSHA).

G. U.S. Environmental Protection Agency (EPA).

H. U.S. Department of Energy (DOE).

1.5 REFERENCES, ABBREVIATIONS, AND ACRONYMS

AA	Aluminum Association.
AAADM	American Association of Automatic Door Manufacturers.
AABC	Associated Air Balance Council.
AAC	Aluminum Anodizers Council.
AAMA	American Architectural Manufacturers Association.
AASHTO	American Association of State Highway and Transportation Officials.
AATCC	American Association of Textile Chemists and Colorists.
ABMA	American Boiler Manufacturer's Association.
ACGIH	American Conference of Government Industrial Hygienists, Inc.
ACI	American Concrete Institute.
ACPA	American Concrete Pipe Association.
AF&PA	American Forest and Paper Association (formerly National Forest Products Association).
AFBMA	Anti-Friction Bearing Manufacturer's Association.
AGA	American Gas Association.
AGC	Associated General Contractors of America.
AGMA	American Gear Manufacturers Association
AHA	American Hardboard Association.
AHJ	Authority Having Jurisdiction.
AI	Asphalt Institute.
AIA	American Institute of Architects.
AIEE	American Institute of Electrical Engineers.
AIHA	American Industrial Hygiene Association.
AISC	American Institute of Steel Construction.
AISI	American Iron and Steel Institute.
AITC	American Institute of Timber Construction.
ALSC	American Lumber Standards Committee.

AMCA	Air Movement and Control Association.
ANSI	American National Standards Institute, Inc.
APA	The Engineered Wood Association.
API	American Petroleum Institute.
APWA	American Public Works Association.
AQMD	Air Quality Management District.
ARI	Air-Conditioning and Refrigeration Institute.
ARMA	Asphalt Roofing Manufacturers Association.
ASCE	American Society of Civil Engineers.
ASD	Advanced Simulation and Design.
ASHRAE	American Society of Heating Refrigerating and Air Conditioning Engineers.
ASME	American Society of Mechanical Engineers.
ASPA	American Sod Producers Association.
ASSE	American Society of Sanitary Engineers.
ASTM	American Society for Testing and Materials.
ATF	Academy of Textiles and Flooring.
AWC	American Wood Council.
AWCI	Association of Wall and Ceiling Industries.
AWG	American Wire Gage.
AWI	Architectural Woodwork Institute.
AWPA	American Wood Protection Association.
AWS	American Welding Society.
AWWA	American Water Works Association.
BAAQMD	Bay Area Air Quality Management District
BHMA	Builders Hardware Manufacturers Association.
BIA	Brick Industry Association.
BOCA	Building Officials and Code Administrators International, Inc.
CAN/ULC	Underwriters' Laboratory of Canada.
CAS	Chemical Abstracts Service (division of the American Chemical Society).
CBC	California Building Code
CBM	Certified Ballast Manufacturers.
CCR	California Code of Regulations
CDA	Copper Development Association.
CE	US Army Corps of Engineers
CFFA	Chemical Fabrics and Film Association, Inc.
CFR	Code of Federal Regulations
CISCA	Ceiling and Interior Systems Construction Association.
CISPI	Cast Iron Soil Pipe Institute.
CLFMI	Chain Link Fence Manufacturing Institute.
CMU	Concrete Masonry Unit
CPA	Composite Panel Association.
CRA	California Redwood Association.
CRI	Carpet and Rug Institute.

CRSI	Concrete Reinforcing Steel Institute.
CS	Commercial Standard.
CSA	Corrections Standards Authority
CSI	Construction Specifications Institute.
CSIAC	California State Industrial Accident Commission.
DHI	Door Hardware Institute.
EIA	Electronic Industries Association.
EIMA	EIFS Industry Manufacturers Association.
ETL	Electrical Testing Laboratories.
EWS	Engineered Wood Systems
FEMA	Federal Emergency Management Agency.
FM	Factory Mutual Research and Engineering Corporation.
FMRC	Factory Mutual Research Corporation.
FS	Federal Specification – U.S. General Services Administration.
FSC	Forest Stewardship Council.
GA	Gypsum Association.
GANA	Glass Association of North America.
GMA	Flat Glass Marketing Association.
HPVA	Hardwood Plywood and Veneer Association.
IAPMO	International Association of Plumbing and Mechanical Officials.
ICC	International Code Council, Inc.
ICC	Interstate Commerce Commission.
ICC-ES	ICC Evaluation Service, Inc.
ICEA	Insulated Cable Engineers Association.
ICRI	International Concrete Repair Institute
IEEE	Institute of Electrical and Electronics Engineers.
IESNA	Illuminating Engineering Society of North America
IMIAC	International Masonry Industry All-Weather Council.
IPCEA	Insulated Power Cable Engineers Association.
ISO	International Standards Organization.
ITS	Intertek Testing Services.
LEED™	Leadership in Energy and Environmental Design (USGBC standard).
LRFD	Load and Resistance Factor Design.
LSGA	Laminators Safety Glass Association.
MBMA	Metal Building Manufacturers Association.
MFMA	Maple Flooring Manufacturers Association.
MFMA	Metal Framing Manufacturers Association.
MIA	Marble Institute of America
MIL	Military Specifications (U.S. Department of Defense).
ML/SFA	Metal Lath/Steel Framing Association Division of NAAMM.
MPI	Master Painters Institute.
MS4	Municipal Separate Storm Sewer Systems.
MSDS	Material Safety and Data Sheet.

MSJC	Masonry Standards Joint Committee.
MSMA	Metal Stud Manufacturers Association.
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry.
MUTCD	Manual of Uniform Traffic Control Devices (U.S. Department of Transportation).
NAAMM	National Association of Architectural Metal Manufacturers.
NAFS	North American Fenestration Standard (Co-published by AAMA & WDMA).
NAPHCC	National Association of Plumbing Heating Cooling Contractors.
NBBPVI	National Board of Boiler and Pressure Vessel Inspectors.
NBFU	National Board of Fire Underwriters.
NBGQA	National Building Granite Quarries Association, Inc.
NCMA	National Concrete Masonry Association.
NCPWB	National Certified Pipe Welding Bureau.
NCRP	National Council on Radiation Protection and Measurement.
NEBB	National Environmental Balancing Bureau.
NEC	National Electrical Code.
NEHRP	National Earthquake Hazards Reduction Program.
NEMA	National Electrical Manufacturers Association.
NES	National Evaluation Service, Inc.
NFPA	National Fire Protection Association.
NFRC	National Fenestration Rating Council.
NIBS	National Institute of Building Sciences.
NIST	National Institute of Science and Technology.
NOFMA	National Oak Flooring Manufacturers Association.
NPDES	National Pollutant Discharge Elimination System.
NRCA	National Roofing Contractors Association.
NRMCA	National Ready Mixed Concrete Association.
NSF	National Sanitation Foundation.
NTMA	National Terrazzo and Mosaic Association.
NWWDA	National Wood Window and Door Association.
OSHA	Occupational Safety and Health Act of 1970.
PCA	Portland Cement Association.
PCI	Precast Prestressed Concrete Institute.
PDI	Plumbing and Drainage Institute.
PEI	Porcelain Enamel Institute.
PS	Voluntary Product Standard (US Department of Commerce / NIST).
RCSC	Research Council on Structural Connections.
RIS	Redwood Inspection Service.
RMA	Rubber Manufacturers Association.
SC	Shading Coefficient.
SCAQMD	South Coast Air Quality Management District
SDI	Steel Deck Institute.
SDI	Steel Door Institute.

SF	Square Feet
SFBC	South Florida Building Code.
SHGC	Solar Heat Gain Coefficient.
SIGMA	Sealed Insulating Glass Manufacturers Association.
SMACNA	Sheet Metal and Air Conditioning Contractors National Association.
SPRI	Single-Ply Roofing Institute.
SSMA	Steel Stud Manufacturers Association.
SSPC	The Society for Protective Coatings.
SWI	Steel Window Institute.
SWPPP	Storm Water Pollution Prevention Plan.
SWRI	Sealant, Waterproofing, and Restoration Institute.
TCA	Tile Council of America.
TEMA	Tubular Exchanger Manufacturers Association, Inc.
TMS	The Masonry Society.
TPI	Truss Plate Institute.
TRI	Tile Roofing Institute.
UL	Underwriters Laboratories, Inc.
ULC	Underwriters Laboratories of Canada.
USGBC	US Green Building Council.
VOC	Volatile Organic Compounds.
WCLIB	West Coast Lumber Inspection Bureau.
WDMA	Window and Door Manufacturers Association (formerly NWWDA - National Wood Window and Door Association).
WDMA	Window and Door Manufacturers Association.
WH	Warnock Hersey.
WI	Woodwork Institute (formerly WIC – Woodwork Institute of California).
WSRCA	Western States Roofing Contractors Association.
WSFI	Wood and Synthetic Flooring Institute.
WWPA	Western Wood Products Association.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01 43 39 - MOCKUPS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Visual Mockups; separate or freestanding construction; removal and demolition work.

1.2 VISUAL MOCKUPS

A. Definitions:

1. Visual Mockup: Separate mockup construction, intended to illustrate materials and workmanship in an assembly, and used for technical and aesthetic evaluation. Mockup shall not to be a part of the finished construction.
2. Integrated Visual Mockup: A single, freestanding visual mockup assembly incorporating elements specified in various Sections, and demonstrating interface of various materials and systems, constructed at the site prior to installation of the actual assembly in the Project. Mockup not to be a part of the finished construction.

B. Configuration and Extent of Mockups: As described in this Section and as required to illustrate the design intent for Architect's evaluation.

C. Maintain and protect Visual Mockups from damage during construction, and dispose of mockups when no longer required, as determined by Architect.

1.3 MOCKUP DESCRIPTION

A. General: Provide mockups as specified below.

1. Mockup Construction Schedule: Indicate time required for mockup construction, Architect's and County's review and acceptance, and removal/demolition work associated with mockups in Construction Progress Schedule. Refer to Section 01 32 16 "Construction Schedules" requirements.

B. Exterior Concrete Retaining Walls, Finishing & Scoring:

1. At location on Project selected by Architect, place and finish an 8 foot x 8 foot x 4 inch deep visual mockup of concrete flatwork including finish, scoring pattern, and color for review by Architect.
2. At location on Project selected by Architect and adjacent to flatwork mockup, place and finish an 8 foot long visual mockup of concrete flatwork including finish, color, end condition and corner condition for review by Architect.
3. Construct mockups using processes and techniques intended for use on permanent work, including curing procedures. Include samples of control, construction, and expansion joints in sample panels. Show how different colors will cleanly and sharply abut to each other. Mockup shall be produced by the individual workers who will perform the work for the Project.
4. Accepted mockup shall provide visual standard for work and shall remain through completion of the work for use as a quality standard for finished work.

5. Accepted mock-up may not remain as part of the completed work. Remove after all colored concrete finishing work had been completed and accepted.

1.4 QUALITY ASSURANCE

A. Pre-Installation Meetings

1. Conduct pre-installation meeting in accordance with Section 01 30 00 “Administrative Requirements”.
2. Convene pre-installation meeting at least one week prior to commencing work on Mockups.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

1.5 MOCKUP MATERIALS

A. Contractor is cautioned to not purchase all materials for the project that are involved in any one mockup until after the mockup has been reviewed and accepted by the Architect.

END OF SECTION

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Temporary Utilities: Electricity, lighting, heating, cooling, ventilation, telephone service, water, sanitary facilities.

B. Construction Facilities: Temporary buildings, vehicular access, parking, project identification, progress cleaning, and fire prevention facilities.

C. Temporary Controls: Barriers, enclosures, security, water control, dust control, erosion control, noise control, and pollution control.

D. Protection of Work.

E. Removal of utilities, facilities, and controls

1.2 TEMPORARY ELECTRICITY

A. Contractor shall provide and pay for power service required from utility source as needed for construction operations. Exercise measures to conserve energy.

B. Provide power outlets for construction operations, with branch wiring and distribution boxes located as required. Provide flexible power cords as required for portable construction tools and equipment.

C. Install and maintain temporary distributions of electrical power to locations at the Site as necessary or appropriate for efficient prosecution of the Work. Remove temporary distributions as appropriate or as directed by County.

D. Provide main service disconnect and overcurrent protection at convenient location.

1.3 TEMPORARY LIGHTING

A. Provide and maintain lighting for construction operations to achieve minimum lighting level of two (2) Lumensper square foot.

B. Provide and maintain a minimum of one Lumen per square foot of lighting at exterior staging and storage areas after dark for security purposes.

C. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps for specified lighting levels.

D. Maintain lighting and provide routine repairs.

1.4 TEMPORARY HEATING

A. Provide heating devices and heat as needed to maintain specified conditions for construction operations. Exercise measures to conserve energy.

B. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless indicated otherwise in product Sections.

1.5 TEMPORARY COOLING

A. Provide cooling devices and cooling as needed to maintain specified conditions for construction operations. Exercise measures to conserve energy.

B. Maintain maximum ambient temperature of 80 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.

1.6 TEMPORARY VENTILATION

A. Ventilate enclosed areas to achieve curing of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

1.7 TELEPHONE SERVICE

A. Provide, maintain and pay for cellular telephone service to field at time of project mobilization and for the duration of the project.

B. Provide, maintain and pay for separate lines for telephone, internet access and facsimile machine service to field office at time of project mobilization and for the duration of the project.

1.8 TEMPORARY WATER SERVICE

A. Contractor shall provide and pay for suitable quality water service as needed to maintain specified conditions for construction operations. Connect to nearest water source. Exercise measures to conserve water.

B. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing.

1.9 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required temporary facilities for use by construction personnel. Maintain daily in sanitary and clean condition.

B. See Section 01 11 00 “Summary of Work” Paragraph 1.4 for additional requirements.

1.10 FIELD OFFICES AND SHEDS

A. Offices: Weather-tight, with telephone, facsimile machine, lighting, electrical outlets, heating, cooling, and ventilating equipment, and equipped with sturdy furniture drawing rack and drawing display table.

B. Provide space for project meetings, with table and chairs to accommodate a minimum of six persons.

C. Locate offices and sheds from new structures so as to not disrupt or interfere with daily operations.

D. See the following sections for additional requirements

1. Section 01 11 00 “Summary of Work” Paragraph 1.4 “County’s Occupancy Requirements”

2. Section 00 72 00 “General Conditions” GC 35 “Temporary Facilities”

E. Construction: Portable or mobile buildings, or buildings constructed with floors raised above ground, securely fixed to foundations with steps and landings at entrance doors.

1. Construction: Structurally sound, secure, weather tight enclosures for office and storage spaces. Maintain during progress of Work; remove at completion of Work.
2. Temperature Transmission Resistance of Floors, Walls, and Ceilings: Compatible with occupancy and storage requirements.
3. Exterior Materials: Weather resistant.
4. Interior Materials in Offices: Sheet type materials for walls and ceilings, pre-finished or painted; resilient floors and bases.
5. Windows: Minimum total area of 10 percent of floor area, with operable sash and insect screens. Locate to provide views of construction area.
6. Lighting for Offices: 50 foot-candles at desk top height, exterior lighting at entrance doors.
7. Interior Materials in Storage Sheds: As required to provide specified conditions for storage of products.

F. Storage Areas And Sheds: Size to storage requirements for products of individual Sections, allowing for access and orderly provision for maintenance and for inspection of products to requirements of Section 01 60 00 “Product Requirements”.

G. Preparation: Fill and grade sites for temporary structures sloped for drainage away from buildings.

H. Installation:

1. Install office spaces ready for occupancy within 15 days of date fixed in Notice to Proceed.

I. Maintenance And Cleaning:

1. Weekly janitorial services for offices; periodic cleaning and maintenance for office and storage areas.
2. Maintain approach walks free of mud, water, and snow.

J. Removal: At completion of Work remove buildings, foundations, utility services, and debris. Restore areas.

1.11 VEHICULAR ACCESS

A. Construct temporary all-weather access roads from public thoroughfares to serve construction area, of width and load bearing capacity to accommodate unimpeded traffic for construction purposes.

B. Extend and relocate vehicular access as Work progress requires, provide detours as necessary for unimpeded traffic flow.

C. Provide unimpeded access for emergency vehicles. Maintain 20 foot wide driveways with turning space between and around combustible materials.

D. Provide and maintain access to fire hydrants and control valves free of obstructions.

E. Provide means of removing mud from vehicle wheels before entering streets.

1.12 PARKING

A. Coordinate parking areas to accommodate construction personnel with County.

B. Provide temporary surface parking areas to accommodate construction personnel.

C. When site space is not adequate, provide additional off-site parking.

D. Use of designated existing on-site streets and driveways used for construction traffic is not permitted. Tracked vehicles not allowed on paved areas.

E. Use of existing parking facilities used by construction personnel is not permitted.

F. Do not allow heavy vehicles or construction equipment in parking areas.

G. Do not allow vehicle parking on existing pavement.

H. Permanent Pavements And Parking Facilities:

1. Bases for permanent roads and parking areas may be used for construction traffic.
2. Avoid traffic loading beyond paving design capacity. Tracked vehicles not allowed.

I. Maintenance:

1. Maintain traffic and parking areas in sound condition.
2. Maintain existing paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.

J. Removal, Repair:

1. Remove temporary materials and construction before Project Completion.
2. Repair existing facilities damaged by use, to original condition.

1.13 PROJECT IDENTIFICATION

A. Project Identification Sign:

1. One painted sign, 32 square foot area, bottom 6 feet above ground.
2. Content:
   a. Project title and name of County as indicated on Contract Documents.
   b. Names and titles of authorities.
   c. Names and titles of Architect and Consultants.
   d. Name of Prime Contractor and major Subcontractors.
3. Graphic Design, Colors, Style of Lettering: Designated by Architect.
4. No other signs are allowed without County permission except those required by law.

B. Design sign and structure to withstand 60 miles per hour wind velocity.

C. Sign Painter: Experienced as professional sign painter for minimum three years.

D. Finishes, Painting: Adequate to withstand weathering, fading, and chipping for duration of construction.

E. Show content, layout, lettering, color, structure, sizes, and grades of members.

F. Sign Materials:

1. Structure and Framing: Wood or metal, structurally adequate.
2. Sign Surfaces: Exterior grade plywood with medium density overlay, minimum 3/4 inches thick, standard large sizes to minimize joints.
3. Rough Hardware: Galvanized.
4. Paint and Primers: Exterior quality, one prime coat and two finish coats; sign background color as selected by Architect.
5. Lettering: Exterior quality paint or pre-cut vinyl self-adhesive products, colors as selected by Architect.

G. Installation:

1. Install project identification sign within 15 days after date fixed by Notice to Proceed.
2. Erect at designated location.
3. Erect supports and framing on secure foundation, rigidly braced and framed to resist wind loadings.
4. Install sign surface plumb and level, with butt joints. Anchor securely.
5. Paint exposed surfaces of sign, supports, and framing.

H. Maintenance: Maintain signs and supports clean, repair deterioration and damage.

I. Removal: Remove signs, framing, supports, and foundations at completion of Project and restore area.

1.14 PROGRESS CLEANING AND WASTE REMOVAL

A. Maintain areas free of waste materials, debris and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces and other closed or remote spaces prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing and continue cleaning to eliminate dust.

D. Remove waste materials, debris and rubbish from site daily and dispose off-site.

1.15 FIRE PREVENTION FACILITIES

A. Smoking on the job site is prohibited.

B. Establish fire watch for cutting and welding and other hazardous operations capable of starting fires. Maintain fire watch before, during, and after hazardous operations until threat of fire does not exist.

C. Portable Fire Extinguishers: NFPA 10; 10 pound capacity, 4A-60B: C UL rating.

1. Provide one fire extinguisher at each stair on each floor of buildings under construction.
2. Provide minimum one fire extinguisher in every construction trailer and storage shed.
3. Provide minimum one fire extinguisher on roof during roofing operations using heat producing equipment.

1.16 BARRIERS AND ENCLOSURES

A. Provide 6 foot high temporary chain link fence barriers to prevent unauthorized entry to construction areas, and to protect adjacent properties from damage from construction operations and demolition.

B. Provide protection for plants designated to remain. Replace damaged plants.

C. Exterior Enclosures: Provide temporary insulated weather tight closure of exterior openings to accommodate acceptable working conditions and protection for products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

1.17 SECURITY

A. Provide security and facilities to protect Work and County occupied areas affected by the Work from unauthorized entry, vandalism or theft.

B. Initiate program at project mobilization. Maintain program throughout construction period until County occupancy.

1.18 WATER CONTROL

A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

1.19 DUST CONTROL

A. Execute Work by methods to minimize raising dust from construction operations.

B. Provide positive means to prevent air-borne dust from dispersing into atmosphere.

1.20 EROSION AND SEDIMENT CONTROL

A. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.

B. Minimize surface area of bare soil exposed at one time.

C. Provide temporary measures including berms, dikes, and drains, and other devices to prevent water flow.

D. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.

E. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

F. Refer to notes and drawings on sheet “Site Erosion Control Plan” for additional requirements.

1.21 NOISE CONTROL

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

1.22 POLLUTION CONTROL

A. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.

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

1.23 PROTECTION OF INSTALLED WORK

A. Protect installed Work and provide special protection where specified in individual specification Sections.

B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to minimize damage.

C. Provide protective coverings at walls, projections, jambs, sills and soffits of openings.

D. Protect finished floors, stairs and other surfaces from traffic, dirt, wear, damage or movement of heavy objects, by protecting with durable sheet materials.

1.24 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

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

B. Clean and repair damage caused by installation or use of temporary work.

C. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

1.25 TEMPORARY SHORING

A. Shoring shall be in accordance with Cal-Osha Construction safety orders, latest edition.

B. Temporary retaining structures shall be designed and constructed by the Contractor.

1. Provide design of temporary shoring design by licensed California Civil Engineer, prior to construction.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Products.

B. Product Delivery Requirements.

C. Product Storage and Handling Requirements.

D. Product Options.

E. Product Substitution Procedures.

1.2 PRODUCTS

A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components required for reuse.

B. All products shall be new, of first class quality, and shall be delivered, installed, connected and finished in every detail, and shall be so selected and arranged as to fit correctly into the proper spaces. Where no specific kind or quality of material is given, a first-class standard article as approved by Architect shall be furnished. Contractor shall provide satisfactory evidence as to the kinds and quality of material and workmanship.

C. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.

D. Furnish interchangeable components from same manufacturer for components being replaced.

1.3 PRODUCT DELIVERY REQUIREMENTS

A. Transport and handle products in accordance with manufacturer's instructions.

B. Delivery of materials to the Project site shall be coordinated by and received by Contractor or his representative, and stored in secured areas as agreed upon at the job start meeting.

C. Promptly inspect shipments to assure that products comply with requirements, quantities are correct and products are undamaged.

D. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement or damage.

E. Contractor shall take into consideration the available space and location of work site when delivery of materials is necessary.

1.4 PRODUCT STORAGE AND HANDLING REQUIREMENTS

A. Store and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

B. For exterior storage of fabricated products, place on sloped supports above ground.

C. Provide off-site storage and protection when site does not permit on-site storage or protection.

D. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation and degradation of products.

E. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.

F. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

G. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.

H. Contractor shall be responsible to provide all new materials in unopened manufacturer's original containers and deliver such items to Project site in good condition for use on this project. Contractor shall be responsible to store all new materials received as per manufacturer recommendations. Any and all materials discovered to be improperly stored and/or damaged will be replaced at the sole expense to Contractor. Any requests for delays or extension of the Contract Time due to the above will not be considered.

I. Contractor shall use all means necessary to protect all materials before, during and after installation and to protect the installed work and materials of all other trades and of existing structures. In event of damage, Contractor is to immediately make all repairs and replacements necessary using compatible and like materials.

1.5 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.

B. Products Specified by Naming One Manufacturer and stating “No Substitutions Allowed, County’s Standard”: Products of manufacturer named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers without naming a Product, with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

D. Products specified by Naming One or More Manufacturers and Naming Product(s) by the first listed Manufacturer, with a Provision for Substitutions: Submit a request for substitution for any product, by any manufacturer, listed or not listed, other than the product(s) listed.

1.6 PRODUCT SUBSTITUTION PROCEDURES

A. County will consider requests for Substitutions up to 45 days after the project has been awarded.

B. Reference to any product, material, equipment, article, system, service or patented process, by trade, catalogue number, name brand product or product manufacturer is for information only and shall not be construed as limiting competition.

C. Substitutions will only be considered when one or more of the following conditions are met:

1. All aspects of the proposed substitution meet or exceed the criteria for the specified product.
2. The proposed changes are in keeping with the general intent of the Contract Documents.
3. The request is fully documented and timely and properly submitted.
4. The specified product cannot be provided within the Contract Time.
5. The request is directly related to an “or equal” clause or similar language in the Contract Documents.
6. The request offers County a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities that County must assume. County’s additional responsibilities may include, but not be limited to, compensation to Architect for redesign and/or evaluation services and increased cost of other construction by County.
7. The specified product becomes unavailable through no fault of Contractor.
8. The specified product cannot receive necessary approvals by governing authorities, and the requested substitution can be approved by governing authorities in a timely manner.
9. It can be demonstrated that the specified product cannot be provided in a manner that is compatible with other materials and Contractor certifies that the proposed substitution will overcome the incompatibility.
10. It can be demonstrated that the specified product cannot be coordinated with other materials and Contractor certifies that the proposed substitution can be coordinated.
11. The specified product cannot provide the warranty required by the Contract Documents and Contractor certifies that the proposed substitution provides the required warranty.

D. Substitutions will not be considered when one or more of the following conditions occur:

1. Acceptance would require revisions to the Contract Documents, Contract Time extensions or an increase in the Contract Sum.
2. They are indicated or implied on shop drawing or product data submittals, without separate written request.
3. When the specified product cannot be provided as a result of failure of Contractor to pursue the Work in a timely manner or properly coordinate construction activities.

E. In those cases where the Specifications designate a product, material, equipment, article, system, service or patented process by specific brand or trade name and there is only one brand or trade name listed, the item involved is:

1. Required to be used since it is a unique or novel product application, or
2. Required to match other products in use by County, or
3. Is the only brand or trade name known to Architect.

F. Document each request on Substitution Request Form attached at the end of this Section with complete data substantiating compliance of proposed Substitution with the Contract Documents. The burden of proof as to comparative quality, suitability and performance of proposed product(s), material(s), equipment, article(s), system(s), service(s) or patented process(es) shall be upon Contractor. Architect will be the sole judge of the equality of the proposed substitution versus the specified item(s).

G. A substitution request constitutes a representation that Contractor:

1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
2. Will provide the same warranty for the Substitution as for the specified product.
3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to County.
4. Waives claims for additional costs or time extensions which may subsequently become apparent.
5. Will reimburse County for review services associated with approvals by authorities having jurisdiction.

H. Substitution Submittal Procedure:

1. Submit request for Substitution electronically for consideration. Limit each request to one proposed Substitution.
2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence.
3. County will notify Contractor, in writing, of decision to accept or reject request.
4. Incomplete Substitution Request package will not be reviewed and will be returned to Contractor. Contractor shall then provide the specified item.
5. Only one request for substitution will be allowed. If proposed substitution is not accepted by Architect, Contractor shall provide the specified item.
6. Use of accepted substitutions shall in no way relieve Contractor from responsibility for compliance with Drawings and Specifications. The use of accepted substitutions will assume that all extra costs caused by the use of such substitutions where they affect other work or trades shall be born by Contractor.
7. All substitutions affecting structural or fire/life safety items will require approval from authority having jurisdiction prior to fabrication and installation on the project.

PART 2 PRODUCTS

2.1 MATERIALS

A. Materials furnished shall be new and never been used before, unless specified otherwise, and will satisfy the requirements herein and all specifications referenced by provisions within these specifications. Contractor shall furnish, upon request of Project Manager, an affidavit from the manufacturer or supplier to the effect that materials furnished shall conform to the General Conditions, the latest revision of AWWA Specifications, ASTM, and Federal Specifications that pertain. All materials shall be installed in accordance with manufacturer's recommendations and the Standard Drawings and Specifications that pertain. Material for one specific product shall be one manufacturer unless otherwise approved by Architect. All materials shall be subject to inspection after delivery to the site and during installation of the Work. Failure of the Inspector, Project Manager or Architect to note faulty material shall not relieve Contractor of the responsibility for removing or replacing any such material at no additional cost to County.

B. For the ease of maintenance and parts replacement, to the maximum extent possible use materials of a single manufacturer, delivered in manufacturer's original, unopened containers with labels intact and legible, and in sufficient quantity to allow continuity of work. Deviation from this requirement shall require written approval from County.

C. County reserves the right to reject any materials list which contains materials from various manufacturers if suitable materials can be secured from fewer manufacturers and to require that source of materials be unified to maximum extent possible.

PART 3 EXECUTION

Not Used

END OF SECTION

SUBSTITUTION REQUEST FORM

SUBSTITUTION REQUEST NUMBER: _____

TO: _____

PROJECT: _____

SPECIFIED ITEM:

Section	Page	Paragraph	Description
_____	_____	_____	_____

The undersigned requests consideration of the following:

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

_____

History: ___New Product, ___Available 2-5 Years, ___Available 6-10 Years, ___Available 10+ Years

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

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

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

1. Reason for not providing specified item:
   _____
   _____
2. Will proposed substitution affect dimensions indicated on Drawings? ____(Yes) ____(No)
   If yes, how? _____
3. Will proposed substitution affect Electrical, Mechanical, Structural, Architectural, etc.?
   ____(Yes) ____(No) If yes, explain:
   _____
   _____
4. Is proposed substitution larger or smaller than specified product? ____(Yes) ____(No)
   If yes, state size of substitute product:
   _____

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

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

The undersigned certifies that the above is accurate and correct.

Signature: _____

Company: _____

Address: _____

_____

Date: _____

Telephone: _____

Attachments: ___Drawings ___Product Data ___Samples ___Tests ___Reports ___Other (Describe)

_____

Architect's Review and Action:

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

_____ Substitution Accepted as Noted - Make submittals in accordance with Specification Section 01 33 00.

_____ Substitution Rejected – Provide specified product.

_____ Substitution Request Received Too Late – Provide specified product.

By: _____ Date:_____

Remarks: _____

_____

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Performance Requirements: Achieve end-of-Project rates for salvage/recycling of 75 percent by weight of total nonhazardous solid waste generated by the Work.

1.2 SUBMITTALS

A. Waste Management Plan: Submit plan within seven days of date established for commencement of the Work.

B. Waste Reduction Progress Reports: Submit concurrent with each Application for Payment. Include total quantity of waste, total quantity of waste salvaged and recycled, and percentage of total waste salvaged and recycled.

C. Recycling and Processing Facility Records: Manifests, weight tickets, receipts, and invoices.

D. Landfill Disposal Records: Manifests, weight tickets, receipts, and invoices.

E. Waste Management Plan: Develop a waste management plan consisting of waste identification, and waste reduction work plan. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
   1. Salvaged Materials for Reuse: Identify materials that will be salvaged and reused.
   2. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

C. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

3.2 SALVAGING DEMOLITION WASTE

A. Salvaged Items for Reuse in the Work: Clean salvaged items and install salvaged items to comply with installation requirements for new materials and equipment.

B. Salvaged Items for Donation: Not permitted on Project site.

C. Salvaged Items for Owner's Use: Clean salvaged items and store in a secure area until delivery to Owner. Coordinate storage location with on-site manager if present.

D. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.

E. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs.

F. Plumbing Fixtures: Separate by type and size.

G. Lighting Fixtures: Separate lamps by type and protect from breakage.

3.3 RECYCLING WASTE

A. General: Recycle paper and beverage containers used by on-site workers.

B. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

C. Site-Clearing Wastes: Chip brush, branches, and trees on-site.

D. Asphaltic Concrete Paving: Break up and transport paving to asphalt-recycling facility.

E. Concrete: Break up and transport paving to concrete-recycling facility. Remove reinforcement and other metals from concrete and sort with other metals.

F. Masonry: Break up and transport masonry to crushing / recycling facility.

G. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.

H. Metals: Separate metals by type.

I. Asphalt Shingle Roofing: Remove and dispose of nails, staples, and accessories.

J. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.

K. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.

L. Metal Suspension System: Separate metal members including trim, and other metals from acoustical panels and tile and sort with other metals.

M. Carpet and Pad: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.

1. Store clean, dry carpet and pad in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.

N. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.

O. Conduit: Reduce conduit to straight lengths and store by type and size.

3.4 DISPOSAL OF WASTE

A. Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

B. Do not burn waste materials.

END OF SECTION 01524

SECTION 01 77 00 - CONTRACT CLOSEOUT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout including, but not limited to, the following:
   1. Inspection procedures.
   2. Project record document submittal.
   3. Operation and maintenance manual submittal.
   4. Submittal of warranties.
   5. Final cleaning.

B. Closeout requirements for specific construction activities are included in the appropriate Sections.

1.3 SUBSTANTIAL COMPLETION

A. Prior to requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.

   1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete.
      a. 100 percent completion will bring the Contractor's progress Payment up to (95%) ninety percent of the Contract Price with (5%) percent to remain in retention until after Notice of Completion.
      b. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
      c. If 100 percent completion cannot be shown, include a list ("punchlist") of incomplete items, the value of incomplete construction, and reasons the Work is not complete.

   2. Advise the Owner of pending insurance changeover requirements.
   3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.
   4. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.

5. Submit record drawings, maintenance manuals, final project photographs, damage or settlement surveys, property surveys, and similar final record information.
6. Deliver tools, spare parts, extra stock, and similar items.
7. Make final changeover of permanent locks and transmit keys to the Owner. Advise the Owner's personnel of changeover in security provisions.
8. Complete startup testing of systems and instruction of the Owner's operation and maintenance personnel. Discontinue and remove temporary facilities from the site, along with mockups, construction tools, and similar elements.
9. Complete final cleanup requirements, including touchup painting.
10. Touch up and otherwise repair and restore marred, exposed finishes.

B. Substantial Completion will not be issued without the following:

1. Issuance of a Certificate of Occupancy.
2. The electrical system, fire alarm, and sprinkler system 100% complete.
3. Operation manuals, maintenance manuals and warranties submitted and approved.
4. Instruction of staff in the operation and maintenance of equipment and systems.
5. Record drawings submitted and approved.
6. Any extra material required by contract delivered.

C. Inspection Procedures:

1. On receipt of a request for inspection, the Owner’s Representative and the Architect will either proceed with inspection or advise the Contractor of unfilled requirements.
2. The Owner’s Representative will prepare the Certificate of Substantial Completion following inspection or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.
   a. The Owner’s Representative and the Architect will repeat inspection when requested and assured that the Work is substantially complete.
   b. Results of the completed inspection will form the basis of requirements for final acceptance.
3. Owner will allow the Contractor no longer than 30 calendar days from the Date of Substantial Completion to remedy deficiencies.

1.4 FINAL ACCEPTANCE

A. Prior to requesting final inspection for certification of final acceptance and final payment, complete and submit the following:

1. Final payment request with releases and supporting documentation not previously submitted and accepted. Include insurance certificates for products and completed operations where required.
2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
3. Certified copy of the Owner’s Representative and Architect's final inspection list of items to be completed or corrected endorsed and dated by the Owner’s Representative and Architect.
   a. Certification shall state that each item has been completed or otherwise resolved for acceptance.
4. Submit consent of surety to final payment.

5. Submit all subcontractor final unconditional lien releases.
6. Submit a final liquidated damages settlement statement.
7. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Re-inspection Procedure:

1. Owner's Representative and /or Architect will re-inspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed.
   a. Indicate items whose completion is delayed under circumstances acceptable to the Owner's Representative.
2. Should the Owner's Representative determine that Work is incomplete or defective:
   a. Owner's Representative will notify the Contractor, in writing, listing incomplete or defective Work.
   b. Contractor shall remedy deficiencies promptly and notify Owner's Representative when ready for re-inspection.

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C. Final Acceptance Certificate

1. Upon completion of inspection or any re-inspections, the Owner's Representative and /or Owner's Lead Agency will prepare a certificate of final acceptance in accordance with the Project Specification Section 00 80 00, Supplemental General Conditions.
2. Final Acceptance will be presented to the County Board of Supervisors.
   a. Only the County Board of Supervisors has final authority over Acceptance of Project.

D. Notice of Completion

1. Upon final acceptance by the County Board of Supervisors, the Owner's Lead Agency will prepare and file a Notice of Completion in accordance with the Project Specification Section 00800, Supplemental General Conditions.
   a. Start of mandatory 35-day lien period.

1.5 RECORD DOCUMENT SUBMITTALS

A. Project Record Drawings:

1. Maintain a clean, undamaged set of Contract Drawings and Shop Drawings and identify as "RECORD DRAWINGS - PROJECT SET".
2. Mark the Drawings to show the actual installation where the installation varies substantially from the Work as originally shown.
   a. Using an erasable colored pencil (not ink or indelible pencil) clearly describes change by graphic line or note.
   b. Date all entries, and note related Change Order number where applicable.
   c. Call attention to all entries by a "cloud" drawn around area affected.
   d. Where overlapping changes occur, mark with different colors.
3. Conversion of schematic layouts:
   a. Design of future modifications of facility may require accurate information as to final physical layout of items that are shown schematically on Drawings.

b. Show on Project set of Record Drawings, by dimension accurate to within one inch, centerline of each run of items shown schematically on Drawings. Clearly identify item by accurate note such as “cast iron drain”, “galv. water”, and the like. Show, by symbol or note, vertical location of item (“under slab”, “in ceiling plenum”, “exposed” and the like).

4. Prior to request for Substantial Completion, secure from the Owner’s Representative at no charge to the Contractor, a complete set, full sized drawings and (.DWG) files of all Contract Documents.
   a. Clearly transfer change data shown on Project set of Record Drawings to corresponding transparencies, coordinating changes as required.
   b. Clearly indicate at each affected detail and other drawings a full description of changes made during construction, and actual location of items.
   c. Show final location of electrical junction boxes and outlets, telephone and data outlets, supply and return registers, and like items.
   d. Call attention to all entries by a “cloud” drawn around area affected.
   e. Make changes neatly, consistently, and with proper media to assure longevity and clear reproduction.

B. Record Specifications:

1. Maintain one complete copy of the Project Manual, including addenda and other written construction documents, such as Change Orders and modifications issued during construction.
2. Mark Specifications to show substantial variations in actual Work performed in comparison with the text of the Specifications.
3. Note substitutions in reference to items specified.

C. Maintenance Manuals:

1. Contractor to submit a written summary of all maintenance manuals to be transmitted to Owner’s Representative.
2. Submit 3 complete copies of all maintenance manuals prior to start-ups and instruction of operation to maintenance personnel.
3. Provide manuals in 8-1/2 x 11 inch format with plastic/fiberboard covers and colored fly-sheets separating sections, to include the following:

   a. Covered labeled as “Operating and Maintenance Instructions” with name and address of Project, and names of Contractor and Subcontractor.
   b. Typewritten index near front of manual, providing immediate information as to location within manual of emergency information regarding installation.
   c. Complete instructions regarding operation and maintenance of all equipment, including lubrication, disassembly, and re-assembly.
   d. Complete nomenclature of all parts of all equipment.
   e. Complete nomenclature and part number of all replacement parts, name and address of nearest vendor, and all other data pertinent to procurement and procedures.
   f. Copy of garnets and warranties issued.
   g. Manufacturers’ bulletins, cuts, and descriptive data, where applicable, clearly indicating precise items included in this installation and deleting, or otherwise clearly indicating, all manufacturers’ data which this installation is not concerned.

h. Such other data as required in applicable Specification Sections.

D. Guarantees/warranties and Bonds:
1. General:
a. Manufacturers' warranties notwithstanding, warrant the entire Work against defects in materials and workmanship for twelve (12) months from the date of Substantial Completion in accordance with the GENERAL CONDITIONS & SUPPLEMENTARY GENERAL CONDITIONS.
b. Guarantee/warrant or bond Work as required in the Specifications.
c. Warranties between the Contractor and manufacturers, and the Contractor and suppliers, shall not affect guarantees/ warranties between the Contractor and the Owner.
d. The Contractor will not be held responsible for defects due to misuse, negligence, willful damage, improper maintenance, or accident caused by Others, nor shall he be responsible for defective parts whose replacement is necessitated by failure of the Owner's maintenance forces to properly clean and service them, provided the Contractor has furnished complete maintenance instructions to the Owner.
e. Compile specified guarantees/warranties and bonds.
f. Time of Submittal:
i. For equipment or component parts of accepted equipment put into service for the Owner's benefit during the progress of the Work, submit guarantees/warranties within ten (10) calendar days after acceptance of the Work.
ii. Otherwise, submit guarantees/warranties within ten (10) calendar days after date of Substantial Completion and prior to the Final Application for Payment.
iii. For items of Work where acceptance is delayed materially beyond the date of Substantial Completion, furnish updated submittal within ten (10) calendar days after such delayed acceptance, listing the date of delayed acceptance as the start of the guarantee/warranty period.

E. Other Documents:

1. Three sets of warranties, guaranties and bonds.
2. Spare parts and materials extra stock list.
3. One set of evidence of compliance with requirements of governmental agencies having jurisdiction including, but not limited to:
a. Certificates of Inspection.
b. Certificates of Occupancy.
4. One set of certificates of insurance for products and completed operations.
5. One set of evidence of payment and release of liens.
6. One copy of list of Subcontractors, service organizations, and principal vendors, including names, addresses, and telephone numbers where they can be reach for emergency service at all times including nights, weekends, and holidays.

1.6 INSTRUCTION

A. Arrange for each Installer of equipment and systems that requires regular maintenance to meet with the Owner's personnel for instruction in proper operation and maintenance of systems, equipment and similar items, which were provided as part of the Work.

1. Submit to Owner's Representative an instruction schedule listing instruction subjects and proposed dates at least 15 calendar days prior to the first proposed date.

1.7 FINAL CLEANING

A. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion.

1. Remove labels that are not permanent labels.
2. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
3. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.
4. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.
5. Clean the site, sweep paved areas broom clean; remove stains, spills, and other foreign deposits. Rake grounds that are neither paved nor planted to a smooth, even-textured surface.

B. Remove temporary protection and facilities installed for protection of the Work during construction.

C. Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from the site and dispose of lawfully.

1. Where extra materials of value remain after completion of associated Work, they become the Owner's property. Dispose of these materials as directed by the Owner.

END OF SECTION

SECTION 018113 – GREEN BUILDING REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. The project requires participation in and verification under the 2013 California Green Building Standards Cod. Requirements of this program is integrated into the Construction Documents. Contractor shall comply with these requirements and provide required documentation of certain products and methods of construction to demonstrate compliance.

B. Implementation: Many of the requirements of this program is integrated into the Construction Documents directly. Other requirements of this program, are included in these Construction Documents by reference. Contractor and subcontractors shall plan for and comply with these requirements and provide required documentation of certain products and methods of construction to demonstrate compliance.

C. Verification: Contractor shall provide all required third party verifications and commissioning as required by each of these particular programs. Schedule required inspections at appropriate times and coordinate among trades for various requirements. Notify architect of date and time of scheduled visits. Accompany verifier and provide access to all spaces and levels as requested.

D. Corrections: Make corrections to the Work as instructed by architect, based on findings and recommendations of verifier(s) and keep Work uncovered pending approval of corrections.

E. Related Sections:

1. Divisions 00 through 33 for Green Building requirements specific to the work of each Section. Requirements may or may not include reference to Green Building.

2. Appendix Section C includes Green Building Forms, which contain specific project requirements as well as documentation procedures. The following Green Building Forms apply to this project:

GREEN BUILDING FORM 1: WS-1 BASELINE WATER USE
GREEN BUILDING FORM 2: WS-2 WATER USE REDUCTION
GREEN BUILDING FORM 3: WATER USE REDUCTION
GREEN BUILDING FORM 4: CONSTRUCTION WASTE MANAGEMENT PLAN
GREEN BULIDING FORM 5: CONSTRUCTION WASTE MANAGEMENT WORKSHEET
GREEN BUILDING FORM 6: CONSTRUCTION WASTE MANAGEMENT ACKNOWLEDGEMENT

2013 CAL GREEN NONRESIDENTIAL REMODEL MANDATORY MEASURES

PLANNING AND DESIGN

Site Development 5.106

5.106.1 Storm water pollution prevention. Newly constructed projects and additions which disturb less than one acre of land shall prevent the pollution of stormwater runoff from the construction activities through one or more of the following measures:

5.106.1.1 Local ordinance. Comply with a lawfully enacted stormwater management and/or erosion control ordinance.

5.106.1.2 Best management practices (BMP). Prevent the loss of soil through wind or water erosion by implementing an effective combination of erosion and sediment control and good housekeeping BMP.

5.106.4 Bicycle parking. Comply with Sections 5.106.4.1, 4.106.4.1 and 5.106.4.1.2; or meet local ordinance, whichever is stricter.

5.106.4.1.1 Short-term bicycle parking. If the new project or an addition or alteration is anticipated to generate visitor traffic, provide permanently anchored bicycle racks within 200 feet of the visitors' entrance, readily visible to passers-by, for 5% of new visitor motorized vehicle parking spaces being added, with a minimum of one two-bike capacity rack.

Exception:

1. Additions or alterations which add nine or less visitor vehicular parking spaces.

5.106.4.1.2 Long-term bicycle parking. For new buildings with over 10 tenant-occupants or for additions or alterations that add 10 or more tenant vehicular parking spaces, provide secure bicycle parking for 5% of the tenant vehicular parking spaces being added, with a minimum of one space.

5.106.5.2 Designated parking. In new projects or additions of alterations that add 10 or more vehicular parking spaces, provide designated parking for any combination of low-emitting, fuel efficient, and carpool/van pool vehicles as shown on Table 5.106.5.2.

5.106.5.2.1 Parking stall marking. Paint, in the paint used for stall striping, the following characters such that the lower edge of the last word aligns with the end of the stall strping and is visibile beneath a parked vehicle:

CLEAN AIR/
VANPOOL/EV

5.106.10 Grading and paving. Construction plans shall indicate how site grading or a drainage system will manage all surface water flows to keep water from entering buildings.

Exception:

1. Additions and alterations not altering the drainage path.

ENERGY EFFICIENCY

General 5.201

5.201.1 Scope. Building meets or exceeds the requirements of the California Building Energy Efficiency Standards.

WATER EFFICIENCY AND CONSERVATION

Indoor Water Use 5.303

5.303.1 Meters. Separate submeters or metering devices shall be installed for the uses described in Sections 5.303.1.1 abd 5.303.1.2.:

5.303.1.1 New buildings or additions in excess of 50,000 square feet. Separate submeters shall be installed as follows:

1. For each individual leased, rented, or other tenant space within the building projected to consume more than 100 gal/day, including, but not limited to, spaces used for laundry or cleaners, restaurant or food service, medical or dental office, laboratory, or beauty salon or barber shop.
2. Where separate submeters for individual building tenants are unfeasible, for water supplied to the following subsystems:
   a. Makeup water for cooling towers where flow through is greater than 500 gpm
   b. Makeup water for evaporative coolers greater than 6gpm
   c. Steam and hot-water boilers with energy input more than 500,000 Btu/h

5.303.1.2 Excess consumption. A separate submeter or metering device shall be provided for any tenant within a new building or within an addition that is projected to consume more than 1,000 gal/day.

5.303.3 Water conserving plumbing fixtures and fittings. Plumbing fixtures (water closets and urinals) and fittings (faucets and showerheads) shall comply with the following:

5.303.1 Water closets. The effective flush volume of all water closets shall not exceed 1.28 gpf. Tank-type water closets shall be certified to the performance criteria of the U.S. EPA WaterSense Specification for Tank-Type Toilets.

Note: The effective flush volume of dual flush toilets is defined as the composite, average flush volume of two reduced flushes and one full flush.

5.303.3.2 Urinals. The effective flush volume of wall mounted urinals shall not exceed 0.125 gpf and floor mounted or other urinals shall not exceed 0.5gpf.

2013 CAL GREEN NONRESIDENTIAL REMODEL MANDATORY MEASURES

5.303.3.3 Showerheads

5.303.3.3.1 Single showerhead. Showerheads shall have a maximum flow rate of not more than 2.0 gallons per minute at 80 psi. Showerheads shall be certified to the performance criteria of the U.S. EPA WaterSense Specification for Showerheads.

5.303.3.3.2 Multiple showerheads serving one shower. When a shower is served by more than one showerhead, the combined flow rate of all showerheads and/or other shower outlets controlled by a single valve shall not exceed 2.0 gallons per minute at 80 psi, or the shower shall be designed to allow only one shower outlet to be in operation at a time.

Note: A hand-held shower shall be considered a showerhead.

5.303.3.4 Faucets and fountains

5.303.3.4.1 Non-residential lavatory faucets. Lavatory faucets shall have a maximum flow rate of not more than 0.5gpm at 60psi.

5.303.3.4.2 Kitchen faucets. Kitchen faucets shall have a maximum flow rate of not more than 1.8fpm at 60psi. Kitchen faucets may temporarily increase the flow above the maximum rate, but not to exceed 2.2gpm at 60psi, must default to a max. flow rate of 1.8gpm at 60psi.

5.303.3.4.3 Wash fountains. Wash fountains shall have a maximum flow rate of not more than 1.8gpm/20[rim space(inches) at 60psi].

5.303.3.4.4 Metering faucets. Metering faucets shall not deliever more than 0.2 gallons per cycle.

5.303.3.4.5 Metering faucets for wash fountains. Metering faucets for wash fountains shall have a maximum flow rate of not more than 0.2 gpm/20 [rim space (inches) at 60psf].

5.303.4 Areas of addition or alteration. For those occupanies within the authority of the California Building Standards Commission as specified in Section 103, the provisions of Section 5.303.3 shall apply to new fixtures in additions or areas of alteration to the building.

Outdoor Water Use 5.304

5.304.3 Outdoor water use in rehabilitated projects equal to or greater than 2,500 suqare feet. Rehabilitated landscape projects with an aggregate landscape area equal to or greater than 2,500 square feet requiring a building or landscape permit, plan check, or design review shall comply with the following:

1. A local water efficient landscape ordinance that is, based on evidence in the record, at least as effective in conserving water as the updated model ordinance adopted by the Department of Water Resources (DWR) per Government Code Section 65595.
2. The California Department of Water Resources Model Water Efficient Landscape Ordinance (MWELO) commencing with Section 490 of Chapter 2.7, Division 2, Title 23, California Code of Regulations.

5.304.4 Outdoor water use in landscape areas of 2500 sq ft or less. Any project with an aggregate landscape area of 2,500 square feet or less may comply with the performance requirements of MWELO or conform to the prescriptive compliance measures contained in MWELO's Appendix D.

5.304.5 Graywater or rainwater use in landscape areas. For projects using treated or untreated graywater or rainwater caputed on site, any lot or parcel within the project that has less than 2,500 square feet of landscape and meets the lot of parcels landscape water requirement (Estiamted Total Water use) entirely with treated or untreated graywater or through stored rainwater capture on site is subject only to Appendix D section (5).

MATERIAL CONSERVATON AND RESOURCE EFFICIENCY

Water Resistance and Moisture Management 5.407

5.407.1 Weather protection. Provide a weather-resistant exterior wall and foundation envelope as required by California Building Code and California Energy Code.

5.407.2 Moisture control. Employ moisture control measures by the following methods:

5.407.2.1 Sprinklers. Design and maintain landscape irrigation systems to prevent spray on structures.

5.407.2.2 Entries and openings. Design exterior entries and/or openings subject to foot traffic or wind-driven rain to prevent water intrusion into buildings as follows:

5.407.2.2.1 Exterior door protection. Primary exterior entries shall be covered to prevent water intrusion by using nonabsorbent floor and wall finishes within at least 2 feet around and perpendicular to such openings plus at least one of the following:

1. An installed awning at least 4 feet in depth.
2. The door is protected by a roof overhang at least 4 feet in depth.
3. The door is recessed at least 4 feet.
4. Other methods which provide equivalent protection.

5.407.2.2.2 Flashing. Install flashings integrated with a drainage plane.

2013 CAL GREEN NONRESIDENTIAL REMODEL MANDATORY MEASURES

Construction Waste Reduction Disposal and Recycling 5.408

5.408.1 Construction waste management. Recycle and/or salvage for reuse a minimum of 50 percent of the nonhazardous construction and demolition waste in accordance with Section 5.408.1.1,5.408.1.2 or 5.408.1.3; or meet a local construction and demolition waste management ordinance, whichever is more stringent.

5.408.1.1 Construction waste management plan. Where a local jurisdiction does not have a construction and demolition waste management ordinance that is more stringent, submit a construction waste management plan that

1. Identifies the construction and demolition waste materials to be diverted from disposal by efficient usage, recycling, reuse on the project or salvage for future use or sale.
2. Determines if construction and demolition waste materials will be sorted on-site (source-separated) or bulk mixed (single stream).
3. Identifies diversion facilities where construction and demolition waste material collected will be taken.
4. Specifies that the amount of construction and demolition waste materials diverted shall be calculated by weight or volume, but not by both.

5.408.1.2 Waste management company. Utilize a waste management company that can provide verifiable documentation that the percentage of construction and demolition waste material diverted from the landfill complies with this section.

Note: The owner or contractor shall make the determination if the construction and demolition waste material will be diverted by a waste management company.

Exceptions to 5.408.1.1 and 5.408.1.2:

1. Excavated soil and land-clearing debris.
2. Alternate waste reduction methods developed by working with local agencies if diversion or recycle facilities capable of compliance with this item do not exist.
3. Demolition waste meeting local ordinance or calculated in consideration of local recycling facilities and markets.

5.408.1.3 Waste stream reduction alternative. The combined weight of new construction disposal that does no exceed two pounds per square foot of the building area may be deemed to meet the 50 percent minimum requirement as approved by the enforcing agency.

5.408.1.4 Documentation. Documentation shall be provided to the enforcing agency which demonstrates compliance with Sections 5.408.1.1 through 5.408.1.3. The waste management plan shall be updated as necessary and shall be accessible during construction for examination by the enforcing agency.

Notes:

1. Sample forms found in "A Guide to the California Green Building Standards Code (Nonresidential)" located at http://www.bsc.ca.govlHome/CALGreen.aspx may be used to assist in documenting compliance with the waste management plan.
2. Mixed construction and demolition debris (C&D) processors can be located at the California Department of Resources Recycling and Recovery (CaIRecycle).

5.408.3 Excavated soil and land clearing debris. [BSC] 100 percent of trees, stumps, rocks and associated vegetation and soils resulting primarily from land clearing shall be reused or recycled. For a phased project, such material may be stockpiled on site until the storage site is developed.

Exception: Reuse, either on-or off-site, of vegetation or soil contaminated by disease or pest infestation.

Notes:

1. If contamination by disease or pest infestation is suspected, contact the County Agricultural Commissioner and follow its direction for recycling or disposal of the material. (www.cdfa.ca.gov/exec/ county/county contacts.html)
2. For a map of known pest and/or disease quarantine zones, consult with the California Department of Food and Agriculture. (www.cdfa.ca.gov)

Building Maintenance and Operation 5.410

5.410.1 Recycling by occupants. Provide readily accessible areas that serve the entire building and are identified for the depositing, storage and collection of non-hazardous materials for recycling, including (at a minimum) paper, corrugated cardboard, glass, plastics and metals or meet a lawfully enacted local recycling ordinance, if more restrictive.

5.410.1.1 Additions. [A] All additions conducted within a 12-month period under single or multiple permits, resulting in an increase of 30 percent or more in floor area, shall provide recycling areas on site.

Exception: Additions within a tenant space resulting in less than a 30-percent increase in the tenant space floor area.

2013 CAL GREEN NONRESIDENTIAL REMODEL MANDATORY MEASURES

5.410.1.2 Sample ordinance. Space allocation for recycling areas shall comply with Chapter 18, Part 3, Division 30 of the Public Resources Code. Chapter 18 is known as the California Solid Waste Reuse and Recycling Access Act of 1991 (Act).

Note: A sample ordinance for use by local agencies may be found in Appendix A of the document at the CalRecycle's web site.

5.410.4 Testing and adjusting. Testing and adjusting of systems shall be required for new buildings less than 10,000 square feet or new systems to serve an addition or alteration subject to Section 303.1.

5.410.4.2 Systems. Develop a written plan of procedures for testing and adjusting systems. Systems to be included for testing and adjusting shall include, as applicable to the project:

1. HVAC systems and controls.
2. Indoor and outdoor Hghting and controls.
3. Water heating systems.
4. Renewable energy systems.
5. Landscape irrigation systems.
6. Water reuse systems.

5.410.4.3 Procedures. Perform testing and adjusting procedures in accordance with manufacturer's specifications and applicable standards on each system.

5.410.4.3.1 HVAC balancing. In addition to testing and adjusting, before a new space-conditioning system serving a building or space is operated for normal use, balance the system in accordance with the procedures defined by the Testing Adjusting and Balancing Bureau National Standards; the National Environmental Balancing Bureau Procedural Standards; Associated Air Balance Council National Standards or as approved by the enforcing agency.

5.410.4.4 Reporting. After completion of testing, adjusting and balancing, provide a final report of testing signed by the individual responsible for performing these services.

5.410.4.5 Operation and maintenance (0 & M) manual. Provide the building owner or representative with detailed operating and maintenance instructions and copies of guaranties/warranties for each system. 0 & M instructions shall be consistent with OSHA requirements in CCR, Title 8, Section 5142, and other related regulations.

5.410.4.5.1 Inspections and reports. Include a copy of all inspection verifications and reports required by the enforcing agency.

ENVIRONMENTAL QUALITY

Fireplaces 5.503

5.503.1 General. Install only a direct-vent sealed-combustion gas or sealed wood-burning fireplace, or a sealed woodstove or pellet stove, and refer to residential requirements in the California Energy Code, Title 24, Part 6, Subchapter 7, Section 150. Woodstoves, pellet stoves and fireplaces shall comply with applicable local ordinances.

5.503.1.1 Woodstoves. Woodstoves and pellet stoves shall comply with U.S. EPA Phase II emission limits where applicable.

Pollutant Source Control 5.504

5.504.1.3 Temporary ventilation. The permanent HVAC system shall only be used during construction if necessary to condition the building or areas of addition or alteration within the required temperature range for material and equipment installation. If the HVAC system is used during construction, use return air filters with a Minimum Efficiency Reporting Value (MERV) of 8, based on ASHRAE 52.2-1999, or an average efficiency of 30 percent based on ASHRAE 52.1-1992. Replace all filters immediately prior to occupancy, or, if the building is occupied during alteration, at the conclusion of construction.

5.504.3 Covering of duct openings and protection of mechanical equipment during construction. At the time of rough installation and during storage on cosntruction site until final startup of heating, cooling and ventilation equipment, all duct and other related air distribution component openings shall be covered with tape, plastic, sheetmetal or other methods acceptable to the enforcing agency to reduce the amount of dust, water and debris which may enter the system.

5.504.4 Finish material pollutant control. Finish materials shall comply with Sections 5.504.4.1 through 5.504.4.4.

5.504.4.1 Adhesives, sealants and caulks. Adhesives, sealants, and caulks used on the project shall meet the requirements of the following standards:

2013 CAL GREEN NONRESIDENTIAL REMODEL MANDATORY MEASURES

1. Adhesives, adhesive bonding primers, adhesive primers, sealants, sealant primers and caulks shall comply with local or regional air pollution control or air quality management district rules where applicable, or SCAQMD Rule 1168 VOC limits, as shown in Tables 5.504.4.1 and 5.504.4.2. Such products also shall comply with the Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene and trichloroethylene), except for aerosol products as specified in subsection 2, below.

2. Aerosol adhesives, and smaller unit sizes of adhesives, and sealant or caulking compounds (in units of product, less packaging, which do not weigh more than one pound and do not consist of more than 16 fluid ounces) shall comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of California Code of Regulations, Title 17, commencing with Section 94507.

5.504.4.3 Paints and coatings. Architectural paints and coatings shall comply with VOC limits in Table 1 of the ARB Architectural Coatings Suggested Control Measure, as shown in Table 5.504.4.3, unless more stringent local limits apply. The VOC content limit for coatings that do not meet the definitions for the specialty coatings categories listed in Table 5.504.4.3 shall be determined by classifying the coating as a Flat, N onflat or N onflat -High Gloss coating, based on its gloss, as defined in Subsections 4.21, 4.36 and 4.37 of the 2007 California Air Resources Board Suggested Control Measure, and the corresponding Flat, N onflat or Nonflat-High Gloss VOC limit in Table 5.504.4.3 shall apply.

5.504.4.3.1 Aerosol paints and coatings. Aerosol paints and coatings shall meet the PWMIR Limits for ROC in Section 94522(a)(3) and other requirements, including prohibitions on use of certain toxic compounds and ozone depleting substances, in Sections 94522(c)(2) and (d)(2) of California Code of Regulations, Title 17, commencing with Section 94520; and in areas under the jurisdiction of the Bay Area Air Quality Management District additionally comply with the percent VOC by weight of product limits of Regulation 8 Rule 49.

5.504.4.3.2 Verification. Verification of compliance with this section shall be provided at the request of the enforcing agency. Documentation may include, but is not limited to, the following:

1. Manufacturer's product specification
2. Field verification of on-site product containers

5.504.4.4 Carpet systems. All carpet installed in the building interior shall meet at least one of the following testing and product requirements:

1. Carpet and Rug Institute's Green Label Plus Program;

2. Compliant with the VOC-emission limits and testing requirements specified in the California Department of Public Health Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1, February 2010 (also known as CDPH Standard Method VI.I or Specfication 01350);

3. NSF/ANSI 140 at the Gold level or higher;

4. Scientific Certifications Systems Sustainable Choice; or

5. Compliant with the California Collaborative for High Performance Schools (CA-CHPS) Criteria Interpretation for EQ 2.2 dated July 2012 and listed in the CHPS High Performance Product Database.

5.504.4.4.1 Carpet cushion. All carpet cushion installed in the building interior shall meet the req uirements of the Carpet and Rug Institute's Green Label program.

5.504.4.4.2 Carpet adhesive. All carpet adhesive shall meet the requirements of Table 5.504.4.1.

5.504.4.5 Composite wood products. Hardwood plywood, particleboard and medium density fiberboard composite wood products used on the interior or exterior of the building shall meet the requirements for formaldehyde as specified in ARB's Air Toxics Control Measure (ATCM) for Composite Wood (17 CCR 93120 et seq.) Those materials not exempted under the ATCM must meet the specified emission limits, as shown in Table 5.504.4.5.

5.504.4.5.1 Early compliance. Reserved.

5.504.4.5.3 Documentation. Verification of compliance with this section shall be provided as requested by the enforcing agency. Documentation shall include at least one of the following:

1. Product certifications and specifications.
2. Chain of custody certifications.
3. Product labeled and invoiced as meeting the Composite Wood Products regulation (see CCR, Title 17, Section 93120, et seq.).
4. Exterior grade products marked as meeting the PS-1 or PS-2 standards of the Engineered Wood Association, the Australian AS/NZS 2269 or European 636 3S standards.
5. Other methods acceptable to the enforcing agency.

2013 CAL GREEN NONRESIDENTIAL REMODEL MANDATORY MEASURES

5.504.4.6 Resilient flooring systems. For 80 percent of floor area receiving resilient flooring, installed resilient flooring shall meet at least one of the following:

1. Certified under the Resilient Floor Covering Institute (RFCI) FloorScore program;
2. Compliant with the VOC-emission limits and testing requirements specified in the California Department of Public Health's 2010 Standard Method for the Testing and Evaluation Chambers, Version 1.1, February 2010;
3. Compliant with the California Collaborative for High Performance Schools (CA-CHPS) Criteria Interpretation for EQ 2.2 dated July 2012 and listed in the CHPS High Performance Product Database; or
4. Compliant with CDPH criteria as certified under the Greenguard Children's & Schools Program.

5.504.4.6.1 Verification of compliance. Documentation shall be provided verifying that resilient flooring materials meet the pollutant emission limits.

5.504.5.3 Filters. In mechanically ventilated buildings, provide regularly occupied areas of the building with air filtration media for outside and return air that provides at least a Minimum Efficiency Reporting Value (MERV) of 8. MERV 8 filters shall be installed prior to occupancy, and recommendations for maintenance with filters of the same value shall be included in the operation and maintenance manual.

Exceptions:

1. An ASHRAE 10-percent to 15-percent efficiency filter shall be permitted for an HV AC unit meeting the 2013 California Energy Code having 60,000 Btulh or less capacity per fan coil, if the energy use of the air delivery system is 0.4 W Icfm or less at design air flow.
2. Existing mechanical equipment.

5.504.5.3.1 Labeling. Installed filters shall be clearly labeled by the manufacturer indicating the MERV rating.

5.504.7 Environmental tobacco smoke (ETS) control. Where outdoor areas are provided for smoking, prohibit smoking within 25 feet of building entries, outdoor air intakes and operable windows and within the building as already prohibited by other laws or regulations; or as enforced by ordinances, regulations or policies of any city, county, city and county, California Community College, campus of the California State University, or campus of the University of California, whichever are more stringent. When ordinances, regulations or policies are not in place, post signage to infonn building occupants of the prohibitions.

Indoor Moisture Control 5.505

5.505.1 Indoor moisture control. Buildings shall meet or exceed the provisions of California Building Code, CCR, Title 24, Part 2, Sections 1203 (Ventilation) and Chapter 14 (Exterior Walls). For additional measures not applicable to low-rise residential occupancies, see Section 5.407.2 of this code.

Indoor Air Quality 5.506

5.506.1 Outside air delivery. For mechanically or naturally ventilated spaces in buildings, meet the minimum requirements of Section 121 (Requirements For Ventilation) of the 2010 California Energy Code, or the applicable local code, whichever is more stringent, and Division 1, Chapter 4 of CCR, Title 8.

5.506.2 Carbon dioxide (C02) monitoring. For buildings or additions equipped with demand control ventilation, CO2 sensors and ventilation controls shall be specified and installed in II accordance with the requirements of the 2013 California Energy Code, Section 120(c)(4).

Environmental Comfort 5.507

5.507.4 Acoustical control. Employ building assemblies and components with Sound Transmission Class (STC) values detennined in accordance with ASTM E 90 and ASTM E 413 or Outdoor-Indoor Sound Transmission Class (OITC) determined in accordance with ASTM E 1332,using either the prescriptive or performance method in Section 5.507.4.1 or 5.507.4.2.

Exception: Buildings with few or no occupants or where occupants are not likely to be affected by exterior noise, as determined by the enforcement authority, such as factories, stadiums, storage, enclosed parking structures and utility buildings.

5.507.4.1 Exterior noise transmission, prescriptive method. Wall and roof-ceiling assemblies exposed to the noise source making up the building or addition envelope or altered envelope shall meet a composite STC rating of at least 50 or a composite OITC rating of no less than 40, with exterior windows of a minimum STC of 40 or OITC of 30 in the following locations:

1. Within the 65 CNEL noise contour of an airport.
2. Within the 65 CNEL or Ldn noise contour of a freeway or expressway, railroad, industrial source or fixed-guideway source as determined by the Noise Element of the General Plan.

5.507.4.1.1 Noise exposure where noise contours are not readily available. Buildings exposed to a noise level of 65 dB Leq -I-hr during any hour of operation shall have building, addition or alteration exterior wall and roof-ceiling assemblies exposed to the noise source meeting a composite STC rating of at least 45 (or OITC 35), with exterior windows of a minimum STC of 40 (or OITC 30).

2013 CAL GREEN NONRESIDENTIAL REMODEL MANDATORY MEASURES

5.507.4.2 Performance method. For buildings located as defined in Section 5.507.4.1 or 5.507.4.1.1, wall and roof-ceiling assemblies exposed to the noise source making up the building or addition envelope or altered envelope shall be constructed to provide an interior noise environment attributable to exterior sources that does not exceed an hourly equivalent noise level (Leq-IHr) of 50 dBA in occupied areas during any hour of operation.

5.507.4.2.1 Site features. Exterior features such as sound walls or earth berms may be utilized as appropriate to the building, addition or alteration project to mitigate sound migration to the interior.

5.507.4.2.2 Documentation of compliance. An acoustical analysis documenting complying interior sound levels shall be prepared by personnel approved by the architect or engineer of record.

5.507.4.3 Interior sound transmission. Wall and floorceiling assemblies separating tenant spaces and tenant spaces and public places shall have an STC of at least 40.

Outdoor Air Quality 5.508

5.508.1 Ozone depletion and greenhouse gas reductions. Installations of HVAC, refrigeration and fire suppression equipment shall comply with Sections 5.508.1.1 and 5.508.1.2.

5.50S.1.1 Chlorofluorocarbons (CFCs). Install HVAC, refrigeration and fire suppression equipment that do not contain CFCs.

5.50S.1.2 Halons. Install HVAC, refrigeration and fire suppression equipment that do not contain Halons.

5.508.2 Supermarket refrigerant leak reduction. New commercial refrigeration systems shall comply with the provisions of this section when installed in retail food stores 8,000 square feet or more conditioned area, and that utilize either refrigerated display cases, or walk-in coolers or freezers connected to remote compressor units or condensing units. The leak reduction measures apply to refrigeration systems containing high-global-warming potential (high-GWP) refrigerants with a GWP of 150 or greater. New refrigeration systems include both new facilities and the replacement of existing refrigeration systems in existing facilities.

Exception: Refrigeration systems containing low-global warming potential (low-GWP) refrigerant with a GWP value Jess than 150 are not subject to this section. Low-GWP refrigerants are nonozone-depleting refrigerants that include ammonia, carbon dioxide ($C0_2$), and potentially other refrigerants.

5.508.2.1 Refrigerant piping. Piping compliant with the California Mechanical Code shall be installed to be accessible for leak protection and repairs. Piping runs using threaded pipe, copper tubing with an outside diameter (OD) less than 1/4 inch, flared tubing connections and short radius elbows shall not be used in refrigerant systems except as noted in sec. 5.508.2.1.1, 5.508.2.1.2, 5.508.2.1.3, 5.508.2.1.4.

5.508.2.2 Valves. Valves and fittings shall comply with the California Mechanical Code and sec. 5.508.2.2.

5.508.2.3 Refrigerated service cases. Refrigerated service cases holding food products containing vinegar and salt shall have evaporator coils of corrosion-resistant material, or be coated to prevent
corrosion from these substances. Consideration shall be given to the heat transfer efficiency of coil coating to maximize energy efficiency.

5.508.2.4 Refrigerant receivers. Refrigerant receivers with capacities greater than 200 pounds shall be fitted with a device that indicates the level of refrigerant in the receiver.

5.508.2.5 Pressure testing. The system shall be pressure tested during installation prior to evacuation and charging per sec. 5.508.2.5.

50.508.2.6 Evacuation. The system shall be evacuated after pressure testing and prior to charging per sec. 5.508.2.6.

1.2 SUBMITTALS

A. **Final Submittals:** One copy of each Green Building Form (1-6), signed and completed in-full and with all required supplemental documents, must be submitted concurrent with Final Application for Payment.

PRODUCTS

1.3 See Green Building Forms and Contract Documents for Green Building related Product requirements. Requirements may or may not include reference to Green Building.

PART 2 - EXECUTION

2.1 See Green Building Forms and Contract Documents for Green Building related Execution requirements. Requirements may or may not include reference to Green Building.

END OF SECTION 018113

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SECTION 024119 - SELECTIVE STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. 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.

B. Related Requirements:

1. Division 01 Section "Summary" for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.
2. Division 01 Section "Historic Treatment Procedures" for historic removal and dismantling.
3. Division 01 Section "Temporary Tree and Plant Protection" for temporary protection of existing trees and plants that are affected by selective demolition.
4. Division 01 Section "Execution" for cutting and patching procedures.
5. Division 31 Section "Site Clearing" for site clearing and removal of above- and below-grade improvements.

1.3 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.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, items listed in “Addendum to Historic Building Analysis” included in Appendix B and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 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.
5. Review areas where existing construction is to remain and requires protection.

1.6 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 elevator and stairs.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

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.

1.7 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.

1.8 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.9 FIELD CONDITIONS

A. Owner will occupy temporary facilities immediately adjacent to the building. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: Hazardous materials are 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 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.

E. Historic Areas: Demolition and hauling equipment and other materials shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, including temporary protection, by 12 inches (300 mm) or more.

F. Storage or sale of removed items or materials on-site is not permitted.

G. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2 - PRODUCTS

2.1 PEFORMANCE 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.

PART 3 - EXECUTION

3.1 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.

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.
2. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.

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.

3.2 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.
g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.

C. Refrigerant: Remove refrigerant from mechanical equipment to be selectively demolished according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Comply with requirements for access and protection specified in Division 01 Section "Temporary Facilities and Controls."

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of temporary facilities.

2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 01 Section "Temporary Facilities and Controls."

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
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. Work in Historic Areas: Selective demolition may be performed only in areas of the Project that are not designated as historic. In historic spaces, areas, and rooms or on historic surfaces, the terms "demolish" or "remove" shall mean historic "removal" or "dismantling" as specified in Division 01 Section "Historic Treatment Procedures."

C. Reuse of Building Elements: Project has been designed to result in end-of-Project rates for reuse of building elements as follows. Do not demolish building elements beyond what is indicated on Drawings without Architect's approval.

1. Achieve end-of-Project rates for salvage/recycling of 75 percent by weight of total nonhazardous solid waste generated by the Work.

D. 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.

E. 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.

F. 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.

3.5 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.

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. See Division 07 Sections for new roofing requirements.

1. Remove existing roof membrane, flashings, copings, and roof accessories.
2. Remove existing roofing system down to substrate.

3.6 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.

3.7 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.

3.8 SELECTIVE DEMOLITION SCHEDULE

A. Existing [**Items**] [**Construction**] to Be Removed: <**Insert description of items and construction to be removed**>.

B. Existing Items to Be Removed and Salvaged: <**Insert description of items to be removed and salvaged**>.

C. Existing Items to Be Removed and Reinstalled: <**Insert description of items to be removed and reinstalled**>.

D. Existing Items to Remain: <**Insert description of items to remain**>.

END OF SECTION 024119

SECTION 031113 - CONCRETE FORMING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. Work Included: Furnish, install and remove forms for cast-in-place concrete including shoring and form supports.

B. Related Work Specified Elsewhere:
1. Formwork for concrete work beyond the building lines: See Sidewalks and Driveways.
2. Excavating, filling and backfilling: See Earthwork.
3. Forms and casting beds for architectural precast concrete: See Concrete, Architectural Precast.
4. Patching and filling of form tie holes: See Concrete Finishes.

1.2 REFERENCES, CODES AND STANDARDS: The following references, codes and standards are hereby made a part of this Section and formwork 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. "Recommended Practice for Concrete Formwork", ACI Latest Edition.

B. California Building Code, 2013 Edition.

1.3 SUBMITTALS: Comply with requirements of Shop Drawings, Product Data and Sample Section.

A. Shop drawings shall include finished elevations and dimensions of all formed surfaces including finish floor elevations.

B. Contractor shall check architectural, structural and mechanical drawings to determine size and location of all depressions, openings, chases.

1.4 ALLOWABLE TOLERANCES: Design, construct, set, and maintain the formwork so as to insure complete work within the suggested tolerance limits specified in ACI 347, Section 3.3.1. See Concrete Finishes Section for traffic surface tolerances of slabs.

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Earth Forms: Unless otherwise indicated or required by the Structural Drawings, concrete for footings may be placed directly against vertical excavated surfaces provided the material will stand without caving and provided that minimum reinforcing steel clearances indicated on Drawings are maintained and suitable provisions are taken to prevent raveling of top edges or

sloughing of loose material from walls of excavation. Sides of excavation shall be made with a neat cut and the width made as detailed on Drawings. Concrete which is exposed to view on exterior shall be formed to a minimum depth of 6" below finished grade.

B. Wood Forms:
   1. Exposed Concrete Not Otherwise Noted or Specified: APA Plyform, Grade B-B, Class I or II (as per strength and tolerance requirements), Exterior, each piece grade marked, no mill oiling permitted.
   2. Chamfer Strips, Reveals, and Score Marks: Clear Douglas fir or pine, selected straight, milled on all faces -or- extruded polyvinylchloride specially produced for concrete work, Vinylex Corp., Preco Industries, Vulcan Metal Products, or equivalent. Material usage shall be consistent for each application.
   3. Unexposed Concrete Not Otherwise Specified: Of sufficient design and strength to hold concrete properly in place and alignment.
   4. Framing: At Contractor option subject to meeting necessary strengths and surface tolerances.

C. Metal Forms: Specification to be issued as an addendum.

D. Form Release Agents:
   1. Exposed Concrete Including Surfaces to Receive Paint: Chemically active type producing water insoluble soaps. Form release agents shall be delivered in manufacturer's sealed and trademarked containers and shall be guaranteed to provide clean, stain-free concrete release and not to interfere with future applied coatings and finishes. Release agents shall contain no petroleum solvents such as creosote, paraffin, waxes or diesel oil.
   2. Concealed Concrete: Contractor option.

E. Form Sealer (Wood Forms): Burke "Form Sealer", or equivalent, and of a type which will not interfere with bond of applied finishes.

F. Form Ties: Metal, spreader type, removable to 1" from concrete face. Ties for exposed concrete shall be of same type throughout project. Wire ties and wood spreaders will not be allowed except that such devices may be permitted for footings, shallow foundations and similar other totally concealed below grade surfaces upon specific approval of Architect. Wood spreaders shall not remain in concrete.

G. Cold Joints (Slabs on Grade): Standard 24 ga. galvanized steel, keyed profile, sized to suit slab thickness.

H. Vinyl Tape (Sandblasted Concrete Form Joints): Pressure sensitive vinyl tape, not thicker than 3 mils, type recommended for sealing forms.

PART 3 - EXECUTION

3.1 PREPARATION:

A. Vertical and Horizontal Controls: Establish and maintain necessary benchmarks, lines, or controls throughout construction.

B. Secure information and provide for openings, sleeves, chases, pipes, recesses, nailers, anchors, ties, inserts, and similar embedded items. Coordinate with concrete work for requirements governing embedment and sleeving of pipes and conduit.

3.2 CONSTRUCTION:

A. Formwork: - General: Construct wood forms of sound material, straight and rigid, thoroughly braced, mortar tight, and of such strength that the pressure of concrete and the movement of men and equipment will not displace them. Visible waves in exposed concrete surfaces after stripping of forms may result in rejection of that portion of the concrete. The design and engineering of formwork shall be the complete responsibility of the Contractor.

B. Plywood Forms for Exposed Concrete:
1. Plywood panels shall be clean, smooth, uniform in size, and free from damaged edges or faces (including holes other than those required for form ties). Use full size (4' x 8' or larger) panels wherever possible. Make plywood panel pattern regular and symmetrical, joints plumb or level, horizontal joints continuous. Block plywood edges which do not occur at bearing points in order to eliminate joint offsets.
2. Construct forms for sandblasted concrete with butted joints. Joints shall be taped carefully applied to completely eliminate wrinkles, ripples, bubbles, fish mouths and other surface defects which would telegraph onto face of concrete. Tape shall be aligned and centered on the joint. The degree of sandblasting to be done in finishing shall be sufficient to completely remove all traces of the impression in the concrete left by the tape. Construct and externally brace forms so that no form ties or other devices penetrate sandblasted surfaces.

C. Framing and Bracing: Framing, bracing and supporting members shall be of ample size and strength to safely carry, without excessive deflection (exceeding allowable tolerances), all dead and live loads to which formwork may be subjected, and shall be spaced sufficiently close to prevent any apparent bulging or sagging of forms.

D. Form Ties: Form ties shall be of sufficient strength and used in sufficient quantities to prevent spreading of the forms. Ties for exposed concrete surfaces shall be arranged symmetrically and shall be aligned both vertically and horizontally (do not stagger). Form ties are not permitted through sandblasted surfaces.

E. Camber:
1. Camber forms for slabs and beams as required to compensate for deflection or settlement due to closure of forms joints, settlement of mudsills, shrinkage of lumber, elastic shortening and/or deflection of form members. Positive means of adjustment (wedges or jacks) of shores and struts shall be provided to permit realignment or readjustment. See Article 3.03, "Falsework".

F. Forms for exposed concrete shall be constructed full height and width between indicated construction joints or emphasized joints in concrete surface and shall not be broken for pour or construction joints within these areas.

G. Construct forms no higher than 12" above the top of a pour or construction joint.

H. Construction Joints: Construction joints shall be in accordance with requirements of Concrete, Cast-In-Place Section. Confine construction or pour joints to rustication strip locations where they occur; where rusticated joints do not occur in a surface, provide a surfaced pouring strip where construction joints intersect exposed surfaces to provide straight line at joints. Prior to

subsequent pour, remove strip and tighten forms. Construction joints shall have no "overlapping" or offsetting of concrete surfaces and shall, as closely as possible, present the same appearance as butted plywood joints. Joints in a continuous line shall be straight and true.

I. Cleanouts: Provide cleanouts along bottom of walls and columns or elsewhere as required to permit thorough cleaning of loose dirt, debris and waste material. Cleanout shall not be apparent on exposed concrete surfaces and no openings in the forms for cleanouts shall be made on surfaces to be sandblasted.

J. Chamfered Corners: In general, chamfer all corners for exposed concrete unless otherwise noted. Obtain chamfers by placing 3/4" x 3/4" non-staining moldings in forms. Pieces shall be in longest lengths possible, joints mitered.

K. Score Lines: Where "score", emphasized or rustication lines are indicated on vertical surface, obtain such lines by accurate placement of moldings in forms. Pieces shall be in longest lengths practical with joints mitered.

L. Arrange forms to allow proper erection sequence and to permit form removal without damage to concrete.

M. Form Sealer: Wood forms for exposed concrete shall be sealed on contact faces and edges using specified form sealer in strict accordance with manufacturer's directions.

N. Form Release Agent: Thoroughly clean forms and coat with release agent prior to initial use and before each reuse. Apply release agent in strict accordance with manufacturer's directions and coverage recommendations avoiding starved areas or excessive applications. Apply release agents before reinforcing steel is placed.

O. Reuse of Forms: Do not reuse any form which cannot be reconditioned to "like new" condition. Control reuse of forms for exposed surfaces to provide surface of uniform color and texture without sharp demarcation between adjacent surfaces.

P. Waterproofing Conditions: Concrete surfaces to receive waterproofing materials shall be formed to provide a relatively smooth surface free of sharp corners, projections, and offsets at form joints. Depressions and voids shall permit satisfactory patching as specified under Concrete Finishes Section. Form ties shall not penetrate or damage applied waterproofing.

Q. Bases and Foundations: Whenever concrete bases or foundations are to be provided for equipment furnished by other trades, dimensions shall be verified for the equipment furnished before concrete is placed.

R. Prior to placement of concrete, remove dirt, debris, and foreign material from forms. Leave no wood in concrete except nailers.

3.3 REMOVAL OF FORMS AND FALSEWORK:

A. The removal of forms and falsework shall be carried out in such manner as to ensure the complete safety of the structure. Supports shall not be removed until members have sufficient strength to safely support their own weight and superimposed loading with proper factor of safety.

B. Forms for exposed concrete surfaces shall be removed in such a manner as to preclude damage to finish. Pinch bars and similar tools shall not be used for prying against exposed surfaces. Stripping shall commence at top edge or vertical corner where the use of wooden wedges is possible. Wedging shall be done gradually and shall be accompanied by light tapping on panels to loosen them. When free at one end, gradually loosen remaining area without jerking.

C. Removal of Forms: After concrete is placed, the following minimum times shall elapse before the removal of forms:
   1. Vertical Forms (Walls, Columns, Beam Sides): 24 hours.
   2. Side Forms (Footings, Slabs on Grade): 24 hours.
   3. Slab and Opening Soffits:
      a. Conventional Reinforcing: 21 days and 1.0 x f'c. Forms may be removed at 14 days and 0.8 x f'c only when reshoring is provided per Section 3.03-D.1.c or 3.03-D.2.c.
      b. Post-tensioned Concrete: After stressing.
   4. Beam Soffits: 21 days and 1.0 x f'c.

D. Removal of Shores/Reshores: After concrete is placed, or formwork is removed, the following conditions shall be satisfied prior to the removal of shoring or reshores.
   1. Shoring (Conventional Reinforcing):
      a. Shoring required to support framing for one floor or roof shall not be removed until concrete has attained both:
      Minimum 21 day age, and
      Minimum Strength of 1.0x f'c.

      b. Where Shoring is used to support a floor or roof which has not yet attained age and strength stipulated above, such shoring or reshoring shall extend to the ground.
      c. Reshoring shall be capable of supporting all permanent and temporary construction loads, without allowing the concrete to settle or deflect.

E. Upon removal of forms, bolts, wires, clamps, rods, etc., not necessary to the work, shall be removed to a minimum of 1 inch from the surface. The Contractor shall so conduct his operations as to eliminate any danger of rust stains from form tie materials or other unprotected ferrous materials embedded in or adjacent to exposed concrete.

END OF SECTION

SECTION 032100 - REINFORCING STEEL

PART 1 - GENERAL

1.1 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.

1.2 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, 2013 Edition.

E. USGBC

1.3 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.

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.

1.4 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.

1.5 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.

PART 2 - PRODUCTS

2.1 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.

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.

2.2 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.

PART 3 - EXECUTION

3.1 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.

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.

3.2 CLEANING:

A. Reinforcement, at time of placing concrete, shall be free of any coating that would impair bond.

3.3 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.

3.4 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.

3.5 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.

3.6 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.

3.7 DEFECTIVE WORK:

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.

3.8 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, postioning, 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

SECTION 033100 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION:

A. Work included: Furnish and install cast-in-place concrete required for the project as shown on the Drawings and specified herein. This Section also includes:
1. Concrete for work specified in Mechanical and Electrical Divisions unless specifically included therein.
2. Grouting of structural steel setting plates and elevator sills (if required).
3. Grouting of bases and equipment not specified under other Sections.
4. Concrete fill for metal stairs and pipe guards (bollards).
5. Coordination with other trades with regard to requirements for special bases, sleeves, chases, inserts, finishes or provisions of any nature.
6. Curing of formed concrete surfaces.
7. Installation of anchor bolts, hangers, anchors, plates, inserts and miscellaneous metal or other materials embedded in concrete and which are furnished by other trades.

B. Related Work Specified Elsewhere:
1. Concrete work beyond the building lines: See Sidewalks and Driveways.
2. Shotcrete.
3. Aggregate base for slabs on grade: See Earthwork.
4. Concrete Forming (including erection, stripping and removal).
5. Reinforcing Steel.
6. Stressing Tendons.
7. Concrete Finishing.

1.2 REFERENCES, CODES AND STANDARDS:

The following references, codes and standards are hereby made a part of this Section and concrete work 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. "Building Code Requirements for Reinforced Concrete", ACI 318-11.

B. California Building Code, 2013 Edition

1.3 SOURCE QUALITY CONTROL:

Refer to quality Control Section for general requirements governing testing and inspection.

A. Cement and Aggregates: Furnish to the Architect the following data:
1. Mill certificates from cement manufacturer certifying that cement meets Specifications and is suitable for purpose intended.
2. Proof of aggregate's compatibility with cement to be used and certification that aggregates meet Specifications. Owner reserves the right to have his testing agency perform any additional tests on cement and aggregates which may be deemed advisable.

1.4 SUBMITTALS: Comply with requirements of Shop Drawings, Product Data, and Sample Sections.

A. Concrete Mix Designs: Furnish to the Architect the following data:
1. Mix designs conforming to the requirements of this section and the requirements in the general notes sheet on the structural drawings including brands, types, and quantities of all admixtures. Include the following for each mix design:
a. Intended uses for mix.
b. Strength, water cement ratio and slump.
c. Field experience or trial batch strength data.
d. Quantities, size, and source of all aggregates, Include product information on aggregates used. Include proof of aggregate's compatibility with cement to be used and certification that aggregates meet Specifications. Owner reserves the right to have his testing agency perform any additional tests on cement and aggregates which may be deemed advisable.
e. Product information on all admixtures.
f. Mill certificates from cement manufacturer certifying that cement meets Specifications and is suitable for purpose intended.
g. Product information on flyash and any other portland cement replacement used demonstrating that product meets Specifications.
h. Shrinkage test data if required for mix.

1.5 ENVIRONMENTAL CONDITIONS:

A. Cold Weather Requirements: Comply with ACI 306R, "Cold Weather Concreting".

B. Hot Weather Requirements: Comply with ACI 305, "Hot Weather Concreting".

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Cement: ASTM C 150, Type II. Cement shall be of same brand, type and source throughout Project.

B. Aggregates:
1. Concrete for slabs on grade, suspended slabs: ASTM C 33 from sources with proven history of successful use. Source shall be constant unless 10 days prior notice is given for approval after recheck of mix design.
a. Aggregates may be submitted for use provided the concrete mix meets the following shrinkage criteria: .040% drying shrinkage (max.), as tested per Structural Engineers Association of California recommendation, May 1989.
2. All Other Concrete: ASTM C 33 from sources with proven history of successful use. Source shall be constant unless 10 days prior notice is given for approval after recheck of mix design.
a. Fine Aggregate: Natural sand with sand equivalent of not less than 75 when tested per Test Method Calif. 217-E.
b. Coarse Aggregate: Fine grain, sound crushed stone, natural gravel or granite with cleanness value not less than 75 when tested as per Test Method Calif. 227.

C. Water: Clean and potable, free from impurities detrimental to concrete.

D. Admixtures: The use of admixtures shall be confined to those admixtures listed below. Admixtures containing chlorides are not permitted. Admixtures shall be batched in strict accordance with manufacturer's recommendations.

1. Chemical Admixtures:
   a. Water Reducing Admixture: W.R. Grace Co. "WRDA-79", Master Builders "Pozzolith 200N" or Sika Chemical Corp. "Plastocrete 161". Admixture shall conform to ASTM C 494, Type A and shall not contain more chloride ions than are present in the municipal drinking water.
   b. High-Range Water Reducing Admixture: W.R. Grace Co. "WRDA-19" or approved equal. Admixture shall conform to ASTM C494 Type F and shall not contain more chloride ions than are present in the municipal drinking water.
   c. Mid-Range Water Reducing Admixture: W.R. Grace Co., Daracon 50, 55, 04 65, or approved equal. Admixtures should conform to ASTM C494 Type A/F and shall not contain more chloride ions than are present in the municipal drinking water.
   d. Air Entraining Agent: Air-entraining admixture conforming to ASTM C260 may be introduced into the mix. Air-entrainment shall not exceed 4 percent. Submit manufacturer's data to Architect for review.
   e. Flyash: Pozzolanic admixtures, conforming with ASTM C618, Class F, with weight loss on ignition limited to 3%, may be utilized in mix designs where indicated on structural drawings. Maximum cement replacement shall be 15% by weight, unless otherwise noted on drawings.
   f. Ground Granulated Blast Furnace Slag Cement (GGBFS): Slag Cement shall conform to ASTM C989 or AASHTO M302 Grade Level 100 or 120.
   g. Crystalline Waterproofing Additive: Zypex crystalline waterproofing admixture, Admix C-1000 or C-2000, by Xypex Chemical Corporation, or approved equal.
2. Certification: Written conformance to above requirements and the chloride ion content of the admixture shall be submitted by the admixture manufacturer prior to review of mix designs by the Architect.

E. Expansion Joint Fillers: ASTM D 994, asphaltic compound strips, 1/2" thick unless otherwise noted, precut to proper size.

F. Non-Shrink Grout (Non-Metallic): Euclid Chemical Co. "Euco N-S", L&M "Crystex", Upco "Upcon", U.S. Grout Corp. "Five Star", Master Builders "Masterflow 713", or approved equal, nonmetallic, non-staining, premixed grout having a compressive strength at 28 days of not less than 6800 psi, non-shrink at all flow levels. Grout shall conform to ASTM C1107.

G. Curing Compounds (Formed Concrete): Conform to requirements of Concrete Finishes Section (for Clear Curing and Sealing Compound).

H. Volclay Waterstops: Bentonite/butyl rubber-based waterstop, RX-101 series by CETCO Building Materials Group, or approved equal.

2.2 MIXES:

A. Mix Designs:

1. Mix designs for concrete shall be Contractor-designed at his expense. Designs shall be prepared by a qualified agency approved by the Architect and Structural Engineer. Four (4) copies, or one electronic copy, of mix designs shall be submitted for Architect's review at least 30 days prior to placing any concrete and shall indicate completely, brands, types and quantities of admixtures included. If concrete is to be placed by pumping, recommendations of ACI Committee 304 shall be followed.

2. Mix designs shall be proportioned in accordance with Section 5.3, "Proportioning on the Basis of Field Experience and/or Trial Mixtures" of ACI 318. Submit mix designs for each class of concrete for review.
3. Mix designs for pit foundations and pit walls shall include a crystalline waterproofing admixture at the rate of 3% of cementitous weight. See drawings for locations.

B. Structural Drawings indicate minimum compressive strengths, slumps, maximum size aggregates and minimum cement contents.

PART 3 - EXECUTION

3.1 MIXING: Concrete shall be ready mixed as per ASTM C 94a. Equipment shall be adequate for the purpose and kept in good mechanical condition at all times.

A. The rate of delivery, haul time, mixing time and hopper capacity shall be such that mixed concrete delivered shall be placed in the forms within 90 minutes or 300 revolutions of the drum from the time of introduction of cement and water to the mixer. Any interruption in placing in excess of 90 minutes or 300 revolutions will be cause for shutdown of the work for the day and the wasting of any remaining mixed concrete in hoppers or mixers. In case such interruption occurs, the Contractor shall provide construction joints where and as directed and cut concrete back to such line, cleaning forms and reinforcing as herein specified. Delivery tickets shall show departure time from plants. Revolution counters shall be set at "0" and shall commence to operate when drum revolution begins after introduction of ingredients into the mixer.

B. No water shall be added to the mix after the initial introduction of mixing water for the batch except when, on arrival at the job site, the slump of the concrete is less than that specified. In this case, and only under the direction of the Special Inspector and with not more than one application per load, additional water may be added from the truck system to bring the slump within required limits. The drum or blades shall then be turned an additional 30 revolutions or more until mix is uniform.

C. Mixers shall be equipped with an automatic device for recording number of revolutions of drum or blades prior to completion of mixing operation.

D. Concrete shall be kept continuously agitated until discharged into the hopper at the job site.

E. Contractor shall note that the appearance of unpainted exposed concrete surfaces depends upon uniform color and texture within any one area and between adjacent areas and he shall exercise strict batching and mixing controls to achieve this end.

3.2 PLACING:

A. Absorbent forms shall be thoroughly wetted before concrete is placed. Aggregate base for slabs on grade shall be moist but not saturated when concrete is placed.

B. Placing of concrete shall be done immediately after mixing. No concrete shall be placed or used after it has begun to set and no retempering will be allowed. The method used in placing shall be such that concrete is conveyed to place and deposited without separation of the ingredients. No concrete shall be placed with a free unconfined fall in excess of six (6) feet. Concrete shall not be allowed to cascade through reinforcing steel in such manner as to promote segregation. Do not support runways on reinforcing steel.

C. Splash or accumulations of hardened or partially hardened concrete shall be removed. Contact faces of forms for exposed concrete shall be protected from splash during placing of adjacent concrete. Concrete containing piping shall be placed in a manner that will prevent damage to pipes.

D. Deposit concrete in approximate horizontal layers not exceeding 18" in thickness, unless otherwise authorized. Placing of concrete shall be carried on in a continuous operation without interruption until placing of course, section, panel or monolith is completed.

E. Distribution of concrete shall be even and continuous and no placement joints shall show. Before a placement is started, make certain that adequate equipment, men, and concrete will be available to place in cycles which will permit proper and thorough integration of each layer of concrete. Upon stopping of a placement, the top surface shall be on a level. Points of deposit in walls shall be so spaced that it will not be necessary for concrete to flow laterally more than 24 inches.

F. No concrete shall be placed for any element until reinforcing for same is fastened in place nor until forms are complete. No concrete shall be placed before work that is to be embedded has been set. Notify other crafts so they may deliver anchor, inserts, etc., or other work to be embedded in ample time and also notify them when their assistance in setting is required. Reinforcing or other materials that have been set in place shall not be disturbed.

G. No pipes except electrical conduits 1-1/4" and less in diameter shall be embedded in structural concrete. Before placing concrete, such pipes and large conduits shall be sleeved providing 1/4" clearance (min.) all around. Sleeves for plumbing and mechanical pipes shall be placed so as not to impair strength of concrete or interfere with reinforcing bar placement. Multiple sleeve openings shall be placed no closer than three times diameter of the larger sleeve. Reinforcing clearances to sleeves shall conform to clearances specified for concrete surfaces. Sleeves and inserts will be provided and set under other Sections of the work.

H. Remove debris, mud and water from places to receive concrete.

I. Concrete splash and/or grout shall be removed from surfaces that will receive painter's finish.

J. Place no concrete in water unless written permission has been obtained from Structural Engineer.

K. Notify Owner's Representative, Architect and Structural Engineer 48 hours minimum prior to placing of any concrete.

3.3 VIBRATION AND CONSOLIDATION:

A. Concrete shall be thoroughly consolidated by means of internal mechanical vibrators. Such consolidation shall be produced as will be obtained by placing the vibrator directly in concrete at 18" - 30" intervals for a period of approximately 5 to 15 seconds and withdrawing slowly or as directed, depending on the consistency of concrete. One vibrator will be required for each location where simultaneous placing takes place, to ensure thorough vibrating of all sections. Provide sufficient spare vibrators on the job so as to have them readily available in case any vibrator in use should suddenly cease to function properly. Where spare vibrators are employed, provide additional spares. Provide smaller diameter vibrators for areas with congested reinforcing steel. Under no condition shall vibrator be placed against reinforcing steel or attached to forms. Use no vibrators to transport material.

B. Vibrator shall be of the flexible immersion type having a frequency of not less than 8,000 rpm. Use and type of vibrator shall conform to ACI 309, "Recommended Practice for Consolidation of Concrete".

C. Spading will not be permitted on exposed concrete surfaces.

D. Voids and rock pockets shall be eliminated. Voids and rock pockets in exposed concrete may subject that portion to rejection.

3.4 CONSTRUCTION JOINTS:

A. Placement of construction joints and the manner in which they are provided for shall be only as approved by Owner's Representative or as shown on the Drawings. Construction joints shall be few as possible and will not be permitted simply to save forms. Submit shop drawings of construction joints showing proposed locations and details. Submit to Architect prior to forming or placing concrete.

B. Provide waterstop material in all construction joints in pit foundations and pit wall construction (top and bottom of walls pours) in accordance with manufacturer’s recommendations, and as shown on drawings.

3.5 CURING: See Section 033500, Paragraph 3.01.

3.6 EQUIPMENT BASES: Verify sizes and shapes required by items specified elsewhere. Concrete bases for special equipment shall be installed in strict accordance with Drawing details and the specifications and recommendations of the equipment manufacturer.

3.7 EXPANSION JOINT FILLERS: Place filler material so that top of surfaces is level and aligned uniformly 1/4" below adjacent concrete surface.

3.8 GROUTING:

A. The setting of steel base plates is specified under Structural Steel Section. The grouting of the steel base plates shall be performed as hereinafter specified and as a part of this Section.

B. Grout used for the grouting of base plates shall be non-metallic, non-shrink grout mixed and applied in strict accordance with manufacturer's directions.

C. Grouting of bases shall be carefully done so as not to leave any voids between the base plates and the concrete.

3.9 FIELD QUALITY CONTROL: Refer to Quality Control Section for general requirements governing testing and inspection.

A. Tests and inspections shall be performed by qualified individuals, engineering companies or testing laboratories who shall perform those special inspections required by Sec. 1701.4 of the California Building Code, those tests and inspections specified below and such other tests and inspections as the Architect or Owner may require to establish the acceptability of the work.

B. Testing and inspection services shall be retained by the Owner at his expense except that when tests or inspections reveal failure of materials to meet contract requirements, costs for subsequent tests and inspections will be deducted from the Contract Price. Excessive inspection time required by Contractor's failure to provide sufficient workmen or to properly pursue the progress of the work shall likewise be deducted from the Contract Price.

C. Furnish material and handling for test cylinders and any other samples which testing agency requires for analysis of concrete work.

D. Compression Tests; unless noted otherwise:
   1. Mild Reinforced Concrete: 4 compression test cylinders will be taken for each placement of 150 cu. yd. or fraction thereof of each class of concrete placed each day. Make, cure and store test cylinders as per ASTM C 31. One cylinder will be tested at 7 days for information; two at 28 days for acceptance; and one retained as a spare.

E. Slump Test: Slump tests will be performed as per ASTM C 143 (slump cone) 360-63 at time of taking test cylinders. Tests shall be taken at the truck.

F. Testing agencies shall select and prepare samples taken at job site.

END OF SECTION

SECTION 033300 - ARCHITECTURAL CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes cast-in-place architectural concrete including form facings, reinforcement accessories, concrete materials, concrete mixture design, placement procedures, and finishes.

B. Related Requirements:

1. Division 07 Section "Joint Sealants" for elastomeric joint sealants in contraction and other joints in cast-in-place architectural concrete.
2. Division 32 Section "Concrete Paving" for concrete pavement and flatwork finishes.
3. Division 32 Section "Decorative Concrete Paving" for surface-imprinted concrete pavement and finishes.

1.3 DEFINITIONS

A. Cast-in-Place Architectural Concrete: Formed concrete that is exposed to view on surfaces of completed structure or building and that requires special concrete materials, formwork, placement, or finishes to obtain specified architectural appearance.

B. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

C. Design Reference Sample: Sample designated by Architect in the Contract Documents that reflects acceptable surface quality and appearance of cast-in-place architectural concrete.

D. Reveal: Projection of coarse aggregate from matrix or mortar after completion of exposure operations.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at [**Project site**] <**Insert location**>.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place architectural concrete to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixtures.
c. Ready-mix concrete manufacturer.
d. Cast-in-place architectural concrete subcontractor.

2. Review [**concrete finishes and finishing,**] [**cold- and hot-weather concreting procedures,**] [**curing procedures,**] [**construction joints,**] [**forms and form-removal limitations,**] [**reinforcement accessory installation,**] [**concrete repair procedures,**] and protection of cast-in-place architectural concrete.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. LEED Submittals:

1. Product Data for Credit MR 4.1[**and Credit MR 4.2**]: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Design Mixtures for Credit ID 1.1: For each concrete mixture containing fly ash as a replacement for portland cement or other portland cement replacements and for equivalent concrete mixtures that do not contain portland cement replacements.

C. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

D. Formwork Shop Drawings: Show formwork construction including form-facing joints, rustications, construction and contraction joints, form joint-sealant details, form tie locations and patterns, inserts and embedments, cutouts, cleanout panels, and other items that visually affect cast-in-place architectural concrete.

E. Placement Schedule: Submit concrete placement schedule before start of placement operations. Include locations of all joints including construction joints.

F. Samples: For each of the following materials:

1. Form-facing panel.
2. Form ties.
3. Form liners.
4. Coarse- and fine-aggregate gradations.
5. Chamfers and rustications.

G. Samples for Verification: Architectural concrete Samples, cast vertically, approximately 18 by 18 by 2 inches (450 by 450 by 50 mm), of finishes, colors, and textures to match design reference sample. Include Sample sets showing the full range of variations expected in these characteristics.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For [**manufacturer**] [**testing agency**].

B. Material Certificates: For each of the following:

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Repair materials.

C. Material Test Reports: For the following, by a qualified testing agency:

1. Aggregates.[**Include service record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity**].

1.7 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.

1. Manufacturer certified according to NRMCA's "NRMCA Quality Control Manual - Section 3, Certification of Ready Mixed Concrete Production Facilities."

B. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
2. Personnel performing laboratory tests shall be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

C. Source Limitations for Cast-in-Place Architectural Concrete: Obtain each color, size, type, and variety of concrete material and concrete mixture from single manufacturer with resources to provide cast-in-place architectural concrete of consistent quality in appearance and physical properties.

D. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specification for Structural Concrete,"[**Sections 1 through 5.**] [**Sections 1 through 5 and Section 6, "Architectural Concrete."**]
2. ACI 303.1, "Specification for Cast-in-Place Architectural Concrete."

E. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

F. Field Sample Panels: After approval of verification sample and before casting architectural concrete, produce field sample panels to demonstrate the approved range of selections made under Sample submittals. Produce a minimum of three sets of full-scale panels, cast vertically, approximately 48 by 48 by 6 inches (1200 by 1200 by 150 mm) minimum, to demonstrate the expected range of finish, color, and texture variations.

1. Locate panels as indicated or, if not indicated, as directed by Architect.
2. Demonstrate methods of curing, aggregate exposure, sealers, and coatings, as applicable.
3. In presence of Architect, damage part of an exposed-face surface for each finish, color, and texture, and demonstrate materials and techniques proposed for repair of tie holes and surface blemishes to match adjacent undamaged surfaces.
4. Maintain field sample panels during construction in an undisturbed condition as a standard for judging the completed Work.
5. Demolish and remove field sample panels when directed.

G. Mockups: Before casting architectural concrete, build mockups to verify selections made under Sample submittals and to demonstrate typical joints, surface finish, texture, tolerances, and standard of workmanship. Build mockups to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
2. Build mockups of typical exterior wall of cast-in-place architectural concrete as shown on Drawings.
3. Demonstrate curing, cleaning, and protecting of cast-in-place architectural concrete, finishes, and contraction joints, as applicable.
4. In presence of Architect, damage part of the exposed-face surface for each finish, color, and texture, and demonstrate materials and techniques proposed for repair of tie holes and surface blemishes to match adjacent undamaged surfaces.
5. Obtain Architect's approval of mockups before casting architectural concrete.
6. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. General: Comply with Division 03 Section "Cast-in-Place Concrete" for formwork and other form-facing material requirements.

B. Form-Facing Panels for [**As-Cast**] [**Exposed-Aggregate**] 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.

C. Form-Facing Panels for [**As-Cast**] [**Exposed-Aggregate**] Finishes: Exterior-grade plywood panels, nonabsorptive, that will provide continuous, true, and smooth architectural concrete surfaces, [**high-density overlay, Class 1, or better**] [**medium-density overlay, Class 1, or**

better, mill-applied release agent and edge sealed], complying with DOC PS 1[**, or Finnish phenolic overlaid birch plywood**].

D. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will provide surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

E. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.

F. Form Liners: Units of face design, texture, arrangement, and configuration [**indicated**] [**to match design reference sample**]. Furnish with manufacturer's recommended liquid-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent surface treatments of concrete.

G. Rustication Strips: Metal, rigid plastic, or dressed wood with sides beveled and back kerfed; nonstaining; in longest practicable lengths.

H. Chamfer Strips: Metal, rigid plastic, elastomeric rubber, or dressed wood, 3/4 by 3/4 inch (19 by 19 mm), minimum; nonstaining; in longest practicable lengths.

I. Form Joint Tape: Compressible foam tape; pressure sensitive; AAMA 800, "Specification 810.1, Expanded Cellular Glazing Tape"; minimum 1/4 inch (6 mm) thick.

J. Form Joint Sealant: Elastomeric sealant complying with ASTM C 920, Type M or Type S, Grade NS, that adheres to form joint substrates.

K. Sealer: Penetrating, clear, polyurethane wood form sealer formulated to reduce absorption of bleed water and prevent migration of set-retarding chemicals from wood.

L. Form-Release Agent: Commercially formulated, colorless form-release agent that will not bond with, stain, or adversely affect architectural concrete surfaces and will not impair subsequent treatments of those surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

M. Surface Retarder: Chemical liquid set retarder, for application on form-facing materials, capable of temporarily delaying final hardening of newly placed concrete surface to depth of reveal specified.

N. 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.

1. Furnish ties[**with tapered tie cone spreaders**] that, when removed, will leave holes [3/4 inch (19 mm)] [1 inch (25 mm)] [1-1/4 inches (32 mm)] [1-1/2 inches (38 mm)] <**Insert dimension**> in diameter on concrete surface.
2. Furnish internally disconnecting ties that will leave no metal closer than 1-1/2 inches (38 mm)[**, after exposing aggregate,**] from the architectural concrete surface.

3. Furnish glass-fiber-reinforced plastic ties, not less than 1/2 inch (13 mm) in diameter, of color [**to match Architect's sample**] [**selected by Architect from manufacturer's full range**].
4. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.2 STEEL REINFORCEMENT AND ACCESSORIES

A. General: Comply with Division 03 Section "Cast-in-Place Concrete" for steel reinforcement and other requirements for reinforcement accessories.

B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than [**25**] [**60**] <**Insert number**> percent.

C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire fabric in place; manufacture according to CRSI's "Manual of Standard Practice."

1. Where legs of wire bar supports contact forms, use [**gray, all-plastic**] [**CRSI Class 1, gray, plastic-protected**] [**or**] [**CRSI Class 2, stainless-steel**] bar supports.

2.3 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**] [**Type II**] [**Type I/II**] [**Type III**], [**gray**] [**white**].[**Supplement with the following:**]

   a. Fly Ash: ASTM C 618, [**Class C**] [**Class F**].
   b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or Grade 120.
   c. Silica Fume: ASTM C 1240, amorphous silica.

2. Blended Hydraulic Cement: ASTM C 595, [**Type IS, portland blast-furnace slag**] [**Type IP, portland-pozzolan**] [**Type I (PM), pozzolan-modified portland**] [**Type I (SM), slag-modified portland**] cement.

B. Normal-Weight Aggregates: ASTM C 33, [**Class 5S**] [**Class 5M**] [**Class 1N**] <**Insert class**> coarse aggregate or better, graded. Provide aggregates from single source[**with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials**].

1. Maximum Coarse-Aggregate Size: [1 inch (25 mm)] [3/4 inch (19 mm)] [1/2 inch (13 mm)] [3/8 inch (10 mm)].
2. Gradation: [**Uniformly**] [**Gap**] graded.

C. Normal-Weight Fine Aggregate: [**ASTM C 33**] [**or**] [**ASTM C 144**], 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.

2.4 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

C. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable,[**free of carbon black,**] nonfading, and resistant to lime and other alkalis.

1. Color: [**As indicated by manufacturer's designation**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**].

2.5 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

1. For integrally colored concrete, curing compound shall be[**pigmented type**] approved by color pigment manufacturer.
2. For concrete indicated to be sealed, curing compound shall be compatible with sealer.

2.6 REPAIR MATERIALS

A. Bonding Agent: ASTM C 1059/C 1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

B. Epoxy Bonding Adhesive: ASTM C 881/C 881M, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements.

1. [**Types I and II, non-load bearing**] [**Types IV and V, load bearing**], for bonding hardened or freshly mixed concrete to hardened concrete.

2.7 CONCRETE MIXTURES, GENERAL

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.

B. Proportion concrete mixtures as follows:

1. Compressive Strength (28 Days): [5000 psi (34.5 MPa)] [4500 psi (31 MPa)] [4000 psi (27.6 MPa)] [3500 psi (24.1 MPa)] [3000 psi (20.7 MPa)].
2. Maximum Water-Cementitious Materials Ratio: 0.46.
3. Slump Limit: [3 inches (75 mm)] [4 inches (100 mm)] [8 inches (200 mm) **for concrete with verified slump of** 2 to 4 inches (50 to 100 mm) **before adding high-range water-reducing admixture or plasticizing admixture**] <**Insert dimension(s)**>, plus or minus 1 inch (25 mm).
4. Air Content: [**5-1/2**] <**Insert number**> percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch (38-mm) nominal maximum aggregate size.
5. Air Content: [**6**] <**Insert number**> percent, plus or minus 1.5 percent at point of delivery for [1-inch (25-mm)] [3/4-inch (19-mm)] nominal maximum aggregate size.

C. Cementitious Materials: For cast-in-place architectural concrete exposed to deicers, limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements.[**Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.**]

D. Limit water-soluble, chloride-ion content in hardened concrete to [**0.06**] [**0.15**] [**0.30**] [**1.00**] percent by weight of cement.

E. Admixtures: Use admixtures according to manufacturer's written instructions.

F. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.8 CONCRETE MIXING

A. [**Ready-Mixed**] [**or**] [**Site-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.

2. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

A. General: Comply with Division 03 Section "Cast-in-Place Concrete" for formwork, embedded items, and shoring and reshoring.

B. Limit deflection of form-facing panels to not exceed ACI 303.1 requirements.

C. In addition to ACI 303.1 limits on form-facing panel deflection, limit cast-in-place architectural concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

1. [**Class A,** 1/8 inch (3.2 mm)] [**Class B,** 1/4 inch (6 mm)] [**Class C,** 1/2 inch (13 mm)].

D. Fabricate forms to result in cast-in-place architectural concrete that complies with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

1. In addition to ACI 117, comply with the following tolerances: <**Insert tolerances**>.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-in-place surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical. Kerf wood rustications, keyways, reglets, recesses, and the like, for easy removal.

1. Seal form joints and penetrations at form ties with form joint tape or form joint sealant to prevent cement paste leakage.
2. Do not use rust-stained steel form-facing material.

F. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

G. [**Chamfer**] [**Do not chamfer**] exterior corners and edges of cast-in-place architectural concrete.

H. Coat contact surfaces of wood rustications and chamfer strips with sealer before placing reinforcement, anchoring devices, and embedded items.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

M. Coat contact surfaces of forms with surface retarder, according to manufacturer's written instructions, before placing reinforcement.

N. Place form liners accurately to provide finished surface texture indicated. Provide solid backing and attach securely to prevent deflection and maintain stability of liners during concreting. Prevent form liners from sagging and stretching in hot weather. Seal joints of form liners and form liner accessories to prevent mortar leaks. Coat form liner with form-release agent.

3.2 REINFORCEMENT AND INSERTS

A. General: Comply with Division 03 Section "Cast-in-Place Concrete" for fabricating and installing steel reinforcement. Securely fasten steel reinforcement and wire ties against shifting during concrete placement.

B. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

3.3 REMOVING AND REUSING FORMS

A. Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.

1. Schedule form removal to maintain surface appearance that matches approved [**field sample panels**] [**mockups**].
2. Cut off and grind glass-fiber-reinforced plastic form ties flush with surface of concrete.

B. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved [**28-day design compressive strength**] [**at least 70 percent of 28-day design compressive strength**]. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

C. Clean and repair surfaces of forms to be reused in the Work. Do not use split, frayed, delaminated, or otherwise damaged form-facing material. Apply new form-release agent.

D. 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.

3.4 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.
2. Form keyed joints as indicated.[**Embed keys at least** 1-1/2 inches (38 mm) **into concrete.**] Align construction joint within rustications attached to form-facing material.
3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
5. Space vertical joints in walls [**as indicated**] <**Insert spacing**>. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
6. Use [**bonding agent**] [**epoxy-bonding adhesive**] at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

B. Contraction Joints: Form weakened-plane contraction 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.

3.5 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, form-release agent, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously between construction joints. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 303.1.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. Do not permit vibrators to contact forms.

E. 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 average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents.
4. Do not use chemical accelerators unless otherwise specified and approved in design mixtures.

F. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. 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. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.6 FINISHES, GENERAL

A. Architectural Concrete Finish: Match Architect's design reference sample, identified and described as indicated, to satisfaction of Architect.

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.

3.7 AS-CAST FORMED FINISHES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections exceeding specified limits on formed-surface irregularities.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Remove fins and other projections exceeding specified limits on formed-surface irregularities. [**Repair**] [**Do not repair**] and patch tie holes and defects.

C. Rubbed Finish: Apply the following to smooth-form-finished as-cast concrete where indicated:

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match surrounding concrete. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match surrounding concrete. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.

D. Form-Liner Finish: Produce a textured surface free of pockets, streaks, and honeycombs, and of uniform appearance, color, and texture.

3.8 EXPOSED-AGGREGATE FINISHES

A. Scrubbed Finish: After concrete has achieved a compressive strength of from 1000 to 1500 psi (6.9 to 10.3 MPa), apply scrubbed finish. Wet concrete surfaces thoroughly and scrub with stiff fiber or wire brushes, using water freely, until top mortar surface is removed and aggregate is uniformly exposed. Rinse scrubbed surfaces with clean water. Maintain continuity of finish on each surface or area of Work. Remove only enough concrete mortar from surfaces to match design reference sample or mockup.

B. High-Pressure Water-Jet Finish: Perform high-pressure water jetting on concrete that has achieved a minimum compressive strength of 4500 psi (31 MPa). Coordinate with formwork removal to ensure that surfaces to be high-pressure water-jet finished are treated at same age for uniform results.

1. Surface Continuity: Perform high-pressure water-jet finishing in as continuous an operation as possible, maintaining continuity of finish on each surface or area of Work. Maintain required patterns or variances in reveal projection to match design reference sample or mockup.

C. Abrasive-Blast Finish: Perform abrasive blasting after compressive strength of concrete exceeds 2000 psi (13.8 MPa). Coordinate with formwork removal to ensure that surfaces to be abrasive blasted are treated at same age for uniform results.

1. Surface Continuity: Perform abrasive-blast finishing in as continuous an operation as possible, maintaining continuity of finish on each surface or area of Work. Maintain required patterns or variances in depths of blast to match design reference sample or mockup.
2. Abrasive Blasting: Abrasive blast corners and edges of patterns carefully, using backup boards, to maintain uniform corner or edge line. Determine type of nozzle, nozzle pressure, and blasting techniques required to match design reference sample or mockup.
3. Depth of Cut: Use an abrasive grit of proper type and gradation to expose aggregate and surrounding matrix surfaces to match design reference sample or mockup, as follows:

a. Brush: Remove cement matrix to dull surface sheen and expose face of fine aggregate; with no significant reveal.
b. Light: Expose fine aggregate with occasional exposure of coarse aggregate and uniform color; with maximum reveal of 1/16 inch (1.5 mm).
c. Medium: Generally expose coarse aggregate; with slight reveal, a maximum of 1/4 inch (6 mm).
d. Heavy: Expose and reveal coarse aggregate to a maximum projection of one-third its diameter; with reveal range of 1/4 to 1/2 inch (6 to 13 mm).

D. Bushhammer Finish: Allow concrete to cure at least 14 days before starting bushhammer surface finish operations.

1. Surface Continuity: Perform bushhammer finishing in as continuous an operation as possible, maintaining continuity of finish on each surface or area of Work. Maintain required patterns or variances of cut as shown on Drawings or to match design reference sample or mockup.
2. Surface Cut: Maintain required depth of cut and general aggregate exposure. Use power tool with hammer attachments for large, flat surfaces, and use hand hammers for small areas, at corners and edges, and for restricted locations where power tools cannot reach.
3. Remove impressions of formwork and form facings with exception of tie holes.

3.9 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with ACI 301 for hot-weather protection during curing.

B. Begin curing cast-in-place architectural concrete immediately after [**removing forms from**] [**applying as-cast formed finishes to**] concrete. Cure according to ACI 308.1, by one or a combination of the following methods that will not mottle, discolor, or stain concrete:

1. Moisture Curing: Keep exposed surfaces of cast-in-place architectural concrete continuously moist for no fewer than seven days with the following materials:

a. Water.
b. Continuous water-fog spray.
c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for no fewer than seven days. Immediately repair any holes or tears during curing period; use cover material and waterproof tape.
3. Curing Compound: Mist concrete surfaces with water. Apply curing compound uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.10 FIELD QUALITY CONTROL

A. General: Comply with field quality-control requirements in Division 03 Section "Cast-in-Place Concrete."

3.11 REPAIRS, PROTECTION, AND CLEANING

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 corners, edges, and surfaces of cast-in-place architectural concrete from damage; use guards and barricades.

C. Protect cast-in-place architectural concrete from staining, laitance, and contamination during remainder of construction period.

D. Clean cast-in-place architectural concrete surfaces after finish treatment to remove stains, markings, dust, and debris.

E. Wash and rinse surfaces according to concrete finish applicator's written instructions. Protect other Work from staining or damage due to cleaning operations.

1. Do not use cleaning materials or processes that could change the appearance of cast-in-place architectural concrete finishes.

END OF SECTION 033300

SECTION 033500 - CONCRETE FINISHING

PART 1 - GENERAL

1.1 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.

1.2 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, 2013 Edition.

1.3 SUBMITTALS: Comply with requirements of Shop Drawings, Product Data, and Sample Sections.

1.4 PROTECTION: Protect exposed surfaces including flat work as required to prevent damage by impact or stains.

PART 2 - PRODUCTS

2.1 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”.

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.).

PART 3 - EXECUTION

3.1 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.

3.2 PATCHING AND REPAIR OF DEFECTIVE AREAS

A. 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.

B. 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.

C. 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.

3.3 FINISHING

A. 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.

B. 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.

C. 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.

D. 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.

I. Treads of concrete stairs shall have a broom finish. Forms for risers shall be removed as soon as concrete has set and surfaces plastered with cement grout and troweled smooth. Treads without safety nosings shall have (4) evenly spaced grooves troweled in with grooving tool.

3.4 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.

3.5 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.

3.6 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 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 033713 - SHOTCRETE

PART 1 - GENERAL

1.1 DESCRIPTION:

A. Work Included: Furnish and install pneumatically placed concrete, "shotcrete" required for the project as shown on the Drawings and specified herein.

B. Related Work Specified Elsewhere:
1. Concrete Forming
2. Concrete Reinforcing
3. Cast-in-Place Concrete
4. Concrete Finishing.

1.2 REFERENCES, CODES AND STANDARDS: The following references, codes and standards are hereby made a part of this Section and shotcrete work 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. ACI, American Concrete Institute: "Specifications for materials, proportioning and applications of shotcrete" (ACI 506.2).

B. ASTM, American Society for Testing Materials.

C. CSHS, State of California, Dept. of Public Works Division of Highways, Standard Specification.

D. Gunite Contractors Assn. Brochure G-84.

E. California Building Code, 2013 Edition.

1.3 SOURCE QUALITY CONTROL: Refer to quality Control Section for general requirements governing testing and inspection.

A. Tests and Inspections: Dry mix and wet mixed shotcrete.
1. Tests shall be made of shotcrete work by an approved independent Testing Laboratory.
2. Testing Agency: Perform and report on following tests, inspections and control of concrete during construction:
a. Preconstruction Tests and Mock-Up Panels.
(1) Required for locations to be constructed of shotcrete and each nozzleman to be prequalified.
(2) Prior to shotcrete placement, shoot, cure, saw, examine, and test representative samples simulating actual job conditions as closely as possible. Reproduce the most thickly reinforced and most congested areas of the structural design, including laps and couplers. Shoot test panels at the same angle, using the same nozzleman and equipment, and using the same mix designs to be used on the Project. Minimum size of test panels shall not be less than 4' wide x "1 story height" tall for wall samples and the

full size column dimensions x "1 story height" tall for columns. If pilasters are to be shotcreted, incorporate pilasters into wall test panels and widen as necessary.

(3) One wall test panel and one column test panel shall be shot by each nozzleman to be prequalified.

(4) From each test panel, take three cores, not through reinforcing, to determine f'c. Take six additional cores from each column and each wall sample, through congested reinforcing, to demonstrate adequate encasement of bars and concrete consolidation; three cores near the bottom of the test panel or column and three cores near the top of the test panel or column.

(5) Average Grade of cores shall be 2.0 or less with no single core above 2.0, per ACI 506.2.

(6) Obtain core or cube samples to determine f'c at 7 and 28 days in accordance with Section 1.03.A.3.e.

b. Provide continuous inspection of shotcrete placement at all locations.

c. Slump test for wet mixed shotcrete: Make slump tests as required during progress of work.

3. Construction Compression Tests and Test Panels.

a. A representative of the Testing Laboratory shall take not less than one test panel each shift nor less than one for each 50 cubic years of shotcrete placed.

(1) Each panel shall be dated, given a number, the name of the nozzleman making the panel and the point in the structure where the panel was taken.

b. The Contractor shall furnish at his own expense specially constructed plywood forms for making unreinforced test panels at least 1 foot square and 3 inches thick.

c. The test panels of shotcrete shall be shot with the same air pressure, nozzle tip, and hydration as the shotcrete in the structure at the point where the panel was taken.

d. At the end of 24 hours after the cylinders are made, the form shall be removed and the panel stored in the testing laboratory in accordance with the current issue of "Standard Method of Making Compression Tests on Concrete", ASTM Designation C39.

e. Three cubes or cores shall be taken from each panel for testing.

(1) The specimens shall be tested in compression at 7 and 28 days in conformance with ASTM C42.

(2) Test results should be evaluated as described in ACI 214-65.

(3) The average compressive strength of the three cores shall be at least 0.85 f'c with no individual core less than 0.75 f'c.

(4) The average compressive strength of the three cubes shall be at least 1.0 f'c with no individual core less than 0.88 f'c.

f. Should the specimen strengths be less than the above criteria, then test cores shall be taken under the direction of the Testing Laboratory.

(1) Should the ultimate compressive strength of these cores be less than the specified f'c in any part of the said deficient work, then this work shall be removed and replaced.

g. Tests for absorption, drying shrinkage, resistance to freezing and thawing and other properties may also be made at the Engineer's direction using appropriate

h. specimens cored or sawed from the panel.

B. Testing Agency.
1. All testing shall be done by the independent Testing Laboratory.
2. Test reports: Submit shotcrete test reports indicating compliance with specifications.

C. Certification.
1. Furnish mill certificates for Portland cement indicating compliance with the Specifications.
2. Certify that aggregates comply with the Specifications and are suitable for the intended use.

1.4 SUBMITTALS: Comply with requirements of Shop Drawings, Product Data, and Sample Sections.

A. Mix Designs.
1. Mix designs shall indicate, completely, types of cements and admixtures; quantities, size and source of all aggregates, slump, strength and water cement ratios.

B. Product Data: Submit manufacturer's product data with application and installation instructions for all proprietary materials and products, including forming and reinforcement accessories, patching compounds, joint systems, and applied materials.

C. Curing Materials
1. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz/sy, and complying with AASHTO M-182.
2. Moisture Retaining Cover: Waterproof paper, polyethylene sheet, or polyethylene-coated burlap complying with ASTM C171.
3. Moisture retaining membrane.

D. Shop Drawings: Submit shop drawings for formwork and reinforcement in accordance with the requirements of Sections 031113 and 032100, and ACI 315.

E. Laboratory Test Reports: Submit laboratory test reports for concrete materials, mix designs, and field quality control testing as specified herein.

F. Placement Schedule: Submit proposed shotcrete placement schedule, including date, method of placement, and location.

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Wet Mixed Shotcrete.
1. Shotcrete, as herein specified, and where shown on the Drawings, shall be a mixture of Portland cement, fine aggregate, pea gravel, water reducing admixture, and water. It shall be mixed wet at the batch plan; delivered to the site in transit mixers, pumped through a hose to the point of deposit by means of a concrete pump or other similar machine, deposited under impact by air pressure and consolidated in the place of final repose.
2. Cement: Portland cement, Type II, shall conform to ASTM C150 with latest amendments.
3. Aggregate: The aggregate shall be comprised of 20 to 40 percent round pea gravel and 60 to 80 percent fine aggregate. The aggregate shall be thoroughly washed, free from oil or other deleterious substances such as clay lumps, shale, free alkalies, coated grains, or soft, flaky particles.
   a. Pea gravel shall conform to ASTM C33 requirements for coarse aggregates with 3/8 inch diameter maximum.
   b. Fine aggregates shall be evenly graded from fine to coarse in accordance with ASTM C33 and shall contain no particles larger than 3/8 inch in diameter. When tested in accordance with ASTM Standard C33, sand shall not show a color solution darker than the standard color solution No. 2.
4. Water: Clean and free from deleterious amounts of acids, alkalies, salts or organic materials.
5. Admixtures:
   a. Calcium chloride: Do not use calcium chloride in concrete; admixtures may be used only when approved by the Engineer.
   b. Water-reducing admixtures: ASTM C494 Type A, Pozzolith 300-N by Master Builders, WRDA by W. R. Grace Co., or equal.

2.2 FORMWORK:

A. Form material as specified in Section 031103.

B. Formwork shall be adequately braced to insure against excessive vibration; forms shall be built so as to permit the escape of air and rebound and to facilitate the placing of shotcrete to finish tolerances.

2.3 REINFORCEMENT:

A. Reinforcement shall be as indicated on the Drawings; see Section 032100 for Material Specification.

B. Reinforcing shall be secured in place so that it is not displaced during shotcreting.

C. Reinforcement may have contact lap splices provided preconstruction mock-up test panels demonstrate adequate coverage and encasement of bars.

D. Reinforcement shall be secured rigidly to eliminate vibration and insure proper encasement in the shotcrete.

E. Reinforcement shall be reviewed by the Testing Agency before placement of shotcrete.

F. Electrical conduits within shotcrete walls shall maintain 2 inches clear from all horizontal and vertical reinforcing. Conduits shall not be placed directly behind and parallel to any horizontal or vertical reinforcing. Secure all conduit rigidly in place to eliminate vibration during shotcrete placement.

2.4 SHOTCRETE QUALITY:

A. Wet Mixed Shotcrete:
1. Wet mixed shotcrete materials shall be mixed with a minimum of seven sacks of cement per cubic yard. The water/cement ratio shall be less than 0.5. The slump shall be such that the material will not slough or sag when placed. The slump at the pump shall be 2 inches plus or minus 1 inch. The materials shall be mixed in an approved power batch mixer equipment with a device for accurately measuring the quantity of fine aggregate. The materials shall be intimately mixed until fully blended as indicated by visual inspection. Wet mixed shotcrete shall be placed within 90 minutes after cement, admixture, and water have been mixed with the aggregate.

2.5 APPARATUS:

A. Wet Mixed Shotcrete:
1. The concrete pump shall be capable of moving the concrete to the nozzle at the proper slump. The air compressor shall be capable of maintaining sufficient nozzle velocity for all parts of the work and for the simultaneous operation of a blow pipe for clearing away rebound. All material, hose and joints shall be tight. The entire machine, apparatus, or device shall be in excellent operating condition before starting work.

2.6 SCAFFOLDING:

A. Provide safety code-approved, remotely controlled type which permits uninterrupted gunning at proper angle and distance.

2.7 WORKMEN AND CONTRACTOR'S EXPERIENCE:

A. Only experienced foremen, gunmen and nozzlemen and rodmen shall be employed and satisfactory written evidence of such experience shall be furnished to the Architect or his representative upon demand.

B. All nozzlemen shall be prequalified for this project by shooting an accepted preconstruction mock-up test panel in accordance with Section 1.03.A.2.a.

C. The Contractor must have had at least five years experience in shotcrete construction and must be able to show examples of similar installations of the shotcrete work as shown on the drawings, which he has constructed and which on investigation have been found to be completed in a satisfactory manner.

PART 3 - EXECUTION

3.1 PREPARATION OF SURFACES TO RECEIVE SHOTCRETE:

A. Forms - Use form-coating material on removable forms to prevent absorption of moisture and to prevent bond with the shotcrete. Use a non-stain material for surfaces exposed to view when construction is completed. The form-coating material shall not interfere with subsequent bonding to the shotcrete when this is required.

3.2 GROUND WIRES:

A. Ground wires shall be installed in such a manner that they accurately outline the finished surface of the shotcrete as indicated on the Drawings. They shall be located at intervals sufficient to insure proper thickness throughout. Wire shall be stretched tight and shall not be removed prior to application of the finish coat. All surfaces shall be rodded to these wires to finish tolerances.

3.3 PLACING SHOTCRETE:

A. In placing shotcrete, the materials shall be delivered at the nozzle in a constant and steady stream and when from any cause the flow is interrupted by "plugs" "blow-outs", or any intermittent separation of the air and cement-fine aggregate mixture, the nozzle shall be turned away from the work until a steady delivery is recovered.

B. Shotcrete deposited on vertical surfaces shall be shot at right angles to the surface, and shall be built up in layers of a thickness that will not slump, allowing sufficient time between layers for set to take place. All loose, fine aggregate or rebound shall be removed from the surface being shotcreted before placing succeeding layers of shotcrete. No rebound shall be used over or in anyway incorporated into the work. Rebound pockets, sags, sloughing or other defects shall be cut out and removed from the surface. If a trowel, straight edge or other implement is used to remove excessive material from the surface, care shall be exercised to prevent the shotcrete from being dragged or torn.

C. When enclosing reinforcing steel, the nozzle shall be held so as to direct the material behind the bars. Each side of each bar shall not be shot separately.

D. Wherever possible, the first layer shall entirely cover the reinforcing in order to secure it in its proper position.

E. Shotcrete shall be placed to final thickness (ground wires) in one operation, before screeding. Multiple layers of shotcrete application will not be allowed for wall less than 18" inches thick. Walls 18" thick or thicker shall not be shotcreted without approval of the architect.

F. Wet mixed shotcrete applied on vertical surfaces shall be applied to within 12 inches from the bottom of the existing concrete beam or ceiling which will form the top of the new shotcrete wall. After a period of not less than 3 hours after the application of the lower wall portion of wet mixed shotcrete, the 12 inch gap between the new shotcrete wall and the existing concrete above shall be filled with shotcrete.

G. Whenever possible the nozzle shall be held at right angles to the surface to be shotcreted and at a distance from two and one-half to three feet. The use of "puddled" shotcrete in which air

pressure is reduced and water content of the mix increased to facilitate the placing in difficult locations will not be permitted. Shotcrete shall not be placed where the stream from the nozzle cannot directly impinge on the surface on which the shotcrete is to be placed. Where shooting conditions are difficult, the proper results are to be obtained by reducing the supply of material.

H. The proportion of water to cement shall be accurately controlled so as to produce thorough and uniform hydration of the gunite which, when shot, will form a homogeneous mass containing neither sags nor dry sand formations.

I. Placing of shotcrete shall be under the continuous inspection of a qualified shotcrete inspector.

J. A second experienced nozzleman equipped with an air jet shall attend the operators whenever reinforcing steel is being enclosed.

K. Shotcrete Placement Limits
1. One story height in one day.
2. 100 feet length between construction joints.

3.4 CONSTRUCTION JOINTS:

A. Where shotcreting is terminated, particular care shall be given to formation of construction joints. They shall be square edge with 2" x 4" x 0'-8" beveled keys at 1'-6" on center and the entire joint shall be thoroughly wetted before adjacent shotcrete is placed.

B. Construction joints at tops of walls shall have a roughened surface without any loose aggregate or shotcrete. Trowel and roughen as required. Provide 2" x 4" x x0'-8" beveled keys at 1'-6" on center.

C. The film of laitance which forms on the surface of the shotcrete shall be carefully removed by wire brushing one hour after application. After 24 hours, the film shall be removed by sand blasting.

D. Joints which receive future concrete or shotcrete placement shall be sound concrete, free of all debris and cleaned and roughened by sandblasting or other approved method. Top of shotcrete walls shall be trowelled with keys formed as shown on drawings.

3.5 FINISHING:

A. Upon reaching the thickness and planes outlined by the forms and ground wires, excess material shall be sliced off with a sharp edge cutting screed to true lines. Low spots shall be built up to proper thickness. All surfaces shall be given a flash coat as soon as possible after the screeding.

B. All exposed surfaces shall have a wood float finish.

C. Finishes shall be true to plane within 1/8 inch in 10 feet as determined by a 10 foot straight edge placed anywhere on the surface in any direction. Grind or patch surface defects which are incompatible with finish.

D. Joints shall be sacked and patched on all interior surfaces and 6 inches below adjacent grade and at exterior exposed surfaces.

3.6 CURING:

A. Shotcrete shall be maintained above 40ºF (4.4ºc) and in moist condition. In initial curing, shotcrete shall be kept continuously moist for 24 hours after placement is complete by means of soaked burlap with soaker hose or spray. Alternative spray applied moisture retaining membrane may be allowed for initial curing, submit products to architect for review. Final curing shall continue for seven days after shotcrete placement or until the specified strength is obtained. Final curing shall consist of a fog spray or an approved moisture-retaining cover or membrane.

B. Method of curing shall be subject to approval of the Architect.

END OF SECTION

SECTION 035300 - CONCRETE TOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Emery-aggregate concrete floor topping.
2. Iron-aggregate concrete floor topping.

B. Related Sections:

1. Division 03 Section "Hydraulic Cement Underlayment" for polymer-modified, cementitious, self-leveling underlayments.
2. Division 09 Section "Tiling" for medium-set and thickset mortar beds for tile.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by [**manufacturer and witnessed by a qualified testing agency**] [**a qualified testing agency**], for concrete floor topping.

C. Field quality-control test reports.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

B. Mockups: Place concrete floor topping mockups to demonstrate typical joints, surface finish, bonding, texture, tolerances, and standard of workmanship.

1. Build mockups approximately 100 sq. ft. (9.3 sq. m) in the location indicated or, if not indicated, as directed by Architect.
2. If Architect determines that mockups do not meet requirements, demolish and remove them from the site and cast others until mockups are approved.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

C. Preinstallation Conference: Conduct conference at [**Project site**] <**Insert location**>.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage, mixing with other components, and application.

B. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture or other detrimental effects.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting concrete floor topping performance.

1. Place concrete floor topping only when ambient temperature and temperature of base slabs are between 50 and 86 deg F (10 and 30 deg C).

B. Close areas to traffic during topping application and, after application, for time period recommended in writing by manufacturer.

PART 2 - PRODUCTS

2.1 CONCRETE FLOOR TOPPINGS

A. Emery-Aggregate Concrete Floor Topping: Factory-prepared and dry-packaged mixture of graded, crushed emery aggregate containing not less than 50 percent aluminum oxide, not less than 24 percent ferric oxide, and not more than 8 percent silica; portland cement or blended hydraulic cement; plasticizers; and other admixtures to which only water needs to be added at Project site.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Anti-Hydro International, Inc.; A-H Emery A-1 Premix.
b. CONSPEC, by Dayton Superior; Conspec Emery Topping.
c. Dayton Superior Corporation; Emery Tuff Top.
d. L&M Construction Chemicals, Inc.; Emerytop 400.
e. Metalcrete Industries; Met-Top E.
f. US Concrete Materials, LLC; Florundum Emery 1-T Premix.
g. <**Insert manufacturer's name; product name or designation**>.

2. Compressive Strength (28 Days): [**10,000 psi (69 MPa)**] <**Insert strength**>; ASTM C 109/C 109M.

B. Iron-Aggregate Concrete Floor Topping: Factory-prepared and dry-packaged mixture of graded iron aggregate, portland cement, plasticizers, and other admixtures to which only water needs to be added at Project site.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Anti-Hydro International, Inc.; A-H Irontop.
b. BASF Construction Chemicals, LLC; Mastertop Anvil-Top 300.
c. CONSPEC, by Dayton Superior; Conplate Floor Topping.
d. EDOCO, by Dayton Superior; Burke Iron Topping.
e. Euclid Chemical Company (The); Super Euco-Top.
f. Metalcrete Industries; Metalcrete.
g. US Concrete Materials, LLC; Ferrotop.
h. <**Insert manufacturer's name; product name or designation**>.

2. Compressive Strength (28 Days): [**12,000 psi (83 MPa)**] <**Insert strength**>; ASTM C 109/C 109M.

2.2 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, 25 percent solids content, minimum.

2.3 RELATED MATERIALS

A. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, [**epoxy resin with a Type A Shore durometer hardness of 80**] [**aromatic polyurea with a Type A Shore durometer hardness range of 90 to 95**] per ASTM D 2240.

B. Joint-Filler Strips: [**ASTM D 1751, asphalt-saturated cellulosic fiber**] [**or**] [**ASTM D 1752, cork or self-expanding cork**].

C. Portland Cement: ASTM C 150, Type I or II.

D. Sand: ASTM C 404, fine aggregate passing No. 16 (1.18-mm) sieve.

E. Water: Potable.

F. Acrylic-Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

G. Epoxy Adhesive: ASTM C 881/C 881M, Type V, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements.

2.4 MIXING

A. Bonding Slurry: Mix portland cement with water to a thick paint consistency.

B. Bonding Slurry: Mix 1 part portland cement and [**1-1/2**] [**2**] [**2-1/2**] parts sand with water[**and an acrylic-bonding agent according to manufacturer's written instructions**] to a thick paint consistency.

C. Floor Topping: Mix concrete floor topping materials and water in appropriate drum-type batch machine mixer or truck mixer according to manufacturer's written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for conditions affecting performance of concrete floor topping.

B. Verify that base concrete slabs comply with scratch finish requirements specified in Division 03 Section "Cast-in-Place Concrete."

C. Verify that base slabs are visibly dry and free of moisture. Test for capillary moisture by the plastic sheet method according to ASTM D 4263.

D. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Existing Concrete: Remove existing surface treatments and deteriorated and unsound concrete. Mechanically abrade base slabs to produce a heavily scarified surface profile with an amplitude of 1/4 inch (6 mm.)

1. Prepare and clean existing base slabs according to concrete floor topping manufacturer's written instructions. Fill voids, cracks, and cavities in base slabs.
2. Mechanically remove contaminants from existing concrete that might impair bond of floor topping.
3. Saw cut contraction and construction joints in existing concrete to a depth of 1/2 inch (13 mm) and fill with semirigid joint filler.
4. To both sides of joint edges and at perimeter of existing base slab [**mechanically remove a 4-inch- (100-mm-) wide and 0- to 1-inch (0- to 25-mm-) deep, tapered wedge of concrete and retexture surface**] [**install concrete nails in manufacturer's recommended staggered pattern**].

B. Install joint-filler strips where topping abuts vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with topping surface, unless otherwise indicated.
2. Terminate full-width, joint-filler strips 1/2 inch (13 mm) below topping surface where joint sealants, specified in Division 07 Section "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

3.3 FLOOR TOPPING APPLICATION

A. Start floor topping application in presence of manufacturer's technical representative.

B. Monolithic Floor Topping: After textured-float finish is applied to fresh concrete of base slabs specified in Division 03 Section "Cast-in-Place Concrete," place concrete floor topping while concrete is still plastic.

C. Deferred Floor Topping: Within 72 hours of placing base slabs, mix and scrub bonding slurry into dampened concrete to a thickness of 1/16 to 1/8 inch (1.6 to 3 mm), without puddling. Place floor topping while slurry is still tacky.

D. Existing Concrete: Apply epoxy-bonding adhesive, mixed according to manufacturer's written instructions, and scrub into dry base slabs to a thickness of 1/16 to 1/8 inch (1.6 to 3 mm), without puddling. Place floor topping while adhesive is still tacky.

E. Place concrete floor topping continuously in a single layer, tamping and consolidating to achieve tight contact with bonding surface. Do not permit cold joints or seams to develop within pour strip.

1. Screed surface with a straightedge and strike off to correct elevations.
2. Slope surfaces uniformly where indicated.
3. Begin initial floating using bull floats to form a uniform and open-textured surface plane free of humps or hollows.

F. Finishing: Consolidate surface with power-driven floats as soon as concrete floor topping can support equipment and operator. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until concrete floor topping surface has a uniform, smooth, granular texture.

1. Hard Trowel Finish: After floating surface, apply first trowel finish and consolidate concrete floor topping by power-driven trowel without allowing blisters to develop. Continue troweling passes and restraighten until surface is smooth and uniform in texture.

a. Finish surfaces to specified overall values of flatness, F(F) 25; and levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and levelness, F(L) 15, and [**measure**] [**notify independent testing agency to permit measurement**] within 24 hours according to ASTM E 1155 (ASTM E 1155M) for a randomly trafficked floor surface.

b. Finish and measure surface so gap at any point between surface and an unleveled freestanding 10-foot- (3-m-) long straightedge, resting on 2 high spots and placed anywhere on the surface, does not exceed 1/4 inch (6 mm).

G. Construction Joints: Construct joints true to line with faces perpendicular to surface plane of concrete floor topping, at locations indicated or as approved by Architect.

1. Coat face of construction joint with epoxy adhesive at locations where concrete floor topping is placed against hardened or partially hardened concrete floor topping.

H. Contraction Joints: Form weakened-plane contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3-mm-) wide joints into concrete floor topping when cutting action will not tear, abrade, or otherwise damage surface and before random contraction cracks develop.

1. Form joints in concrete floor topping over contraction joints in base slabs, unless otherwise indicated.
2. Construct contraction joints for a combined depth equal to topping thickness and not less than one-fourth of base-slab thickness.
3. Construct contraction joints for a depth equal to one-half of concrete floor topping thickness, but not less than 1/2 inch (13 mm) deep.

3.4 PROTECTING AND CURING

A. General: Protect freshly placed concrete floor topping from premature drying and excessive cold or hot temperatures.

B. Evaporation Retarder: Apply evaporation retarder to concrete floor topping surfaces in hot, dry, or windy conditions before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying floor topping, but before float finishing.

C. Begin curing immediately after finishing concrete floor topping. Cure by one or a combination of the following methods, according to concrete floor topping manufacturer's written instructions:

1. Moisture Curing: Keep surfaces continuously moist for not less than 7 days with [**water**] [**continuous water-fog spray**] [**or**] [**absorptive cover, water saturated and kept continuously wet. Cover topping surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers**].
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in two coats in continuous operations by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.5 JOINT FILLING

A. Prepare and clean contraction joints and install semirigid joint filler, according to manufacturer's written instructions, once topping has fully cured.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semirigid joint filler full depth of contraction joints. Overfill joint and trim semirigid joint filler flush with top of joint after hardening.

3.6 REPAIRS

A. Defective Topping: Repair and patch defective concrete floor topping areas, including areas that have not bonded to concrete substrate.

3.7 FIELD QUALITY CONTROL

A. Testing Agency: [**Owner will engage**] [**Engage**] a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Testing Services: Testing and inspecting of completed applications of concrete floor toppings shall take place in successive stages, in areas of extent and using methods as follows:

1. Sample Sets: At point of placement, a set of 3 molded-cube samples shall be taken from the topping mix for the first 1000 sq. ft. (93 sq. m), plus 1 set of samples for each subsequent 5000 sq. ft. (464 sq. m) of topping, or fraction thereof, but not less than 6 samples for each day's placement. Samples shall be tested according to ASTM C 109/C 109M for compliance with compressive-strength requirements.
2. Concrete floor topping shall be tested for delamination by dragging a steel chain over the surface.
3. Concrete floor topping shall be tested for compliance with surface flatness and levelness tolerances.

C. Remove and replace applications of concrete floor topping where test results indicate that it does not comply with specified requirements.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

END OF SECTION 035300

SECTION 039300 - CONCRETE PATCH REPAIR

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Furnish all materials, labor, tools, equipment and incidentals required to make all concrete patch repairs as detailed on the Drawings and as specified herein. The Engineers will direct the Contractor where to perform concrete patch repairs.

B. Concrete Patch Repairs are classified as follows:
1. Type 1- Repair to be used, as directed by the Engineer, for up to 2.5 inch deep spalled, delaminated or deteriorated concrete.
2. Type 2 - Repair to be used, as directed by the Engineer, for greater than 2.5 inch deep spalled, delaminated or deteriorated concrete.
3. Type 3- Repair to be used, as directed by the Engineer, for greater than 2.5 inch deep spalled, delaminated or deteriorated concrete when reinforcing steel needs to be replaced.

C. Measurement and Payment Procedures:
1. Work documented on the contract drawings shall be included in the base bid.
2. Undocumented Concrete Patch Repair Type 1 discovered during construction will be measured separately for payment and be paid for at contact unit price per cubic foot of repair area. Concrete patch repair Type 1 will be measured and paid for only for Concrete patch repair Type 1 that is directed by the Engineer to be performed. The quantity for each patch shall be determined by measuring the surface area of the patch area and then measuring several depths to determine an average depth of patch. Each patch quantity shall be jointly measured and agreed upon by the Contractor and the Engineer following the removal of the deteriorated concrete and prior to the placement of the patch.
3. Undocumented Concrete Patch Repair Type 2 discovered during construction will be measured separately for payment and be paid for at contact unit price per cubic foot of repair area. Concrete patch repair Type 2 will be measured and paid for only for Concrete patch repair Type 2 that is directed by the Engineer to be performed. The quantity for each patch shall be determined by measuring the surface area of the patch area and then measuring several depths to determine an average depth of patch. Each patch quantity shall be jointly measured and agreed upon by the Contractor and the Engineer following the removal of the deteriorated concrete and prior to the placement of the patch.
4. Undocumented Concrete Patch Repair Type 3 discovered during construction will be measured separately for payment and be paid for at contact unit price per cubic foot of repair area. Concrete patch repair Type 3 will be measured and paid for only for Concrete patch repair Type 3 that is directed by the Engineer to be performed. The quantity for each patch shall be determined by measuring the surface area of the patch area and then measuring several depths to determine an average depth of patch. Each patch quantity shall be jointly measured and agreed upon by the Contractor and the Engineer following the removal of the deteriorated concrete and prior to the placement of the patch.

1.2 REFERENCES:

A. Codes, Regulations and Referenced Standards:
1. Codes and regulations of the jurisdictional authorities.
2. ASTM C-881: “Standard Specification for Epoxy –Resin- Base Bonding Systems for Concrete”.
3. ACI: Unless otherwise specified, ACI requirements govern the performance if the work of this section.
4. ASTM C 109 “Test Method for Compressive Strength of Hydraulic Cement Mortars”.
5. ASTM C157 “Test Method for Length Change of Hardened Cement Mortar and Concrete”.
6. ASTM C 882 “Test Method for Bond Strength of Epoxy- Resin Systems Used with Concrete by Slant Shear”.

1.3 SUBMITTALS

A. Shop Drawings:
1. GR.-16 titled Shop And Working Drawings applies. Submit specification sheet on the products including names, sources and descriptions.
2. The Contactor shall submit the method of performing pull- off testing of repair material and shall submit information on testing equipment and accessory materials to be used in test.

B. Samples:
1. Submit samples of materials being used when requested by the Engineer.

C. Certifications:
1. The contactor shall submit laboratory test reports and mill or manufacturer’s certifications verifying that ingredients conform to specified requirements and have a six months residual shelf life when shipped.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping:
1. Deliver materials to the site appropriately packaged and labeled to indicated manufacturer’s name, type, grade and color.

B. Storage and Protection
1. Store materials in accordance with manufacture’s precautions
2. Follow manufacturer’s precautions for handing components

PART 2 - PRODUCTS

2.1 MATERIALS

A. Patch material shall be high-strength, non-shrink, non- metallic grout.

B. Bonding agent shall be per ASTM C-881 and as follows:

1. Epoxy bonding compound shall be Sikadur 32, Hi-Mod by Sika; Concresive 1001 – LPL by Structa –Bond, Inc, ; Dural- Bond by Dural International Corp,; Meta Bond HM by American Metaseal Company; or approved equivalent.
2. The compound shall be a tow component epoxy resin system, with 100 percent reactive components and 100 percent solids.
3. The compound shall be new and shall be used within the shelf life limitations marked on each container.

PART 3 - EXECUTION

3.1 SURFACE PREPARATIONS

A. The perimeter of the damaged area shall be score cut to a minimum depth of 0.50 inch and a maximum depth so as not to cut any existing reinforcing steel. Existing concrete shall be chipped up to the score line so that the minimum thickness of repair mortar is 0.50 inch. Area requiring repair should be modified to provide for simple layouts. Excessive or complex edge condition results in shrinkage stress concentration and cracks. Care shall be taken while saw cutting and chipping around existing reinforcing steel to avoid damage. Any existing reinforcing steel damaged shall be replaced as instructed by the Engineer at no additional cost.

B. The entire area to be repaired shall have all laitance, foreign material and all loose, broken, softened and acid contaminated concrete removed by chipping (only. 15 and 30 pound pneumatic chipping hammers to be used with pointed shipping ends, 30 pound hammer limited to large areas and away from reinforcement) and/or hydroblasting. The surface shall be further roughened to ¼-inch amplitude textured surface (ridge to valley shall be approximately ¼-inch) as specified herein. Where repair mortar is used, any additional surface preparations steps recommended by the manufacturer shall be performed.

C. Where existing reinforcing bars are exposed, concrete shall be removed to a minimum of one inch all around the bars. If the existing bars are damaged, notify the Engineer.

D. The recommendations of both the repair material and bonding agent manufacturers shall be followed.

E. Epoxy Bonding of Concrete:
1. After roughening, surfaces shall be recleaned with either a stream of water (unoccupied spaces only) or clean compressed air.
2. The roughened/cleaned concrete surfaces shall be saturated with clean water. Pools shall be subsequently removed by clean air jet.
3. The prepared concrete surfaces shall be coated with an epoxy bonding-agent compound per manufacturer’s recommendations
4. The patch material shall be deposited per these specifications and bonded to the epoxy compound after the compound has been cured per the manufacturer’s recommendations.

3.2 PLACEMENT, COMPACTING, FLOATING AND FINISHING

A. The procedures recommended by the manufacturer for the mixing and placement of the non-shrink grout shall be followed

B. After the initial nixing of the non-shrink grout, additional water shall not be added to change the consistency should the mix begin to stiffen.

C. Non-shrink shall be place to a minimum thickness as recommended by the manufacturer but not less than 0.50 inch.

3.3 CURING

A. Curing shall follow immediately behind the final finish. Curing shall be performed by a combination of covering the concrete with a layer of wet burlap and the application of a liquid membrane-forming curing compound. The sequence, at the contractor's option, shall be selected to retain moisture in the slab for a minimum of 7 days.

3.4 DEFECTIVE REPAIR

A. A repair will be considered defective if a Schmidt-Hammer test gives results less than 3500 psi for repair mortars and 3000 psi for topping grout at any location in seven days, or if the repair is not properly finished and within specified tolerances.

B. Concrete repair material in place that is deemed structurally defective must be removed.

C. Replace, strengthen or correct defective concrete repair material as directed.

END OF SECTION

SECTION 039400 - CONCRETE CRACK REPAIR

PART 1 - GENERAL

1.1 SUMMARY:

A. Furnish all materials, labor, tools, equipment and incidentals required to make all concrete crack repairs as detailed on the Drawings and as specified herein. The Engineer will direct the Contractor where to perform concrete crack repairs.

B. Concrete Crack Repairs are classified as follows:
1. Type 1- Repair to be used, as directed by the Engineer, for 1/16” to 1/8” wide structural cracks.
2. Type 2- Repair to be used, as directed by the Engineer, for 1/16” to 1/8” wide structural cracks, with exposed surfaces ground smooth for finishes.

C. Related Sections:
1. Section 039300: Concrete Patch Repair

D. Measurement and Payment Procedures:
1. Work documented on the contract drawings shall be included in the base bid.
2. Undocumented Concrete Crack Repair Type 1 discovered during construction will be measured separately for payment and be paid for at the contract unit price per linear foot of repair length. Concrete Crack Repair Type 1 will be measured and paid for only for Concrete Crack Repair Type 1 that is directed by the Engineer to be performed.
3. Undocumented Concrete Crack Repair Type 2 discovered during construction will be measured separately for payment and be paid for at the contract unit price per linear foot of repair length. Concrete Crack Repair Type 2 will be measured and paid for only for Concrete Crack Repair Type 2 that is directed by the Engineer to be performed.

1.2 REFERENCES

A. Codes, Regulations and Referenced Standards:
1. ASTM C-881: “Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.”

1.3 SUBMITTALS

A. The Contractor shall furnish recent independent laboratory tests showing compliance with requirements specified. Certification or affidavits will not be acceptable.

B. The Contractor shall furnish manufacturer’s literature describing product and instructions for use.

C. General Requirement titled “Shop And Working Drawings” applies.

1.4 QUALITY ASSURANCE

A. Qualifications:
   1. The Contractor shall furnish the name of all subcontractors that he proposes to use for this work including necessary evidence and experience records to ascertain their qualifications in the application of the crack repair material. The qualifications shall include:
      a. A minimum of five years experience in applying crack repair materials similar to those specified.
      b. A list of the five previous jobs that successfully utilized the application of the crack repair material.
      c. A letter from the crack repair material manufacturer, on the manufacturer's letterhead, signed by an officer of the company, stating that the applicator has been trained in the proper techniques for the proper preparation of the surface, and proper methods of mixing, placing, curing, caring and application of the manufacturer's product.

1.5 DELIVERY, STORAGE AND HANDLING

A. Product shall be delivered in moisture proof containers with the manufacturer's name, product name and general instructions for placement printed on the container.

B. Product shall be stored and handled per manufacturer's instructions and protected from damage and freezing. Material that freezes shall be discarded.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Concrete Crack Repair Types 1 and 2 — Product shall be very low viscosity, low VOC, high strength moisture tolerant epoxy adhesive.
   1. Product shall be:
      a. Sikadur *35,* Hi-Mod LV, as manufactured by Sika Corporation.
      b. Eucopoxy Injection Resin, as manufactured by The Euclid Chemical Company.
      c. Or Equal.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION:

A. Crack must be clean and sound, free of standing water and in accordance with the Manufacturer's written instructions regarding surface preparation. Removal of all dust, grease, and foreign particles from cracks shall be done with compressed air.

3.2 MIXING:

A. Product shall be mixed in strict accordance with the manufacturer's written instructions.

B. At most mix only that quantity of material that can be placed within 20 minutes after mixing.

3.3 APPLICATION:

A. All work shall be done in strict accordance with the manufacturer's recommendations, including special procedures for hot and cold weather application.

B. At the request of the Engineer, the manufacturer's representative shall be called to the job site for consultation regarding detailed use of the product.

C. At enclosed, occupied spaces, seal area and keep under constant negative pressure as required to minimize odor.

3.4 PROCEDURES:

A. Concrete Crack Repair Types 1 and 2
   1. All cracks identified by the Engineer for Type 1 or 2 Crack Repair shall have resin product pressure injected into crack. The manufacturer's installation instructions and recommendations shall be followed.
   2. Location of Injection Ports: Injection ports shall be spaced as recommended by the manufacturer and as needed to insure complete penetration of the joint of crack with the injected material. Spacing of injection ports shall not exceed 2 feet.
   3. Drilling Ports: Holes for injection ports shall be drilled to the depth needed for proper distribution of the injected material. Care shall be taken to not damage any reinforcing steel.
   4. Port Penetration: Holes for injection ports shall be cleaned of all debris and fitted with an injection fitting as provided by the manufacturer of the injected material, or equal. The injection fitting shall be installed as per manufacturer's instructions and will remain in place until injection work has been completed at that area. Caps or valves will be installed at the injection ports to prevent back flow of the uncured injected material after it has been injected.
   5. Injection Produces:
      a. The Contractor shall follow the instructions of the manufacturer and their representatives for all mixing and injection procedures.
      b. All cracks shall be sealed at the surface where needed to provide for complete penetration of the injected material and prevent loss of material.
      c. Prior to sealing material injection, water shall be injected into the ports in order to flush the crack clean and to verify continuity between adjacent ports. Water shall be injected into each of the ports until it begins to flow from an adjacent or nearby port.
      d. If the water injection procedure indicates the potential presence of voids within members or behind members resting against soil, the Engineer shall be notified immediately.
      e. Beginning at the lowest injection port, inject the sealing material until it begins to flow from an adjacent or nearby port. Repeat the process until the crack is completely filled. In general, the port to port travel of the injection will be from low to high in a continuous operation.
      f. If port to port continuity does not occur at locations where continuity was verified through water injection, mark location and notify the Engineer.
      g. Avoid sudden application of high pressures during the injection process.
      h. After completion of the injection operation, all ports and surface sealing materials shall be removed so as to leave an undamaged surface.

B. Finishing Concrete Crack Repair Type 2
   1. Grind all exposed surfaces smooth and flush with adjacent concrete.

END OF SECTION

SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 DESCRIPTION:

A. Work Included: Items of structural steel and miscellaneous metal and related accessory items required for the Project and which are not specified elsewhere. Such items include but are not limited to:
1. Items of structural steel.
2. Metal connectors requiring special fabrication.
3. Metal railings and brackets (except railings and brackets related to prefabricated metal building stairs and so specified therewith).
4. Metal ladders.
5. Trench gratings including frames.
6. Manhole frames/lids (sand and sump pits).
7. Boots for rainwater leaders.
8. Bollards.
9. Angle supports for elevator sills.
10. Metal grid grillwork.
11. Perforated cover for elevator sump pit.
12. Sleeves for miscellaneous metal items.
13. Grouting required for setting miscellaneous metal items.

B. Related Work Specified Elsewhere:
1. Gratings for site drainage structures (beyond building lines) are a part of the site work.
2. Concrete fill for bollards and grout for structural steel setting plates: See Cast-In-Place Concrete.
3. Anchorage for precast concrete trim items: See Concrete, Architectural Precast.
4. Metal Stairs and Stairs.
5. Strand Barriers.
6. Metal Seismic Joint Covers.
7. Preformed Metal Roofing.
8. Metal stud framing and furring systems: See Metal Framing and Support Systems - Non-Load Bearing.
9. Finish painting: See Painting.

1.2 REFERENCES, CODES AND STANDARDS:

The following references and standards are hereby made a part of this Section and structural steel and miscellaneous metal work 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 or governing rules and regulations.

A. American institute of Steel Construction (AISC).
1. “Steel Construction Manual, 14th Edition”, AISC 325-11.
2. “Specification for Structural Steel for Buildings”, AISC 360-10.

B. American Welding Society's (AWS): “Structural Welding Code” (AWS D1.1-10).

C. National Assn. of Architectural Metal Manufacturers (NAAMM): "Pipe Railing Manual"

D. Steel Structures Painting Council (SSPC): “Surface Preparation Specifications (Vol. 2, Painting Manual)”.

E. California Building Code, 2013 Edition.

1.3 QUALIFICATIONS: Welding procedures, welders, and tackers for structural metal work shall be qualified in accord with AWS Building Code.

1.4 SUBMITTALS: Comply with requirements of Shop Drawings, Product Data and Samples Section.

A. Shop Drawings: Shop drawings shall show dimensions, sizes, thicknesses, gages, finishes, joining, attachments, and relationship of work to adjoining construction. Where items must fit and coordinate with finished surfaces and/or constructed spaces, take measurements at site and not from Drawings. Where materials must be set to exact locations to receive work, furnish assistance and direction necessary to permit other trades to properly locate their work. Where welded connectors and inserts are required to receive work, shop drawing shall show exact locations required, and such drawings shall be furnished to the trades responsible for installing the connectors or inserts. Catalog work sheets showing illustrated cuts of item to be furnished, scale details and dimensions may be submitted for standard manufactured items. Indicate welds by AWS Welding Symbols.

B. Proof of Compliance: Unless otherwise noted, submit the following in four (4) copies.
1. Certified ladle analysis for steel used for structural purposes.
2. Certified reports of tensile properties and bend tests for steel shapes, bars and plates used for structural purposes.
3. Certificates of conformance for steel tubing where used for structural purposes.

C. Samples: Submit for selection and approval of enamel finish for metal grid grillwork.

PART 2 - PRODUCTS

2.1 BASIC MATERIALS AND ACCESSORIES:

A. Standard Structural Steel Shapes, Bars and Plates: ASTM A36

B. Architectural and Miscellaneous Steel Items: ASTM A283 grade optional.

C. Steel Tubing: ASTM A 500 welded or seamless, grade as required for proper strength except that where used structurally, tubing shall have a strength of not less than Fy = 46 ksi.

D. Steel Pipe: ASTM A53, Type E or S, Grade B for structural pipe; Grade A or Type F for railings where bending is required.

E. Fastenings (General): Furnish Bolts, nuts, screws, clips, washers and any other fastenings necessary for proper erection of items specified herein. Use stainless steel or hot dip galvanized on exterior. On interior, match adjacent material.

F. Welding Electrodes: As permitted by AWS D 1.1. Where exposed and unpainted, select filler metal to match base metal.

G. Paint (Primer): Fed. Spec. TT-P-86, Type II or TT-P-645 (zinc chromate).

H. Non-Shrink Grout: Sauereisen No. F-100, Euclid "Euno NS", Upco "Upcon", 5-Star, Master Builders "Masterflow 713", or approved equal, non-metallic, non-staining, premixed grout having a min. compressive strength of 6,800 psi (28 days).

I. Anchor Cement: Quick setting type conforming to ASTM C 595, factory prepared with accelerator.

2.2 STANDARD CATALOG PRODUCTS:

A. Ferrous Metal Handrail Brackets: Curved top, 3" projection unless otherwise noted, galvanized, machine screw anchorage with expansion wedges; Julius Blum, J.G. Braun, or approved equal.

B. Metal Grid Grillwork: Orsogril (Ametco Mfg. Corp., Willoughby, OH or A&T Iron Works, Inc., New Rochelle, NY), or approved equal, "Sterope" Model, welded mild steel grid with 1" x 1/8" (nom.) vertical bars spaced 2-7/16" o.c. and 3/16" o.d. horizontal ties spaced 5-3/16" o.c. Include all posts, framing bars, anchors and theft-proof fasteners.

C. Trench Gratings: Neenah Foundry Co. R-4999-BX, equivalent McKinley Iron Works, or approved equal, cast iron, Type P slotted grate with Type X frame.

D. Manhole Frames/Lids (Sand and Sump pits): Neenah Foundry Co. R-6662-UP, equivalent McKinley Iron Works, or approved equal, cast iron, 54" x 54" size (inside dimensions) frame with loose lid.

E. Rainwater Leader (Downspout) Boots: McKinley Iron Works Type DS4 (1st Floor) and Type DS8 (4th Floor), equivalent Neenah Foundry Co., or approved equal, cast iron, 3" x 4" x 4'-0".

2.3 SPECIALLY FABRICATED PRODUCTS:

A. Tubular Railings:
1. Conform to requirements of NAAMM "Pipe Railing Manual" where same covers points not otherwise detailed or specified.
2. Members may be of pipe or of round tubing having equivalent size and strength.
3. Size: As noted on Drawings.
4. Make bends to uniform radius, free from buckles and twists, with smooth finished surfaces.
5. Fabricate in largest sections practicable, shop joints accurately coped or mitered as required and welded all around, field joints with concealed compression fittings or welded and ground smooth. Welds shall be thoroughly fused without undercutting or overlap. Remove weld spatter, grind exposed welds smooth and contour surfaces to match adjacent.
6. Return rails to wall where possible. Where railing ends cannot return, close ends with welded cap or prefabricated flush fitting. Ease sharp edges.

B. Metal Ladders: Unless otherwise indicated on the Drawings, Metal ladders shall be of welded steel construction with 3/8" x 2-1/2" (min.) flat steel bar rails approximately 18" apart with 3/4" round steel bar rungs spaced approximately 12" o.c., let into rails and fully welded in place.

Provide welded angle brackets at top, bottom and at intermediate supports not to exceed 6 foot spacing. Securely fasten to building structure. Ladders shall conform to requirements of General Industrial Safety Orders, Division of Industrial Safety, State of California. Stock aluminum fixed ladders manufactured by O'Keeffe's Inc., Russo Architectural Metals Inc., or approved equal, and conforming to above dimensions and safety requirements are acceptable.

2.4 FINISHES: Where used in this Section, "Exterior" shall be construed to include all exposures except within totally enclosed spaces.

A. Exterior Ferrous Metal Not Otherwise Specified and Interior Ferrous Metal Exposed to Continuing Moisture: Welds, burrs, and rough surfaces ground smooth after fabrication and completed assembly hot dip galvanized. Exceptions are:
1. Castings: Smooth shot blasted finish with one coat of shop primer.

B. Metal Grid Grillwork: Referenced manufacturer's standard hot dip galvanized and polyurethane enamel finish on all components, one standard color as selected.

C. Interior Ferrous Metal: Welds, burrs, and rough surfaces ground smooth and completed assembly cleaned and given one shop prime coat of paint.

D. Exposed Fastenings: Match color and finish of adjacent material.

2.5 FABRICATION - STRUCTURAL STEEL:

A. Fabricate items of structural steel in accord with applicable provisions of Section 1.02 - Reference Standard 1.02A, California Building Code and with modifications and other specific requirements described herein.

B. Fabricate and assemble structural steel in the shop to the greatest extent possible. Do shearing and flame cutting carefully and accurately using machine equipment where possible.

C. Structural connections shall be welded or bolted as indicated. Shop connections not otherwise shown shall be welded. Eccentric connections are not permitted unless shown in detail on shop drawings.

D. Provide bearing plates for members bearing on masonry and concrete.

E. Drift pins may be used for assembling parts provide metal is not distorted or holes enlarged. Holes requiring enlargement to admit bolts shall be reamed. Misaligned holes will subject members to rejection.

F. No gas cutting of structural steel will be allowed without prior written approval of Architect.

G. Structural Welding:
1. Perform welding in accord with appropriate Sections of Reference Standards 1.02A and 1.02B and governing building code.
2. Unless otherwise noted or permitted, do welding by shielded arc method.
3. In addition to specific requirements of Drawings, details of welded joints shall comply with requirements for joints which are accepted without qualification tests under the AWS D1.1 Structural Welding Code.
4. Preparation of Surfaces: Surfaces to be welded shall be free of loose scale, slag, rust, grease, paint, and any other foreign material.

5. Welding Equipment: Welding equipment to be used in each case shall be acceptable to welding inspector. Use equipment with suitable devices to regulate speed and manually adjust operating amperage and voltage. The amperage capacity shall be sufficient to overcome line drop and to give adequate welding heat.

PART 3 - EXECUTION

3.1 CONDITION OF SURFACES: Inspect surfaces to receive metal work and report any defects which would interfere with the installation. Starting work implies acceptance of surfaces as satisfactory.

3.2 WORKMANSHIP:

A. General Requirements:
1. Erect items of structural steel in accord with applicable provisions of Reference Standard 1.02A, International Building Code, and with modifications and other specific requirements described herein.
2. Verify measurements at job.
3. Coordinate metal work with adjoining work for details of attachment, fittings, etc. Do cutting, shearing, drilling, punching, threading, tapping, etc., required for metal or for attachment of adjacent work. Drill or punch holes; do not use cutting torch. Shearing and punching shall leave true lines and surfaces.
4. Conceal fastenings where practicable. Thickness of metal and details of assembly and supports shall give ample strength and stiffness. Form joints exposed to weather to exclude water.
5. Make permanent connections in ferrous metal surfaces using welds where possible; do not use bolts or screws where they can be avoided.
6. Provide lugs, clips, anchors and miscellaneous fastenings necessary for the complete assembly and installation.
7. Set work plumb, true, rigid, and neatly trimmed out. Miter corners and angles of exposed moldings and frames unless otherwise noted.
8. Do grouting of frames, plates, bolts, and similar items with non-shrink grout.
9. Set railings and similar items shown or required to be set in concrete in sleeves with molten lead or quick-setting anchor cement. Where anchor cement is utilized, prepare and use cement in accord with manufacturer's directions. Unless otherwise noted, sleeves shall be not less than 5" long and shall be sized for approximately 1/4" clearance all around. Brace railings until lead or cement sets. Remove excess and leave 1/8" build-up sloped away from post.
10. Castings subject to foot or vehicular traffic shall have bearing surfaces machined to prevent rocking and rattling. Cast iron gratings and manhole frames shall be bolted or otherwise securely fastened to frames prior to installation in concrete and shall remain so until concrete has set.
11. Where items must be incorporated or built into adjacent work, deliver to trade responsible for such work in sufficient time that progress of work is not delayed. Be responsible for proper location of such items.
12. Protect dissimilar metals from galvanic corrosion.

B. Welding:
1. Perform welding in accord with AWS D 1.1, Structural Welding Code.
2. Welds shall be made only by operators experienced in performing the type of work indicated.

3. Welds normally exposed to view in the finished work shall be uniformly made and ground smooth.
4. Where welding is done in proximity to glass or finished surfaces shall be protected from damage due to weld sparks, spatter, or tramp metal.

C. Bolted, Screwed, and Riveted Connections:
1. In general, use bolts for field connections only and then only as detailed. Provide washers under heads and nuts bearing on wood. Draw nuts tight and upset threads of permanent connections to prevent loosening. Use beveled washers where bearing is on sloped surfaces.
2. Where screws must be used for permanent connections in ferrous metal, use flat head type, countersunk, with screw slots filled and finished smooth and flush.
3. Where rivets are used, they shall be machine driven, tight, heads centered, countersunk, and finished flush and smooth.

D. Surface Treatment and Protective Coatings:
1. Cleaning: Thoroughly clean mill scale, rust, dirt, grease and other foreign matter from ferrous metal prior to any galvanizing or painting. Conditions which are too severe to be removed by hand cleaning methods shall be cleaned as per SSPC "Surface Preparation Specifications", "Solvent Cleaning, SSPC-SP 1"; "Power Tool Cleaning, SSPC-SP 3"; or "Brush-Off Blast Cleaning, SSPC-SP7", as required.
2. Painting: After material has been properly cleaned and treated, apply shop prime coat of paint to all surfaces except those encased in concrete or masonry. Apply paint as per manufacturer's directions. Spot paint abrasions and field connections after assembly. Shop coat shall be dry prior to shipment to job site. Unless otherwise specified or directed, do not apply shop prime coats or any stenciled or painted identification markings to any galvanized surfaces.

3. Galvanizing: Conform to ASTM A123 for rolled, pressed and forged shapes, plates, bar and strip and assembled steel products and A153 for hardware items. Conform to ASTM A384 and A385 (Recommended Practices) pertaining to galvanizing assembled steel products. Unless otherwise permitted, do galvanizing after fabrication, in largest sections practicable. Where galvanizing is removed by welding or other assembly procedure, touch-up welds and abraded areas with zinc-rich paint.

3.3 PROTECTION AND CLEANING: Remove soil and foreign matter from finished surfaces and apply such protective measures as may be required to prevent damage or discoloration of any kind until acceptance of Project. Protection of work and initial cleaning shall be the responsibility of each installer or erector until the installation is finally completed, whereupon the responsibility for subsequent protection and final cleaning shall pass to the General Contractor for the entire Project.

3.4 QUALITY CONTROL:

A. Tests and inspections of structural steel work shall be performed by qualified individuals, engineering companies or testing laboratories who shall perform those special inspections required by AISC 360, Section 1705.2 of the California Building Code, those tests and inspections specified below and such other tests and inspections as the Architect or Owner may require to establish the acceptability of the work. Testing and inspection services shall be retained by the Owner at his expense except as follows:
1. When tests or inspections reveal failure of materials to meet contract requirements, costs for subsequent tests and inspections will be deducted from the Contract Price.
2. Costs made necessary by excessive inspection time shall be deducted from the Contract Price.

B. Where certified analysis and/or test reports required under "Submittals" are not furnished, or where inspecting agency cannot identify the material or where the source is questionable, material will be treated to determine compliance with Specifications. Costs of tests therefore shall be paid by the Owner but deducted from the Contract Price.

C. Inspection of shop and field welding shall be in accord with AWS D1.1, AISC 360 and Table 1705.2.2 of the California Building Code.

D. Material required for laboratory tests shall be furnished by Contractor, free of additional charges, FOB the testing laboratory.

END OF SECTION

SECTION 05 73 00 - DECORATIVE METAL RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Steel and iron decorative railings**.**

B. Related Sections:
   1. Division 06 Section "Rough Carpentry" for wood blocking for anchoring railings.
   2. Division 06 Section “Interior Architectural Woodwork" for wood railings.

1.3 DEFINITIONS

A. Railings: Guards, handrails, and similar devices used for protection of occupants at open-sided floor areas, pedestrian guidance and support, visual separation, or wall protection.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design railings, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:
   1. Steel: 72 percent of minimum yield strength.

C. Structural Performance: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

   1. Handrails and Top Rails of Guards:

      a. Uniform load of 50 lbf/ft. applied in any direction.
      b. Concentrated load of 200 lbf applied in any direction.
      c. Uniform and concentrated loads need not be assumed to act concurrently.

   2. Infill of Guards:

      a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
      b. Infill load and other loads need not be assumed to act concurrently.

D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.5 SUBMITTALS

A. Product Data: For the following:
   1. Grout, anchoring cement, and paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples for Verification: For each type of exposed finish required.

   1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
   2. Fittings and brackets.
   3. Welded connections.
   4. Assembled Samples of railing systems, made from full-size components, including top rail, post, handrail, and infill. Show method of finishing members at intersections. Samples need not be full height.

D. Welding certificates.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of railing from single source from single manufacturer.

B. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including structural analysis, preconstruction testing, field testing, and in-service performance.

   1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

C. Product Options: Drawings indicate size, profiles, and dimensional requirements of railings and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."

   1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

D. Welding Qualifications: Qualify procedures and personnel according to the following:

   1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

   1. Build mockups for each form and finish of railing consisting of two posts, top rail, infill area, and anchorage system components that are full height and are not less than 24 inches in length.

F. Preinstallation Conference: Conduct conference at Project site.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.8 COORDINATION AND SCHEDULING

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for railings. 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.

C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not suit structural performance requirements.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Same metal and finish as supported rails unless otherwise indicated.

2.2 STEEL AND IRON

A. Tubing: ASTM A 500 (cold formed) or ASTM A 513.

B. Bars: Hot-rolled, carbon steel complying with ASTM A 29/A 29M, Grade 1010.

C. Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.3 FASTENERS

A. Fastener Materials: Unless otherwise indicated, provide the following:
   1. Uncoated Steel Components: Plated-steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating where concealed; Type 304 stainless-steel fasteners where exposed.
   2. Galvanized-Steel Components: Plated-steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating.

3. Dissimilar Metals: Type 316 stainless-steel fasteners.

B. Fasteners for Anchoring to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

C. Provide concealed fasteners for interconnecting railing components and for attaching railings to other work unless otherwise indicated.

1. Provide square or hex socket flat-head machine screws for exposed fasteners unless otherwise indicated.

D. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.

2.4 MISCELLANEOUS MATERIALS

A. Wood Rails: Hardwood rails complying with Division 06 Section "Interior Architectural Woodwork."

B. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

D. Shop Primers: Provide primers that comply with Division 09 painting Sections. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

E. Shop Primer for Galvanized Steel: Water-based galvanized metal primer complying with MPI#134.

F. Intermediate Coats and Topcoats: Provide products that comply with Division 09 painting Sections.

G. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.5 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate. Locate weep holes in inconspicuous locations.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Connections: Fabricate railings with welded or nonwelded connections unless otherwise indicated.

H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds: no evidence of a welded joint.

I. Mechanical Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

J. Form changes in direction as follows:

1. As detailed.
2. By radius bends of radius indicated

K. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

L. Close exposed ends of hollow railing members with prefabricated end fittings.

M. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns, unless clearance between end of rail and wall is 1/4 inch or less.

N. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers, or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.

O. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

P. For railing posts set in concrete, provide **steel** sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with metal plate forming bottom closure.

2.6 GENERAL FINISH REQUIREMENTS

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 shipment.

C. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

2.7 STEEL AND IRON FINISHES

A. Galvanized Railings:

1. Hot-dip galvanize exterior steel and iron railings, including hardware, after fabrication.
2. Comply with ASTM A 123/A 123M for hot-dip galvanized railings.
3. Comply with ASTM A 153/A 153M for hot-dip galvanized hardware.
4. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

B. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

C. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.

D. For nongalvanized-steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors to be embedded in exterior concrete or masonry.

E. Preparing Nongalvanized Items for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

F. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

G. Shop-Painted Finish:

1. Color: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

C. Adjust railings before anchoring to ensure matching alignment at abutting joints.

D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.

B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

3.4 ANCHORING POSTS

A. Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Form or core-drill holes not less than 6 inches deep and 3/4 inch larger than OD of post for installing posts in existing concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.

C. Leave anchorage joint exposed with anchoring material flush with adjacent surface, tooled to match as closely as possible.

D. Anchor posts to metal surfaces with flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:
   1. For steel railings, weld flanges to posts and bolt to metal-supporting surfaces.

3.5 ATTACHING RAILINGS

A. Attach handrails to walls with wall brackets. Provide brackets with 1-1/2-inch (38-mm) clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

   1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt or predrilled hole for exposed bolt anchorage.
   2. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

B. Secure wall brackets to building construction as follows:

   1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
   2. For wood stud partitions, use hanger or lag bolts set into wood backing between studs. Coordinate with carpentry work to locate backing members.
   3. For steel-framed partitions, use hanger or lag bolts set into wood backing between studs. Coordinate with stud installation to locate backing members.

3.6 CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

   1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

3.7 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 057300

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION:

A. Work Included: Furnish and install Rough Carpentry required for the project as shown on the Drawings and specified herein. This Section also includes:
1. Structural floor, wall, and roof framing.
2. Built-up structural beams and columns.
3. Floor, wall and roof plywood sheathing.
4. Furring for wall finishes.
5. Rough hardware.
6. Blocking for roofing systems and related metal flashings.
7. Preservative treatment.
8. Concealed wood blocking and backing for support of accessories, wall cabinets, finish hardware.

B. Related work specified elsewhere:
1. Concrete Formwork.
2. Metal Fabrications.
3. Glued Laminated Structural Units.
4. Laminated Strand (LSL) Lumber
5. Laminated Veneer (LVL) Lumber.
6. Parallel Strand (PSL) Lumber.
7. Prefabricated Wood Trusses.
8. Prefabricate I-Joists.
9. Finish Carpentry.

1.2 REFERENCES, CODES AND STANDARDS:

The following references, codes and standards are hereby made a part of this Section and rough carpentry work 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. ALSC (American Lumber Standards Committee) American Softwood Lumber Standard PS-20.

B. APA (American Plywood Association) - Guide to Plywood Grades.

C. ASTM A307 - Carbon Steel Externally Threaded Standard Fasteners.

D. ASTM D3498 - Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems.

E. AWPA (American Wood Preserver’s Association) - Book of Standards.

F. DFPA (Douglas Fir Plywood Association)

G. FS FF-S-325 - Shield, Expansion; Nail, Expansion; and nail, Drive Screw (Devices, Anchoring, Masonry).

H. FS TT-W-571 - Wood Preservation - Treating Practices.

I. FSC – Forest Stewardship Council, Washington, D.C.

J. NLMA (National Lumber Manufacturers Association) – National Design Specification for Stress-Grade Lumber and its Fastenings.

K. WCLIB (West Coast Lumber Inspection Bureau) - Standard Grading Rules No. 17.

L. WWPA (Western Wood Products Association) - Western Lumber Grading Rules

M. AFPA (American Forest & Paper Association)
1. National Design Specification (NDS) for Wood Construction with 2012 Supplement, (NSD-12).
2. Special Design Provisions for Wind and Seismic, (SDPWS-08).
3. Manual for Engineered Construction

N. California Building Code, 2013 Edition.

1.3 QUALITY ASSURANCE:

A. Lumber Grading Agency: Certified by ALSC.

B. Plywood Grading Agency: Certified by APA.

1.4 SUBMITTALS: Comply with requirements of Shop Drawings, Product Data, and Sample Sections.

A. Product Data: Submit manufacturer's literature describing products.

B. Samples: Only as requested by the Architect.

C. Manufacturer's Certificates: Submit certificates of compliance with standards noted.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING:

A. Store and protect products under provisions of Section 016000.

B. Provide proper facilities for handling and storage of materials to prevent damage to edges, ends, and surfaces.

C. Deliver and store packaged products in original containers or bundles with seals unbroken and labels intact until time of use.

D. Keep materials dry. Where necessary, stack materials off ground on level flat forms, fully protected from weather.

E. Protect 'kiln-dried' and 'S-Dry' materials from moisture. Separate from contact with soil or earth or other sources of moisture.

PART 2 - PRODUCTS

2.1 LUMBER MATERIALS:

A. Refer to Drawings for schedule.

2.2 PLYWOOD MATERIALS:

A. Refer to Drawings for schedule.

2.3 ACCESSORIES:

A. Rough Hardware: Exterior hardware nails and fasteners shall be hot-dipped galvanized, plain finish for interior locations, size and type to suit application. Nails to be common nails or ICBO approved equivalent, unless authorized otherwise in writing.

B. Bolts: Hexagonal heads, Grade A conforming to ASTM A307; galvanized for exterior, exposed applications only.

C. Sill Bolts: Galvanized conforming to ASTM F1554, Grade 36.

D. Lag Screws and Lag Bolts: Meet requirements of National Design Specifications for Stress Grade Lumber and Its Fastenings.

E. Washers: Washers for bearing against wood shall be provided under all bolt heads, lag screw heads, and nuts. Malleable iron or steel plate having an area equal to 16 times the area of bolt or lag screw. Steel washers shall have a thickness not less than 1/10 the length of the washer's longest side. Malleable iron washers shall have a thickness not less than 1/2 the bolt or lag screw diameter and having a bearing surface for the nut or head equal in diameter and having a bearing surface for the nut or head equal in diameter to not less than the long diameter of the nut or head.

F. Powder Driven Fasteners: Tempered steel pins with special corrosive-resistant plating or coating. Pins shall have guide washers to accurately control penetration, maximum 3/4 inch. Fastening shall be accomplished by low-velocity piston-driven powder-actuated tool. Pins and tool shall be same as manufactured by Hilti Fastening Systems; Impex Tool corporation; or equal product substituted under provisions of Section 01630.

G. Expansion Bolts: FS FF-S-325, Group II, Type 4, size as noted. Same as Hilti, Inc. Kwik Bolt TZ, or approved equal.

H. Fabricated Sheet Metal Timber Framing Connectors: Fabricate from hot-dipped galvanized steel. Connectors shall be at least 20 gauge material (1/8 inch plate materials where welded), unless otherwise noted, punched for nailing. Nails and Nailing shall conform to the manufacturer's instructions with a nail provided for each punched hole. Types as noted on the drawings. Same as Simpson Co.; KC metal Products; or equal product substituted under provisions of Section 01630.

I. Glue: Conforming to ASTM D3498 and APA Performance Specification AFG-01.

2.4 WOOD TREATMENT:

A. Materials:
1. Wood Preservative, Pressure Treatment: FS-TT-W-571, AWPA treatment C2 and C9 using either Alkaline Quat (ACQ Type B and D), Copper Azole (CBA-A, CA-B), Sodium Borates (SBX).
2. Wood Preservative, Surface Application: Copper green, manufactured by Willard Products.

B. Shop Treatment of Wood Materials:
1. Provide pressure treatment for lumber other than foundation grade redwood located within 1-1/2 inches of concrete, in contact with bituminous roofing, waterproofing, and related metal flashings, and where noted on Drawings.
2. Lumber: Treat in accordance with AWPB LP-3.
3. Plywood: Treat in accordance with AWPB LP-3.

C. Galvanization
1. Anchor bolts, nails, fasteners, and metal framing connectors in contact with pressure treated lumber shall be hot-dipped galvanized to a rating of G-185 per ASTM A653.

PART 3 - EXECUTION

3.1 SITE TREATMENT OF WOOD MATERIALS:

A. Apply non-pressure wood preservative to lumber and plywood embedded in and placed against concrete.

3.2 FRAMING:

A. Erect wood framing members level and plumb.

B. Place horizontal members laid flat, crown side up.

C. Construct framing members full length without splices.

D. Double members at openings over one sq.ft. Space short studs over and under opening to stud spacing.

E. Construct double joist headers at floor and ceiling openings. Frame rigidly into joists.

F. Make bearings full and finish bearing surfaces to give sure and even support.

G. Do not notch, bore, or cut members for pipes, vents, conduits or other reasons except as shown on the Drawings or specifically authorized by the Architect.

H. Construct double joists under discontinuous walls.

I Coordinate delivery of glue laminated structural units and plywood web joists.

J. Layout embedded items for entire project.

K. Shim, strip and furr as necessary to achieve described tolerances.

3.3 BRIDGING:

A. Install solid blocking between joists at points of support and wherever sheathing or flooring is discontinuous.

B. Blocking may be omitted where joists rests on ribbons and are nailed to studs and where joists are supported on metal hangers.

3.4 SHEATHING:

A. Secure roof sheathing perpendicular to framing members with ends staggered. Secure sheet edges over firm bearing.

B. Secure wall sheathing vertically parallel to wall studs, with ends staggered, over solid blocking. Secure sheet edges over firm bearing.

C. Secure subfloor and flat roof sheathing perpendicular to floor framing with end joints staggered. Secure sheet edges over firm bearing. Attach sheathing with subfloor glue and nail as shown.

D. Nail panel edges to framing members or blocking at least 1-1/2 inches thick. Space nails at panel edges as indicated on drawings, or if not shown, in accordance with CBC requirements. Place nails not less than 3/8 inches from panel edges and drive solidly into the support.

3.5 FASTENING:

A. In general, provide nail penetration into the piece receiving the point of not less than 1/2 the length of the nail or spike provided; however, 16d nails may be used to connect two pieces of 2 inch (nominal) thickness.

B. In diaphragms, the minimum penetration shall be 1-1/2 inches for 8d nails and 1-5/8 inches for 10d nails.

C. Perform nailing without splitting wood, preboring as required; replace split members.

D. Drill bolt holes 1/16 inches larger in diameter than the bolts being used; drill straight and true from one side only.

E. Bolt threads must not bear on wood; use washers under head and nut where bolts bear on wood; use washers under nuts.

F. Lag screw anchorage embedment in piece lagged to shall not be less than 0.6 times lag screw length nor less than 8 times lag screw diameter.

G. Prebore holes for lag screws same diameter as root of thread; enlarge holes to shank diameter for length of shank.

H. Do not drive lag screws.

3.6 MISCELLANEOUS ROUGH CARPENTRY:

A. Install miscellaneous blocking, furring, cants, nailing strips, framing and sheathing.

B. Install members true, plumb, and level. Secure in place.

C. Space miscellaneous framing and furring at 16 inches o.c.

D. Construct members of continuous pieces of longest possible lengths.

3.7 TOLERANCES:

A. Framing Members: 1/4 inch maximum from true position.

B. Surface Flatness of Floor: 1/4 inch in 10 feet maximum.

END OF SECTION

SECTION 06 40 23 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Interior standing and running trim.
2. Interior frames and jambs.
3. Stairwork and rails.
4. Interior ornamental work.
5. Wood cabinets.
6. Wood countertops.
7. Closet and utility shelving.
8. Shop finishing of interior woodwork.

B. Related Sections include the following:

1. Division 06 Section "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing woodwork and concealed within other construction before woodwork installation.

1.3 DEFINITIONS

A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction before woodwork installation.

1.4 SUBMITTALS

A. Product Data: For panel products cabinet hardware and accessories, and finishing materials and processes.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

1. Show details full size.
2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
3. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets and other items installed in architectural woodwork.

4. Show veneer leaves with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf.

C. Samples for Initial Selection:

1. Shop-applied transparent finishes.
2. Shop-applied opaque finishes.

D. Samples for Verification:

1. Lumber with or for transparent finish, not less than 5 inches wide by 24 inches long, for each species and cut, finished on 1 side and 1 edge.
2. Lumber and panel products with shop-applied opaque finish, 50 sq. in. for lumber and 8 by 10 inches for panels, for each finish system and color, with 1/2 of exposed surface finished.
3. Corner pieces as follows:

    a. Cabinet-front frame joints between stiles and rails, as well as exposed end pieces, 18 inches high by 18 inches wide by 6 inches deep.
    b. Miter joints for standing trim.

4. Exposed cabinet hardware and accessories, one unit for each type and finish.

E. Qualification Data: For fabricator.

1.5 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.

B. Installer Qualifications: Fabricator of products.

C. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of interior architectural woodwork with sequence-matched wood veneers and wood doors with face veneers that are sequence matched with woodwork and transparent-finished wood doors that are required to be of same species as woodwork.

D. Quality Standard: AWI, AWMAC, and WI's "Architectural Woodwork Standards."

E. Forest Certification: Provide interior 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."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork 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. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.
2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.8 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide materials that comply with requirements of AWI, AWMAC, and WI's "Architectural Woodwork Standards." for each type of woodwork and quality grade specified, unless otherwise indicated.

B. Wood Species and Cut for Transparent Finish: White ash, plain sawn or sliced.

C. Wood Species for Opaque Finish: Any closed-grain hardwood.

D. Wood Products: Comply with the following:
1. Softwood Plywood: DOC PS 1**,** Medium Density Overlay.

E. Tempered Float Glass for Cabinet Doors: If necessary for repair or refurbishment of existing cabinets, use ASTM C 1048, Kind FT, Condition A, Type I, Class 1 (clear), Quality-Q3, 6 mm thick, unless otherwise indicated.

F. Tempered Float Glass for Cabinet Shelves: If necessary for repair or refurbishment of existing cabinets, use ASTM C 1048, Kind FT, Condition A, Type I, Class 1 (clear) Quality-Q3; with exposed edges seamed before tempering, 6 mm thick.

2.2 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets.

B. Butt Hinges: 2-3/4-inch, 5-knuckle steel hinges made from 0.095-inch-thick metal, and as follows:

1. Semiconcealed Hinges for Flush Doors: BHMA A156.9, B01361.
2. Semiconcealed Hinges for Overlay Doors: BHMA A156.9, B01521.

C. Back-Mounted Pulls: BHMA A156.9, B02011.

D. Wire Pulls: Back mounted, solid metal, 4 inches long, 5/16 inch in diameter.

E. Catches: Magnetic catches, BHMA A156.9, B03141.

F. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081

G. Shelf Rests: BHMA A156.9, B04013; metal.

H. Drawer Slides: BHMA A156.9, B05091.
1. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-extension type; zinc-plated steel ball-bearing slides.

I. Door Locks: BHMA A156.11, E07121.

J. Drawer Locks: BHMA A156.11, E07041.

K. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
1. Satin Stainless Steel: BHMA 630.

L. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.3 MISCELLANEOUS MATERIALS

A. Rough Carriages for Stairs: No. 1 grade and the following species, kiln dried to 15 percent maximum moisture content:

1. Douglas fir-larch.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

C. Handrail Brackets: Custom fabricated from bronze with wall flange drilled for exposed anchor and with support arm for fastening to underside of rail. Sized to provide 1-1/2-inch clearance between handrail and wall.

D. Adhesives, General: Do not use adhesives that contain urea formaldehyde.

E. VOC Limits for Installation Adhesives and Glues: Use installation adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Wood Glues: 30 g/L.
2. Contact Adhesive: 250 g/L.

2.4 FABRICATION, GENERAL

A. Interior Woodwork Grade: Unless otherwise indicated, provide Premium-grade interior woodwork complying with referenced quality standard.

B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.

C. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
1. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members and Rails: 1/16 inch.

D. 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.
1. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.

E. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

1. Seal edges of openings in countertops with a coat of varnish.

F. Install glass to comply with applicable requirements in Division 08 Section "Glazing" and in GANA's "Glazing Manual." For glass in wood frames, secure glass with removable stops.

2.5 INTERIOR STANDING AND RUNNING TRIM FOR TRANSPARENT FINISH

A. Grade: Premium.

B. Wood Species and Cut: Match species and cut indicated for other types of transparent-finished architectural woodwork located in same area of building, unless otherwise indicated.

C. For trim items wider than available lumber, use veneered construction. Do not glue for width.

D. For rails wider or thicker than available lumber, use veneered construction. Do not glue for width or thickness.

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. Assemble moldings in plant to maximum extent possible. Miter corners in plant and prepare for field assembly with bolted fittings designed to pull connections together.

2.6 INTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH

A. Grade: Premium

B. Wood Species: Any closed-grain hardwood.

C. 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.

2.7 STAIRWORK AND RAILS

A. Grade: Premium.

B. Wood Species and Cut for Transparent Finish: White ash, plain sawn or sliced.

C. Wood Species for Opaque Finish: Any closed-grain hardwood.

D. Finishes for Stair Parts: As follows:

1. Treads: Opaque.
2. Risers: Opaque.
3. Stringers: Transparent
4. Balusters: Transparent.
5. Handrails: Transparent.
6. Scotia, Cove, and Other Moldings: Transparent.

E. Cut carriages to accurately fit treads and risers. Glue treads to risers, and glue and nail treads and risers to carriages.
1. Fabricate stairs with treads and risers no more than 1/8 inch from indicated position and no more than 1/16 inch out of position for adjacent treads and risers.

2.8 WOOD CABINETS FOR OPAQUE FINISH

A. Grade: Premium.

B. Type of Construction: Frameless.

C. Cabinet and Door and Drawer Front Interface Style: Flush overlay.

D. Species for Exposed Lumber Surfaces: Any closed-grain hardwood.

E. Panel Product for Exposed Surfaces: Medium-density overlay.

2.9 WOOD CABINETS FOR TRANSPARENT FINISH

A. Grade: Premium.

B. Type of Construction: Frameless.

C. Cabinet and Door and Drawer Front Interface Style: Flush overlay.

D. Wood Species for Exposed Surfaces: White ash.

E. Cut: Plain sliced/plain sawn.

F. Grain Direction: Vertically for doors and fixed panels & drawer fronts.

G. Matching of Veneer Leaves: Book match.

H. Veneer Matching within Panel Face: Center-balance match.

I. Semiexposed Surfaces Other Than Drawer Bodies: Same species and cut indicated for exposed surfaces

J. Drawer Subfronts, Sides, and Backs: Solid-hardwood lumber.

K. Drawer Bottoms: Hardwood plywood.

2.10 WOOD COUNTERTOPS

A. Grade: Premium.

B. Type of Top: Solid wood for transparent finish, edge glued, with crown direction reversed in adjacent boards, to produce widths indicated. Select boards for similarity of color and grain and arrange boards for optimum match between adjacent boards. Species and cut as follows:

1. Wood Species and Cut: White ash, quarter sawn.

2.11 CLOSET AND UTILITY SHELVING

A. Grade: Premium

B. Shelf Material: 3/4-inch veneer-faced panel product with solid-lumber edge.

C. Cleats: 3/4-inch solid lumber.

D. Wood Species: Any closed-grain hardwood.

2.12 SHOP FINISHING

A. Grade: Provide finishes of same grades as items to be finished.

B. General: Shop finish transparent-finished interior architectural woodwork at fabrication shop as specified in this Section. Refer to Division 09 painting Sections for finishing opaque-finished architectural woodwork.

C. Shop Priming: Shop apply the prime coat including backpriming, if any, for transparent-finished items specified to be field finished. Refer to Division 09 painting Sections for material and application requirements.

D. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.

1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling and to end-grain surfaces. Concealed surfaces of plastic-laminate-clad woodwork do not require backpriming when surfaced with plastic laminate, backing paper, or thermoset decorative panels.

E. Transparent Finish:
1. Finish System 12: Polyurethane, water based.
2. Staining: Match Architect's sample and/or existing adjacent woodwork.
3. Wash Coat for Stained Finish: Apply wash-coat sealer to woodwork made from closed-grain wood before staining and finishing.

a. Apply wash-coat sealer after staining and before filling.

4. Sheen: Satin, 31-45 gloss units measured on 60-degree gloss meter per ASTM D 523.
a. Verify sample with architect on-site prior to finishing to compare with existing adjacent woodwork.

F. Opaque Finish:

1. Grade: Premium.
2. Finish System: System shall be washable, highly durable, and easily repairable.
a. Provide submittals for approval by architect
3. Sheen: Gloss, 61-100 gloss units measured on 60-degree gloss meter per ASTM D 523.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.

B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.

B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.

C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.

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. Do not use pieces less than 96 inches long, except where shorter single-length pieces are necessary. Scarf running joints and stagger in adjacent and related members.

1. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base if finished.
2. Install wall railings on indicated metal brackets securely fastened to wall framing.
3. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches.

G. Stairs: Securely anchor carriages to supporting substrates. Install stairs with treads and risers no more than 1/8 inch from indicated position.

H. Railings:

1. General: Install rails with no more than 1/8 inch in 96-inch variation from a straight line.
2. Stair Rails: Glue and dowel or pin balusters to treads and railings, and railings to newel posts.
3. Wall Rails: Support rails on indicated metal brackets securely fastened to wall framing.

I. 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. Complete installation of hardware and accessory items as indicated.

1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
2. Maintain veneer sequence matching of cabinets with transparent finish.
3. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. with No. 10 wafer-head screws sized for 1-inch penetration into wood framing, blocking, or hanging strips.

J. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
1. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
2. Calk space between backsplash and wall with sealant specified in Division 07 Section "Joint Sealants."

K. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 064023

SECTION 071326 - SELF-ADHERING SHEET WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Modified bituminous sheet waterproofing.
2. Modified bituminous sheet waterproofing, fabric reinforced.
3. Modified bituminous deck paving sheet waterproofing.
4. Modified bituminous composite panel waterproofing.
5. Adhesive-coated HDPE sheet waterproofing.
6. Molded-sheet drainage panels.
7. Insulation.
8. Plaza deck pavers[**and paver pedestals**].

B. Related Sections include the following:

1. Division 07 Section "Joint Sealants" for joint-sealant materials and installation.

1.3 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.

1. Include setting drawings showing layout, sizes, sections, profiles, and joint details of pedestal-supported concrete pavers.

C. Samples: For the following products:

1. 12-by-12-inch (300-by-300-mm) square of waterproofing and flashing sheet.
2. 12-by-12-inch (300-by-300-mm) square of insulation.
3. 4-by-4-inch (100-by-100-mm) square of drainage panel.
4. Plaza deck paver, [**4-by-4-inch (100-by-100-mm) square**] [**full sized**], in each color and texture required.
5. Paver pedestal assembly.

D. Installer Certificates: Signed by manufacturers certifying that installers comply with requirements.

E. Qualification Data: For Installer.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for waterproofing.

G. Warranties: Special warranties specified in this Section.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A firm that is [**approved or licensed by**] [**acceptable to**] waterproofing manufacturer for installation of waterproofing required for this Project.

B. Source Limitations: Obtain waterproofing materials[**, protection course,**] [**and**] [**molded-sheet drainage panels**] through one source from a single manufacturer.

C. Mockups: Before beginning installation, install waterproofing to 100 sq. ft. (9.3 sq. m) <**Insert area**> of [**deck**] [**wall**] to demonstrate surface preparation, crack and joint treatment, corner treatment, and execution quality.[**Install pavers and paver supports to demonstrate aesthetic affects and set quality standards for materials and execution.**]

1. If Architect determines mockups do not comply with requirements, reapply waterproofing[**and reinstall overlying construction**] until mockups are approved.
2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

D. 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.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver liquid materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by waterproofing manufacturer.

C. Remove and replace liquid materials that cannot be applied within their stated shelf life.

D. Store rolls according to manufacturer's written instructions.

E. Protect stored materials from direct sunlight.

1.6 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.

1. Do not apply waterproofing in snow, rain, fog, or mist.

B. Maintain adequate ventilation during preparation and application of waterproofing materials.

1.7 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.

1. Warranty does not include failure of waterproofing due to failure of substrate prepared and treated according to requirements or formation of new joints and cracks in substrate exceeding 1/16 inch (1.6 mm) in width.
2. Warranty Period: [**Three**] [**Five**] <**Insert number**> years from date of Substantial Completion.

B. Special Installer's Warranty: Specified form, [**on warranty form at end of this Section,**]signed by Installer, covering Work of this Section, for warranty period of [**two**] <**Insert number**> years.

1. Warranty includes removing and reinstalling protection board, drainage panels, insulation, pedestals, and pavers on plaza decks.

PART 2 - PRODUCTS

2.1 MODIFIED BITUMINOUS SHEET WATERPROOFING

A. Modified Bituminous Sheet: Not less than 60-mil- (1.5-mm-) thick, self-adhering sheet consisting of 56 mils (1.4 mm) of rubberized asphalt laminated to a 4-mil- (0.10-mm-) thick, polyethylene film with release liner on adhesive side[**and formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction**].

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 [**3000**] [**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.
m. <**Insert manufacturer's name; product name or designation.**>

3. Physical Properties:

a. Tensile Strength: 250 psi (1.7 MPa) 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 (minus 29 deg C); ASTM D 1970.
d. Crack Cycling: Unaffected after 100 cycles of 1/8-inch (3-mm) movement; ASTM C 836.
e. Puncture Resistance: 40 lbf (180 N) minimum; ASTM E 154.
f. Hydrostatic-Head Resistance: 150 feet (45 m) minimum; ASTM D 5385.
g. Water Absorption: 0.15 percent weight-gain maximum after 48-hour immersion at 70 deg F (21 deg C); ASTM D 570.
h. Vapor Permeance: 0.05 perms (2.9 ng/Pa x s x sq. m); ASTM E 96, Water Method.

B. Modified Bituminous Sheet, Fabric Reinforced: 60-mil- (1.5-mm-) 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- (0.01-mm-) 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.
c. <**Insert manufacturer's name; product name or designation.**>

3. Physical Properties:

a. Pliability: No cracks when bent 180 degrees over a 1-inch (25-mm) mandrel at minus 25 deg F (minus 32 deg C); ASTM D 146.
b. Hydrostatic-Head Resistance: 150 feet (45 m) minimum.
c. Vapor Permeance: 0.05 perms (2.9 ng/Pa x s x sq. m); ASTM E 96, Water Method.

2.2 MODIFIED BITUMINOUS DECK PAVING SHEET WATERPROOFING

A. Modified Bituminous Deck Paving Sheet: Provide [**one of the products**] [**the product**] described below:

1. 65-mil- (1.6-mm-) thick, self-adhering sheets consisting of 53 to 56 mils (1.3 to 1.4 mm) of rubberized asphalt laminated to a heat-resisting, 9- to 12-mil- (0.2- to 0.3-mm-) thick, woven polypropylene geotextile reinforcement with release liner on adhesive side.
2. 70-mil- (1.8-mm-) thick, self-adhering sheets consisting of rubberized asphalt embedded in inert fabric reinforcement laminated to a reflective geotextile protective topping with release liner on adhesive side.
3. 60-mil- (1.5-mm-) thick, self-adhering sheets consisting of rubberized asphalt embedded in [**nonwoven**] [**woven**] fiberglass fabric reinforcement laminated to a 0.50-mil- (0.01-mm-) thick polyester mat with release liner on adhesive side.
4. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
5. Products: Subject to compliance with requirements, provide one of the following:

    a. Carlisle Coatings & Waterproofing Inc.; CCW 711.
    b. Grace, W. R. & Co.; Bituthene 5000.
    c. Meadows, W. R., Inc.; SealTight Mel-Dek.
    d. Pecora Corporation; Duramem 712 Pre-Pave.
    e. Polyguard Products; Polyguard 665.
    f. Progress Unlimited, Inc.; Plastiwrap 65.
    g. Protecto Wrap Company; Jiffy Seal 400.
    h. Royston Laboratories, Div. of Chase Corporation; [**10AN Easy Pave ER**] [**10A Easy Pave**].
    i. Tamko Roofing Products, Inc.; Bridgeguard.
    j. <**Insert manufacturer's name; product name or designation.**>

6. Physical Properties:

    a. Tensile Strength, Membrane: [**50 lbf/in (8.75 kN/m)**] <**Insert value**> minimum; ASTM D 882.
    b. Pliability: Unaffected when bent 180 degrees over a 1/4-inch (6.4-mm) mandrel at minus 15 deg F (minus 26 deg C); ASTM D 146.
    c. Puncture Resistance, Mesh: 200 lbf (890 N) minimum; ASTM E 154.

2.3 MODIFIED BITUMINOUS COMPOSITE PANEL WATERPROOFING

A. Modified Bituminous Composite Panel: 90-mil- (2.2-mm-) thick, multilaminated panel consisting of a protection course bonded to an asphalt saturated carrier sheet bonded to a rubberized asphalt waterproofing self-adhering membrane with release liner.

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. Meadows, W. R., Inc.; Mel-Gard.
    b. <**Insert manufacturer's name; product name or designation.**>

2.4 ADHESIVE-COATED HDPE SHEET WATERPROOFING

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. Grace, W. R. & Co.; Preprufe [**160R**] [**and**] [**300R**].
2. <**Insert manufacturer's name; product name or designation.**>

C. Adhesive-Coated HDPE Sheet for Vertical Applications: 32-mil- (0.8-mm-) thick, uniform, flexible sheets consisting of 16-mil- (0.4-mm-) thick, HDPE sheet coated with a pressure-sensitive rubber adhesive, a protective adhesive coating, and a release liner with the following physical properties:

1. Tensile Strength, Film: 4000 psi (27.6 MPa) minimum; ASTM D 412.
2. Low-Temperature Flexibility: Pass at minus 10 deg F (minus 23 deg C); ASTM D 1970.
3. Peel Adhesion to Concrete: 5 lbf/in. (875 N/m); ASTM D 903, modified.
4. Lap Adhesion: 2.5 lbf/in. (440 N/m); ASTM D 1876, modified.
5. Hydrostatic-Head Resistance: 231 feet (70 m); ASTM D 5385, modified.
6. Vapor Permeance: 0.01 perms (0.6 ng/Pa x s x sq. m); ASTM E 96, Water Method.
7. Water Absorption: 0.5 percent; ASTM D 570.

D. Adhesive-Coated HDPE Sheet for Horizontal Applications: 46-mil- (1.2-mm-) thick, uniform, flexible sheets consisting of 30-mil- (0.76-mm-) thick, HDPE sheet coated with a pressure-sensitive rubber adhesive, a protective adhesive coating, a detackifying surface treatment, an uncoated self-adhering side lap strip, and a release liner with the following physical properties:

1. Tensile Strength, Film: 4000 psi (27.6 MPa) minimum; ASTM D 412.
2. Low-Temperature Flexibility: Pass at minus 10 deg F (minus 23 deg C); ASTM D 1970.
3. Peel Adhesion to Concrete: 5 lbf/in. (875 N/m); ASTM D 903, modified.
4. Lap Adhesion: 2.5 lbf/in. (440 N/m); ASTM D 1876, modified.
5. Hydrostatic-Head Resistance: 231 feet (70 m); ASTM D 5385, modified.
6. Vapor Permeance: 0.01 perms (0.6 ng/Pa x s x sq. m); ASTM E 96, Water Method.
7. Water Absorption: 0.5 percent; ASTM D 570.

2.5 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**] [**solvent-borne**] 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.

1. Detail Tape: Two-sided, pressure-sensitive, self-adhering reinforced tape, 4-1/2 inches (114 mm) wide, with a tack-free protective adhesive coating on one side and release film on self-adhering side.
2. Detail Strips: 62.5-mil- (1.58-mm-) thick, felt-reinforced self-adhesive strip, 9 inches (229 mm) wide, with release film on adhesive side.

H. Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick, predrilled at 9-inch (229-mm) 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 (3 mm)**] [**1/4 inch (6 mm)**], nominal.
2. Thickness: 1/8 inch (3 mm), nominal, for vertical applications; 1/4 inch (6 mm), nominal, elsewhere.
3. Adhesive: Rubber-based solvent type recommended by waterproofing manufacturer for type of protection course.

J. Protection Course: Fan folded, with a core of extruded-polystyrene board insulation faced [**one side**] [**or**] [**both sides**] with plastic film, nominal thickness 1/4 inch (6 mm), with compressive strength of not less than 8 psi (55 kPa) per ASTM D 1621, and maximum water absorption by volume of 0.6 percent per ASTM C 272.

K. Protection Course: Unfaced, fan-folded, extruded-polystyrene board insulation, nominal thickness 1/4 inch (6 mm) with compressive strength of not less than 8 psi (55 kPa) per ASTM D 1621.

L. Protection Course: Extruded-polystyrene board insulation, unfaced, ASTM C 578, Type X, 1/2 inch (13 mm) thick.

M. Protection Course: Molded-polystyrene board insulation, ASTM C 578, Type I, 0.90-lb/cu. ft. (15-kg/cu. m) minimum density, 1-inch (25-mm) minimum thickness.

2.6 MOLDED-SHEET DRAINAGE PANELS

A. Molded-Sheet Drainage Panel: Comply with Division 33 Section "Subdrainage."

B. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: Manufactured composite subsurface drainage panels consisting of a nonwoven, needle-punched geotextile facing with an

apparent opening size not exceeding No. 70 (0.21-mm) sieve laminated to one side [**with**] [**or**] [**without**] a polymeric film bonded to the other side of a studded, nonbiodegradable, molded-plastic-sheet drainage core, with a vertical flow rate of 9 to 15 gpm per ft. (112 to 188 L/min. per m).

C. Woven-Geotextile-Faced, Molded-Sheet Drainage Panel: Manufactured composite subsurface drainage panels consisting of a woven-geotextile facing with an apparent opening size not exceeding No. 40 (0.425-mm) sieve laminated to one side [**with**] [**or**] [**without**] a polymeric film bonded to the other side of a studded, nonbiodegradable, molded-plastic-sheet drainage core, with a horizontal flow rate not less than 2.8 gpm per ft. (35 L/min. per m).

2.7 INSULATION

A. Board Insulation: Extruded-polystyrene board insulation complying with ASTM C 578, [**square**] [**or**] [**shiplap**] edged.

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. Diversifoam Products.
    b. Dow Chemical Company (The).
    c. Owens Corning.
    d. Pactiv Building Products.
    e. T. Clear Corporation.
    f. <**Insert manufacturer's name.**>

3. Type IV, 25-psi (173-kPa) minimum compressive strength.
4. Type VI, 40-psi (276-kPa) minimum compressive strength.
5. Type VII, 60-psi (414-kPa) minimum compressive strength.
6. Type V, 100-psi (690-kPa) minimum compressive strength.

B. Unfaced Wall Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, [**Type IV, 25-psi (173-kPa)**] [**or**] [**Type VI, 40-psi (276-kPa)**] minimum compressive strength; unfaced; fabricated with shiplap or channel edges and with 1 side having grooved drainage channels.

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. Diversifoam Products; CertiFoam [**25**] [**40**] Drainage Board.
    b. Dow Chemical Company (The); Perimate.
    c. Pactiv Building Products; Green-Guard-DC.
    d. <**Insert manufacturer's name; product name or designation.**>

C. Geotextile-Faced Wall Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, [**Type IV, 25-psi (173-kPa)**] [**or**] [**Type VI, 40-psi (276-kPa)**]

minimum compressive strength; fabricated with tongue-and-groove edges and with 1 side having grooved drainage channels faced with nonwoven geotextile filter fabric.

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. Owens Corning; Insul-Drain.
    b. T. Clear Corporation; Thermadry 1250.
    c. <**Insert manufacturer's name; product name or designation.**>

D. Unfaced Plaza Deck Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, [**Type VI, 40-psi (276-kPa)**] [**Type VII, 60-psi (414-kPa)**] minimum compressive strength; unfaced; fabricated with shiplapped or channel edges and with 1 side having ribbed drainage channels.

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. Diversifoam Products; CertiFoam Plaza Deck.
    b. Dow Chemical Company (The); Styrofoam Ribbed Roofmate.
    c. Owens Corning; Foamular [**404 RB**] [**604 RB**].
    d. <**Insert manufacturer's name; product name or designation.**>

E. Geotextile-Faced Plaza Deck Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, Type VII, 60-psi (414-kPa) minimum compressive strength; fabricated with tongue-and-groove edges and with 1 side having grooved drainage channels faced with manufacturer's standard, nonwoven geotextile filter fabric.

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. T. Clear Corporation; Thermadry 1750.
    b. <**Insert manufacturer's name; product name or designation.**>

2.8 PLAZA DECK PAVERS

A. Plaza Deck Pavers: [**Brick**] [**Concrete**] [**Asphalt-block**] pavers specified in Division 32 Section "Unit Paving."

B. Plaza Deck Pavers: [**Granite**] [**Limestone**] [**Marble**] [**Quartz-based stone**] [**Slate**] pavers specified in Division 09 Section "Stone Flooring."

C. Plaza Deck Pavers: Heavyweight, hydraulically pressed, concrete units, [**square edged**] [**with top edges beveled 3/16 inch (5 mm)**], manufactured for use as plaza deck pavers; minimum compressive strength [**7500 psi (52 MPa)**] [**6500 psi (45 MPa)**] <**Insert value**>, ASTM C 140; absorption not greater than 5 percent, ASTM C 140; no breakage and maximum 1 percent mass loss when tested for freeze-thaw resistance according to ASTM C 67.

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:
3. Basis-of-Design Product: Subject to compliance with requirements, provide [**the product indicated on Drawings**] <**Insert manufacturer's name; product name or designation**> or a comparable product by one of the following:

    a. Hanover Architectural Products.
    b. Hastings Pavement Co., Inc.
    c. Roofblok Limited.
    d. Sunny Brook Pressed Concrete Co.
    e. Wausau Tile, Inc.; Terra-Paving Div.
    f. Westile Roofing Products.
    g. <**Insert manufacturer's name.**>

4. Thickness: [**1-5/8 inches (41 mm)**] [**1-3/4 inches (45 mm)**] [**2 inches (51 mm)**] [**2-3/8 inches (60 mm)**] <**Insert dimension**>.
5. Face Size: [**8-7/8 inches (225 mm) square**] [**9 inches (229 mm) square**] [**9 by 18 inches (229 by 457 mm)**] [**12 inches (305 mm) square**] [**12 by 24 inches (305 by 610 mm)**] [**18 inches (457 mm) square**] [**24 inches (610 mm) square**] [**As indicated**] <**Insert dimensions and shape**>.
6. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

D. Setting Bed: Provide [**aggregate**] [**mortar**] [**bituminous**] setting-bed materials specified in Division 32 Section "Unit Paving."

E. Paver Pedestals: Paver manufacturer's standard SBR rubber, HDPE, or polyurethane paver support assembly, including [**fixed-height**] [**adjustable or stackable**] pedestals, shims, and spacer tabs for joint spacing of [**1/8 inch (3 mm)**] [**3/16 inch (5 mm)**] [**1/8 to 3/16 inch (3 to 5 mm)**].

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. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation.**>

3. Concrete Fill: ACI 301, compressive strength of 5000 psi (34 MPa) at 28 days and air content of 6 percent.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.

1. Verify that concrete has cured and aged for minimum time period recommended by waterproofing manufacturer.
2. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
3. Verify that compacted subgrade is dry, smooth, and sound; and ready to receive adhesive-coated HDPE sheet.
4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 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.

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.

1. Install sheet strips and center over treated construction and contraction joints and cracks exceeding a width of [**1/16 inch (1.6 mm)**] [**or**] [**1/8 inch (3 mm) for modified bituminous deck paving waterproofing**].

F. Bridge and cover [**isolation joints**] [**expansion joints**] [**and**] 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.

1. Install membrane strips centered over vertical inside corners. Install 3/4-inch (19-mm) fillets of liquid membrane on horizontal inside corners and as follows:

a. At footing-to-wall intersections, extend liquid membrane each direction from corner or install membrane strip centered over corner.

b. At plaza deck-to-wall intersections, extend liquid membrane or sheet strips onto deck waterproofing and to finished height of sheet flashing.

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.

3.3 MODIFIED BITUMINOUS SHEET WATERPROOFING 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- (64-mm-) minimum lap widths and end laps. Overlap and seal seams and stagger end laps to ensure watertight installation.

1. When ambient and substrate temperatures range between 25 and 40 deg F (minus 4 and plus 5 deg C), install self-adhering, modified bituminous sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F (16 deg C).

D. Two-Ply Application: Install sheets to form a membrane with lap widths not less than 50 percent of sheet widths to provide a minimum of 2 thicknesses of sheet membrane over areas to receive waterproofing.

E. Horizontal Application: Apply sheets from low point to high point of decks to ensure that side laps shed water.

F. Apply continuous sheets over sheet strips bridging substrate cracks, construction, and contraction joints.

G. Seal exposed edges of sheets at terminations not concealed by metal counterflashings or ending in reglets with mastic.

H. Install sheet waterproofing and auxiliary materials to tie into adjacent waterproofing.

I. 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 (150 mm) beyond repaired areas in all directions.

J. Install protection course with butted joints over waterproofing membrane immediately.

1. [**Molded-sheet drainage panels**] [**Insulation drainage panels**] [**Board insulation**] may be used in place of a separate protection course to vertical applications when approved by waterproofing manufacturer and installed immediately.

K. Correct deficiencies in or remove sheet waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

3.4 MODIFIED BITUMINOUS DECK PAVING SHEET WATERPROOFING APPLICATION

A. Install modified bituminous deck paving sheets according to waterproofing manufacturer's written instructions.

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 areas to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- (64-mm-) minimum lap widths and 6-inch (150-mm) end laps. Overlap and seal seams and stagger end laps to ensure watertight installation.

D. Apply sheet waterproofing 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 edges of sheet waterproofing terminations 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 (150 mm) beyond repaired areas in all directions.

I. Correct deficiencies in or remove sheet waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

3.5 MODIFIED BITUMINOUS COMPOSITE PANEL WATERPROOFING APPLICATION

A. Install modified bituminous composite panels according to waterproofing manufacturer's written instructions.

B. Apply primer to substrate at required rate and allow to dry. Limit priming to areas that will be covered by waterproofing in same day. Reprime areas exposed for more than 24 hours.

C. Install and firmly adhere composite panels over area to receive waterproofing. Accurately align and butt vertical and horizontal joints.

D. Seal vertical and horizontal butt joints and exposed top, side, and bottom edges at composite panel waterproofing terminations with detail strips.

E. Correct deficiencies in or remove composite panel waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair detail strips.

3.6 ADHESIVE-COATED HDPE SHEET WATERPROOFING APPLICATION

A. Install adhesive-coated HDPE sheets according to manufacturer's written instructions.

B. Place and secure molded-sheet drainage panels over substrate. Lap edges and ends of geotextile to maintain continuity.

C. Vertical Applications: Install adhesive-coated HDPE sheet with HDPE face against substrate. Accurately align sheets and maintain uniform 3-inch- (75-mm-) minimum lap widths and end laps. Overlap and seal seams and stagger and tape end laps to ensure watertight installation. Mechanically fasten to substrate.

1. Securely fasten top termination of membrane with continuous metal termination bar anchored into substrate and cover with detailing tape.

D. Horizontal Applications: Install adhesive-coated HDPE sheet with HDPE face against substrate. Accurately align sheets and maintain uniform 3-inch- (75-mm-) minimum lap widths and end laps. Overlap and seal seams. Overlap, stagger, and seal end laps with detail tape to ensure watertight installation.

E. Corners: Seal lapped terminations and cut edges of sheet waterproofing at inside and outside corners with detail tape.

F. Seal penetrations through sheet waterproofing to provide watertight seal with detail tape patches or wraps and a liquid-membrane troweling.

G. Install sheet waterproofing and auxiliary materials to produce a continuous watertight tie into adjacent waterproofing.

H. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Tape perimeter of damaged or nonconforming area extending 6 inches (150 mm) beyond repaired areas in all directions. Apply a patch of sheet waterproofing and firmly secure with detail tape.

I. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

3.7 MOLDED-SHEET DRAINAGE PANEL INSTALLATION

A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck substrate, according to manufacturer's written instructions. Use adhesives[**or mechanical fasteners**] that do not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.

1. For vertical applications, install [**board insulation**] [**protection course**] before installing drainage panels.

3.8 INSULATION INSTALLATION

A. Install [**one or more layers of board insulation to achieve required thickness**] [**and**] [**insulation drainage panels**] over waterproofed surfaces. Cut and fit to within 3/4 inch (19 mm) of projections and penetrations.

B. On vertical surfaces, set insulation units in adhesive or tape applied according to manufacturer's written instructions.

C. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

3.9 PLAZA DECK PAVER INSTALLATION

A. Setting Bed: Install setting bed in locations and of thickness indicated to comply with requirements in Division [**09 Section "Stone Flooring**] [**32 Section "Unit Paving**]."."

B. Install concrete pavers in locations indicated according to manufacturer's written instructions.

C. Accurately install [**fixed**] [**adjustable**]-height paver pedestals and accessories in locations and to elevations required. Adjust for final level and slope with shims.

1. Fill paver pedestal with concrete mix, strike smooth with top of pedestal, and cure according to ACI 301.

D. Loosely lay pavers on pedestals, maintaining a uniform open joint width. Tightly seat pavers against spacers to eliminate lateral movement or drift of paving assembly. Align joint patterns parallel in each direction.

1. Lay out pavers to avoid less-than-half-width pavers at perimeter or other terminations.

E. Install pavers to not vary more than 1/16 inch (1.6 mm) in elevation between adjacent pavers or more than 1/16 inch (1.6 mm) from surface plane elevation of individual paver.

F. Maintain tolerances of paving installation within [**1/4 inch in 10 feet (1:48)**] <**Insert surface tolerance**> of surface plane in any direction.

3.10 FIELD QUALITY CONTROL

A. Engage a full-time site representative qualified by waterproofing membrane manufacturer to inspect substrate conditions; surface preparation; membrane application, flashings, protection, and drainage components; and to furnish daily reports to Architect.

B. Flood Testing: Flood test each deck area for leaks, according to recommendations in ASTM D 5957, after completing waterproofing but before overlying construction is placed. Install temporary containment assemblies, plug or dam drains, and flood with potable water.

1. Flood to an average depth of 2-1/2 inches (64 mm) with a minimum depth of 1 inch (25 mm) and not exceeding a depth of 4 inches (100 mm). Maintain 2 inches (51 mm) of clearance from top of sheet flashings.
2. Flood each area for [**24**] [**48**] [**72**] hours.
3. After flood testing, repair leaks, repeat flood tests, and make further repairs until waterproofing installation is watertight.

C. [**Owner will engage**] [**Engage**] an independent testing agency to observe flood testing and examine underside of decks and terminations for evidence of leaks during flood testing.

3.11 PROTECTION AND CLEANING

A. Do not permit foot or vehicular traffic on unprotected membrane.

B. Protect waterproofing from damage and wear during remainder of construction period.

C. Protect installed [**board insulation**] [**insulation drainage panels**] 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

SECTION 071416 - COLD FLUID-APPLIED WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Single-component polyurethane waterproofing.
2. Two-component polyurethane waterproofing.
3. Polyester waterproofing.
4. Latex-rubber waterproofing.
5. Molded-sheet drainage panels.
6. Insulation.
7. Plaza deck pavers.

B. Related Section:

1. Division 07 Section "Joint Sealants" for joint-sealant materials and installation.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. 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.

1. Include setting drawings showing layout, sizes, sections, profiles, and joint details of pedestal-supported concrete pavers.

C. Samples: For the following products:

1. Flashing sheet, 10 by 8 inches (250 by 200 mm).
2. Membrane-reinforcing fabric, 10 by 8 inches (250 by 200 mm).
3. Insulation, 10 by 8 inches (250 by 200 mm).
4. Drainage panel, 4 by 4 inches (100 by 100 mm).
5. Plaza deck paver, [**4 by 4 inches (100 by 100 mm) square**] [**full sized**] in each color and texture required.
6. Paver pedestal assembly.

D. Qualification Data: For Installer.

E. Product Test Reports: For waterproofing, based on evaluation of comprehensive tests performed by a qualified testing agency.

F. Field quality-control reports.

G. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A firm that is [**approved or licensed by**] [**acceptable to**] waterproofing manufacturer for installation of waterproofing required for this Project.

B. Source Limitations: Obtain waterproofing materials[**, protection course**] [**and**] [**molded-sheet drainage panels**] from single source from single manufacturer.

C. Mockups: Before beginning installation, install waterproofing to 100 sq. ft. (9.3 sq. m) <**Insert area**>of [**deck**] [**wall**] to demonstrate surface preparation, crack and joint treatment, corner treatment, thickness, texture, and execution quality.[**Install pavers and paver supports to demonstrate aesthetic effects and set quality standards for materials and execution.**]

1. If Architect determines mockups do not comply with requirements, reapply waterproofing[**and reinstall overlaying construction**] until mockups are approved.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

D. Preinstallation Conference: Conduct conference at [**Project site**]<**Insert location**>.

1. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and flashings, installation procedures, testing and inspection procedures, and protection and repairs.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver liquid materials to Project site in original containers with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, shelf life, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by waterproofing manufacturer.

C. Remove and replace liquid materials that cannot be applied within their stated shelf life.

D. Protect stored materials from direct sunlight.

1.6 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, when relative humidity exceeds 85 percent, or when temperatures are less than 5 deg F (3 deg C) above dew point.

1. Do not apply waterproofing in snow, rain, fog or mist, or when such weather conditions are imminent during application and curing period.

B. Maintain adequate ventilation during application and curing of waterproofing materials.

1.7 WARRANTY

A. Special Manufacturer's Warranty: Manufacturer's standard form in which waterproofing manufacturer[**and Installer**] agree to repair or replace waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.

1. Warranty does not include failure of waterproofing due to failure of substrate prepared and treated according to requirements or formation of new joints and cracks in substrate that exceed 1/16 inch (1.6 mm) in width.
2. Warranty Period: [**Five**] <**Insert number**> years from date of Substantial Completion.

B. Special Installer's Warranty: Specified form, [**on warranty form at end of this Section,**]signed by Installer, covering Work of this Section, for warranty period of [**two**] <**Insert number**> years.

1. Warranty includes removing and reinstalling protection board, drainage panels, insulation, pedestals, and pavers on plaza decks.

PART 2 - PRODUCTS

2.1 SINGLE-COMPONENT POLYURETHANE WATERPROOFING

A. Single-Component, Modified Polyurethane Waterproofing: Comply [**with ASTM C 836 and**]with manufacturer's written physical requirements.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. American Permaquik Inc.; PQ 6800.
b. Anti-Hydro International, Inc.; A-H Seamless Membrane.
c. Carlisle Coatings & Waterproofing Inc.; CCW-525.
d. CETCO; LDC 60.
e. Degussa Building Systems; HLM 5000.
f. Karnak Corporation; One-Kote System.
g. Meadows, W.R., Inc.; Sealtight Meadow-Pruf Seamless
h. Mer-Kote Products, Inc.; Mer-Thane 320.

i. Neogard, Div. of Jones-Blair; Neogard 7401.
j. Pacific Polymers International, Inc.; [**Elasto-Deck B.T.**] [**Elasto-Deck B.T. 100% Solids**] [**Elasto-Deck B.T. H20**].
k. Tremco Incorporated; [**Tremproof 60**] [**Vulkem 250 GC**] [**Vulkem 201**].
l. United Coatings; Elastall 1000.
m. <**Insert manufacturer's name; product name or designation**>.

B. Single-Component, Reinforced, Modified Polyurethane Waterproofing: Comply [**with ASTM C 836 and**]with manufacturer's written physical requirements.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Carlisle Coatings & Waterproofing Inc.; CCW-525-H.
b. <**Insert manufacturer's name; product name or designation**>.

C. Single-Component, Unmodified Polyurethane Waterproofing: Comply with ASTM C 836 and with manufacturer's written physical requirements.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. 3M; Scotch Clad 5893/5864.
b. Tremco Incorporated; Vulkem 101.
c. <**Insert manufacturer's name; product name or designation**>.

2.2 TWO-COMPONENT POLYURETHANE WATERPROOFING

A. Two-Component, Modified Polyurethane Waterproofing: Comply with ASTM C 836 and with manufacturer's written physical requirements.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Gaco Western Inc.; LM-60.
b. Tremco Incorporated; Vulkem 222.
c. <**Insert manufacturer's name; product name or designation**>.

B. Two-Component, Unmodified Polyurethane Waterproofing: Comply with ASTM C 836 and with manufacturer's written physical requirements.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Carlisle Coatings & Waterproofing Inc.; CCW 703 Liquiseal.

b. Pacific Polymers International, Inc.; [**Elasto-Deck B.T. 1000**] [**Elasto-Deck B.T. Two-Component**].
c. 3M; FC 100.
d. Tremco Incorporated; Vulkem 102.
e. <**Insert manufacturer's name; product name or designation**>.

C. Two-Component, Reinforced, Unmodified Polyurethane Waterproofing: Comply [**with ASTM C 836 and**]with manufacturer's written physical requirements.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Kemper System, Inc.; Kemperol 2K-PUR.
b. <**Insert manufacturer's name; product name or designation**>.

2.3 POLYESTER WATERPROOFING

A. Two-Component, Reinforced, Unsaturated Polyester Waterproofing: Comply [**with ASTM C 836 and**]with manufacturer's written physical requirements.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Kemper System, Inc.; Kemperol BR.
b. Landmark Products, Inc.; Triflex D.
c. <**Insert manufacturer's name; product name or designation**>.

2.4 LATEX-RUBBER WATERPROOFING

A. Two-Component, Unreinforced, Latex-Rubber Waterproofing: Comply [**with ASTM C 836 and**]with manufacturer's written physical requirements.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Grace, W. R. & Co.; Procor.
b. <**Insert manufacturer's name; product name or designation**>.

B. Two-Component, Reinforced, Latex-Rubber Waterproofing: Comply [**with ASTM C 836 and**]with manufacturer's written physical requirements.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Grace, W. R. & Co.; Procor Deck System 3R.
b. <**Insert manufacturer's name; product name or designation**>.

2.5 AUXILIARY MATERIALS

A. General: Provide auxiliary materials recommended by manufacturer to be compatible with one another and with waterproofing, as demonstrated by waterproofing manufacturer, based on testing and field experience.

B. Primer: Manufacturer's standard, factory-formulated polyurethane or epoxy primer.

C. Sheet Flashing: 50-mil- (1.3-mm-) minimum, nonstaining, uncured sheet neoprene.

1. Adhesive: Manufacturer's recommended contact adhesive.

D. Membrane-Reinforcing Fabric: Nonwoven, needle-punched white polyester fabric, [**6-oz./sq. yd. (200-g/sq. m)**] [**5-oz./sq. yd. (169-g/sq. m)**] [**3.2-oz./sq. yd. (109-g/sq. m)**] [**manufacturer's standard**] weight.

E. Joint Reinforcing Strip: Manufacturer's recommended fiberglass mesh or polyester fabric.

F. Joint Sealant: Multicomponent polyurethane sealant, compatible with waterproofing, complying with ASTM C 920 Type M, Class 25; Grade NS for sloping and vertical applications or Grade P for deck applications; Use NT exposure; and as recommended by manufacturer for substrate and joint conditions.

1. Backer Rod: Closed-cell polyethylene foam.

2.6 PROTECTION COURSE

A. 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 (3 mm)**] [**1/4 inch (6 mm)**], nominal.
2. Thickness: 1/8 inch (3 mm), nominal, for vertical applications; 1/4 inch (6 mm), nominal, elsewhere.
3. Adhesive: Rubber-based solvent type recommended by waterproofing manufacturer for type of protection course.

B. Protection Course: Fan folded, with a core of extruded-polystyrene board insulation faced [**one**] [**or**] [**both**] side(s) with plastic film, nominal thickness of 1/4 inch (6 mm), with compressive strength not less than 8 psi (55 kPa) per ASTM D 1621 and maximum water absorption by volume of 0.6 percent per ASTM C 272.

C. Protection Course: Unfaced, fan-folded, rigid, extruded-polystyrene board insulation; nominal thickness of 1/4 inch (6 mm) with compressive strength of not less than 8 psi (55 kPa) per ASTM D 1621.

D. Protection Course: Fan folded, with a core of molded-polystyrene board insulation faced both sides with plastic film, nominal thickness of [**1/4 inch (6 mm)**] [**3/8 inch (9.5 mm)**] [**1/2 inch (13 mm)**], with compressive strength not less than 12 psi (83 kPa) per ASTM D 1621 and water absorption by volume of less than 1 percent per ASTM C 272.

E. Protection Course: Unfaced, extruded-polystyrene board insulation; ASTM C 578, Type X, 1/2 inch (13 mm) thick.

F. Protection Course: Molded-polystyrene board insulation, ASTM C 578, Type I, 0.90-lb/cu. ft. (15-kg/cu. m) minimum density, 1-inch (25-mm) minimum thickness.

2.7 MOLDED-SHEET DRAINAGE PANELS

A. Molded-Sheet Drainage Panel: Comply with Division 33 Section "Subdrainage."

B. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: Manufactured composite subsurface drainage panels consisting of a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 (0.21-mm) sieve laminated to one side[**with**] [**or**] [**without**] a polymeric film bonded to the other side of a studded, nonbiodegradable, molded-plastic-sheet drainage core, with a vertical flow rate of 9 to 15 gpm per ft. (112 to 188 L/min. per m).

C. Woven-Geotextile-Faced, Molded-Sheet Drainage Panel: Manufactured composite subsurface drainage panels consisting of a woven-geotextile facing with an apparent opening size not exceeding No. 40 (0.43-mm) sieve, laminated to one side[**with**] [**or**] [**without**] a polymeric film bonded to the other side of a studded, nonbiodegradable, molded-plastic-sheet drainage core, with a horizontal flow rate not less than 2.8 gpm per ft. (35 L/min. per m).

2.8 INSULATION

A. Board Insulation: Extruded-polystyrene board insulation complying with ASTM C 578, [**square**] [**or**] [**shiplap**] edged.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. DiversiFoam Products.
    b. Dow Chemical Company (The).
    c. Owens Corning.
    d. Pactiv Corporation.
    e. T. Clear Corporation.
    f. <**Insert manufacturer's name**>.

2. Type IV, 25-psi (173-kPa) minimum compressive strength.
3. Type VI, 40-psi (276-kPa) minimum compressive strength.
4. Type VII, 60-psi (414-kPa) minimum compressive strength.
5. Type V, 100-psi (690-kPa) minimum compressive strength.

B. Unfaced, Wall Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, [**Type IV, 25-psi (173-kPa)**] [**Type VI, 40-psi (276-kPa)**] minimum compressive strength; unfaced; fabricated with shiplap or channel edges and with one side having grooved drainage channels.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. DiversiFoam Products; CertiFoam [**25**] [**40**] Drainage Board.
    b. Dow Chemical Company (The); Perimate.
    c. Pactiv Corporation; Green-Guard-DC.
    d. <**Insert manufacturer's name; product name or designation**>.

C. Geotextile-Faced, Wall Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, [**Type IV, 25-psi (173-kPa)**] [**Type VI, 40-psi (276-kPa)**] minimum compressive strength; fabricated with tongue-and-groove edges and with one side having grooved drainage channels faced with a nonwoven-geotextile filter fabric.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. Owens Corning; Insul-Drain.
    b. T. Clear Corporation; Thermadry [**750**] [**1250**].
    c. <**Insert manufacturer's name; product name or designation**>.

D. Unfaced, Plaza Deck, Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, [**Type VI, 40-psi (276-kPa)**] [**Type VII, 60-psi (414-kPa)**] minimum compressive strength; unfaced; fabricated with shiplapped or channel edges and with one side having ribbed drainage channels.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. DiversiFoam Products; CertiFoam Plaza Deck.
    b. Dow Chemical Company (The); Styrofoam Ribbed Roofmate.
    c. Owens Corning; [**Foamular 404 RB**] [**Foamular 604 RB**].
    d. <**Insert manufacturer's name; product name or designation**>.

E. Geotextile-Faced, Plaza Deck, Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, Type VII, 60-psi (414-kPa) minimum compressive strength; fabricated with tongue-and-groove edges and with one side having grooved drainage channels faced with manufacturer's standard, nonwoven-geotextile filter fabric.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. T. Clear Corporation; Thermadry 1750.
    b. <**Insert manufacturer's name; product name or designation**>.

2.9 PLAZA DECK PAVERS

A. Plaza Deck Pavers: [**Brick**] [**Concrete**] [**Asphalt-block**] pavers specified in Division 32 Section "Unit Paving."

B. Plaza Deck Pavers: [**Granite**] [**Limestone**] [**Marble**] [**Quartz-based stone**] [**Slate**] pavers specified in Division 09 Section "Stone Flooring."

C. Plaza Deck Pavers: Heavyweight, hydraulically pressed, concrete units, [**square edged**] [**with top edges beveled 3/16 inch (5 mm)**], manufactured for use as plaza deck pavers; minimum compressive strength of [**7500 psi (52 MPa)**] [**6500 psi (45 MPa)**] <**Insert value**>, ASTM C 140; absorption not greater than 5 percent, ASTM C 140; no breakage and maximum 1 percent mass loss when tested for freeze-thaw resistance according to ASTM C 67.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:
2. Basis-of-Design Product: Subject to compliance with requirements, provide [**product indicated on Drawings**] <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

    a. Hanover Architectural Products.
    b. Hastings Pavement Company, LLC.
    c. Roofblok Ltd.
    d. Sunny Brook Pressed Concrete Co.
    e. Wausau Tile, Inc.; Terra-Paving Div.
    f. Westile Roofing Products.
    g. <**Insert manufacturer's name**>.

3. Thickness: [**1-5/8 inches (41 mm)**] [**1-3/4 inches (45 mm)**] [**2 inches (51 mm)**] [**2-3/8 inches (60 mm)**] <**Insert dimension**>.
4. Face Size: [**8-7/8 inches (225 mm) square**] [**9 inches (229 mm) square**] [**9-by-18 inches (229-by-457 mm)**] [**12 inches (305 mm) square**] [**12-by-24 inches (305-by-610 mm)**] [**18 inches (457 mm) square**] [**24 inches (610 mm) square**] [**As indicated**] <**Insert dimensions and shape**>.
5. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

D. Setting Bed: Provide [**aggregate**] [**mortar**] [**bituminous**] setting-bed materials specified in Division 32 Section "Unit Paving."

E. Paver Pedestals: Paver manufacturer's standard SBR rubber, high-density polyethylene, or polyurethane paver support assembly, including [**fixed-height**] [**adjustable or stackable**] pedestals, shims, and spacer tabs for joint spacing of [**1/8 inch (3 mm)**] [**3/16 inch (5 mm)**] [**1/8 to 3/16 inch (3 to 5 mm)**].

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

2. Basis-of-Design Product: Subject to compliance with requirements, provide [**product indicated on Drawings**] <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

   a. <**Insert manufacturer's name**>.

3. Concrete Fill: ACI 301, compressive strength of 5000 psi (34 MPa) at 28 days and air content of 6 percent.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.

1. Verify that concrete has cured and aged for minimum time period recommended by waterproofing manufacturer.
2. Verify that substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

A. Clean and prepare substrate according to manufacturer's written recommendations. Provide clean, dust-free, and dry substrate for waterproofing application.

B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage or overspray affecting other construction.

C. Close off deck drains and other deck penetrations to prevent spillage and migration of waterproofing fluids.

D. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, acid residues, and other penetrating contaminants or film-forming coatings from concrete.

1. Abrasive blast clean concrete surfaces uniformly to expose top surface of fine aggregate according to ASTM D 4259 with a self-contained, recirculating, blast-cleaning apparatus. Remove material to provide a sound surface free of laitance, glaze, efflorescence, curing compounds, concrete hardeners, or form-release agents. Remove remaining loose material and clean surfaces according to ASTM D 4258.

E. Remove fins, ridges, and other projections and fill honeycomb, aggregate pockets, and other voids.

3.3 PREPARATION AT TERMINATIONS AND PENETRATIONS

A. Prepare vertical and horizontal surfaces at terminations and penetrations through waterproofing and at expansion joints, drains, and sleeves according to [**ASTM C 898**] [**ASTM C 1471**] and manufacturer's written instructions.

B. Prime substrate unless otherwise instructed by waterproofing manufacturer.

C. Apply waterproofing in two separate applications, and embed a joint reinforcing strip in the first preparation coat when recommended by waterproofing manufacturer.

1. Provide sealant cants around penetrations and at inside corners of deck-to-wall butt joints when recommended by waterproofing manufacturer.

3.4 JOINT AND CRACK TREATMENT

A. Prepare, treat, rout, and fill joints and cracks in substrate according to [**ASTM C 898**] [**ASTM C 1471**] and waterproofing manufacturer's written instructions. Remove dust and dirt from joints and cracks, complying with ASTM D 4258, before coating surfaces.

1. Comply with ASTM C 1193 for joint-sealant installation.
2. Apply bond breaker between sealant and preparation strip.
3. Prime substrate and apply a single thickness of preparation strip extending a minimum of 3 inches (75 mm) along each side of joint. Apply waterproofing in two separate applications and embed a joint reinforcing strip in the first preparation coat.

B. Install sheet flashing and bond to deck and wall substrates where indicated or required according to waterproofing manufacturer's written instructions.

1. Extend sheet flashings onto perpendicular surfaces and other work penetrating substrate according to ASTM C 898.

3.5 WATERPROOFING APPLICATION

A. Apply waterproofing according to [**ASTM C 898**] [**ASTM C 1471**] and manufacturer's written instructions.

B. Start installing waterproofing in presence of manufacturer's technical representative.

C. Apply primer over prepared substrate.

D. Unreinforced Waterproofing Applications: Mix materials and apply waterproofing by spray, roller, notched squeegee, trowel, or other application method suitable to slope of substrate.

1. Apply one or more coats of waterproofing to obtain a seamless membrane free of entrapped gases, with an average dry film thickness of [**60 mils (1.5 mm) and a minimum dry film thickness of 50 mils (1.3 mm) at any point**] [**120 mils (3 mm)**] <**Insert thickness**>.
2. Apply waterproofing to prepared wall terminations and vertical surfaces.
3. Verify wet film thickness of waterproofing every 100 sq. ft. (9.3 sq. m).

E. Reinforced Waterproofing Applications: Mix materials and apply waterproofing by roller, notched squeegee, trowel, or other suitable application method.

1. Apply first coat of waterproofing, embed membrane-reinforcing fabric, and apply second coat of waterproofing to completely saturate reinforcing fabric and to obtain a seamless reinforced membrane free of entrapped gases, with an average dry film total thickness of [**70 mils (1.8 mm)**] [**80 mils (2 mm)**] [**120 mils (3 mm)**] <**Insert thickness**>.
2. Apply reinforced waterproofing to prepared wall terminations and vertical surfaces.
3. Verify wet film thickness of waterproofing every 100 sq. ft. (9.3 sq. m).

F. Install protection course with butted joints over nominally cured membrane before starting subsequent construction operations.

1. [**Molded-sheet drainage panels**] [**Insulation drainage panels**] [**Board insulation**] may be used in place of a separate protection course to vertical applications when approved by waterproofing manufacturer.

3.6 MOLDED-SHEET DRAINAGE PANEL INSTALLATION

A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck substrate, according to manufacturer's written instructions. Use adhesives[**or mechanical fasteners**] that do not penetrate waterproofing. Lap edges and ends of geotextile fabric to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.

1. For vertical applications, install [**board insulation**] [**protection course**] before installing drainage panels.

3.7 INSULATION INSTALLATION

A. Install [**one or more layers of board insulation to achieve required thickness**] [**insulation drainage panels**] over waterproofed surfaces. Cut and fit to within 3/4 inch (19 mm) of projections and penetrations.

B. On vertical surfaces, set insulation units in adhesive applied according to manufacturer's written instructions. Use type of adhesive recommended in writing by insulation manufacturer.

C. On horizontal surfaces, place insulation units unadhered according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

3.8 PLAZA DECK PAVER INSTALLATION

A. Setting Bed: Install setting bed in locations and of thickness indicated to comply with requirements in [**Division 32 Section "Unit Paving."**] [**Division 09 Section "Stone Flooring."**]

B. Install concrete pavers, in locations indicated, according to manufacturer's written instructions.

C. Accurately install [**fixed**] [**adjustable**]-height paver pedestals in locations and to elevations required. Adjust for final level and slope with shims.

1. Fill paver pedestal with concrete mix, strike smooth with top of pedestal, and cure according to ACI 301.

D. Loosely lay pavers on pedestals, maintaining a uniform open joint width. Tightly seat pavers against spacers to eliminate lateral movement or drift of paving assembly. Align joint patterns parallel in each direction.

1. Lay out pavers to avoid less-than-half-width pavers at perimeter or other terminations.

E. Install pavers to not vary more than 1/16 inch (1.6 mm) in elevation between adjacent pavers or more than 1/16 inch (1.6 mm) from surface plane elevation of individual paver.

F. Maintain tolerances of paving installation within [**1/4 inch in 10 feet (1:48)**] <**Insert surface tolerance**> of surface plane in any direction.

3.9 FIELD QUALITY CONTROL

A. Engage a full time site representative qualified by the waterproofing membrane manufacturer to inspect substrate conditions, surface preparation, and application of the membrane, flashings, protection, and drainage components; and to furnish daily reports to Architect.

B. Flood Testing: Flood test each deck area for leaks, according to recommendations in ASTM D 5957, after completing waterproofing but before overlaying construction is placed. Install temporary containment assemblies, plug or dam drains, and flood with potable water.

1. Flood to an average depth of 2-1/2 inches (64 mm) with a minimum depth of 1 inch (25 mm) and not exceeding a depth of 4 inches (100 mm). Maintain 2 inches (50 mm) of clearance from top of sheet flashings.
2. Flood each area for [**24**] [**48**] [**72**] hours.
3. After flood testing, repair leaks, repeat flood tests, and make further repairs until waterproofing installation is watertight.

C. [**Owner will engage**] [**Engage**] an independent testing agency to observe flood testing and examine underside of decks and terminations for evidence of leaks during flood testing.

3.10 CURING, PROTECTION, AND CLEANING

A. Cure waterproofing according to manufacturer's written recommendations, taking care to prevent contamination and damage during application stages and curing.

1. Do not permit foot or vehicular traffic on unprotected membrane.

B. Protect waterproofing from damage and wear during remainder of construction period.

C. Protect installed [**board insulation**] [**insulation drainage panels**] from damage due to ultraviolet light, harmful weather exposures, physical abuse, and other causes. Immediately

after installation, provide temporary coverings where insulation will be subject to abuse and cannot be concealed and protected by permanent construction.

D. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 071416

SECTION 071900 - WATER REPELLENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes [**penetrating**] [**film-forming**] [**MPI-approved**] water-repellent treatments for the following vertical and horizontal surfaces:

1. Cast-in-place concrete.
2. Precast concrete.
3. Cast stone.
4. Concrete unit masonry.
5. Clay brick masonry.
6. Natural stone.
7. Portland cement plaster (stucco).

B. Related Sections:

1. Division 03 Section "Maintenance of Cast-in-Place Concrete" for penetrating polymer sealers for exterior traffic surfaces.
2. Division 04 Section "Maintenance of Stone Assemblies" for combined stone consolidation and water-repellent treatment.
3. Division 04 Section "Unit Masonry" for integral water-repellent admixture for unit masonry assemblies.

1.3 PERFORMANCE REQUIREMENTS

A. General Performance: Water repellents shall meet performance requirements indicated without failure due to defective manufacture, fabrication, or installation.

1. Water Repellents: Comply with performance requirements specified, as determined by [**preconstruction**]testing[**on manufacturer's standard**] substrate assemblies representing those indicated for this Project.

B. Water Absorption: Minimum [**80**] [**90**] <**Insert number**> percent reduction of water absorption after 24 hours in comparison of treated and untreated specimens.

1. Cast-in Place Concrete: ASTM C 642.
2. Precast Concrete: ASTM C 642.
3. Cast Stone: ASTM C 1195.
4. Concrete Masonry Units: ASTM C 140.

5. Clay Brick: ASTM C 67.
6. Natural Stone: ASTM C 97.
7. Portland Cement Plaster (Stucco): ASTM D 6532.

C. Water-Vapor Transmission: Comply with one or both of the following:

1. Maximum [**10**] <**Insert number**> percent reduction in rate of vapor transmission in comparison of treated and untreated specimens, according to ASTM E 96/E 96M.
2. Minimum [**80**] <**Insert number**> percent water-vapor transmission in comparison of treated and untreated specimens, according to ASTM D 1653.

D. Water Penetration and Leakage through Masonry: Minimum [**90**] <**Insert number**> percent reduction in leakage rate in comparison of treated and untreated specimens, according to ASTM E 514.

E. Durability: Maximum [**5**] <**Insert number**> percent loss of water-repellent properties after 2500 hours of weathering according to ASTM G 154 in comparison to water-repellent-treated specimens before weathering.

F. Chloride-Ion Intrusion in Concrete: NCHRP Report 244, Series II tests.

1. Reduction of Water Absorption: [**80**] <**Insert number**> percent.
2. Reduction in Chloride Content: [**80**] <**Insert number**> percent.

1.4 PRECONSTRUCTION TESTING

A. Preconstruction Testing: Installed water repellents shall comply with performance requirements indicated, as evidenced by reports [**of tests performed on manufacturer's standard substrate assemblies**] [**based on Project-specific preconstruction testing of existing substrate assemblies**] by a qualified testing agency.

1. Select sizes and configurations of assemblies to adequately demonstrate capability of water repellents to comply with performance requirements.
2. In addition to verifying performance requirements, use test applications to verify manufacturer's written instructions for application procedure and optimum rates of product application to substrate assemblies.
3. Notify Architect [**seven**] <**Insert number**> days in advance of the dates and times when assemblies will be tested.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

1. Include manufacturer's printed statement of VOC content.
2. Include manufacturer's standard colors.
3. Include manufacturer's recommended number of coats for each type of substrate and spreading rate for each separate coat.

4. Printout of current "MPI Approved Products List" for each product category specified in Part 2 that specifies water repellents approved by MPI, with the proposed product highlighted.

B. Samples: For each type[**and color**] of water repellent and substrate indicated, 12 by 12 inches (300 by 300 mm) in size, with specified water-repellent treatment applied to half of each Sample.

C. Qualification Data: For qualified [**Applicator**] [**testing agency**].

D. Product Certificates: For each type of water repellent, from manufacturer.

E. Preconstruction Testing Reports: For water-repellent-treated substrates.

F. Field quality-control reports.

G. Warranty: Special warranty specified in this Section.

1.6 QUALITY ASSURANCE

A. Applicator Qualifications: An employer of workers trained and approved by manufacturer.

B. MPI Standards: Comply with MPI standards indicated and provide water repellents listed in its "MPI Approved Products List."

C. Mockups: Apply water repellent to each type of substrate required.

1. Locate each test application as [**shown on Drawings**] [**directed by Architect**].
2. Size: [**10 sq. ft. (9.3 sq. m)**] [**25 sq. ft. (2.3 sq. m)**] <**Insert size**>.
3. Final approval by Architect of[**color and**] water-repellent application will be from test applications.

D. Preinstallation Conference: Conduct conference at [**Project site**] <**Insert location**>.

1.7 PROJECT CONDITIONS

A. Limitations: Proceed with application only when the following existing and forecasted weather and substrate conditions permit water repellents to be applied according to manufacturers' written instructions and warranty requirements:

1. Concrete surfaces and mortar have cured for not less than 28 days.
2. Building has been closed in for not less than 30 days before treating wall assemblies.
3. Ambient temperature is above 40 deg F (4.4 deg C) and below 100 deg F (37.8 deg C) and will remain so for 24 hours.
4. Substrate is not frozen and substrate-surface temperature is above 40 deg F (4.4 deg C) and below 100 deg F (37.8 deg C).
5. Rain or snow is not predicted within 24 hours.
6. Not less than [**24 hours**] [**seven days**] have passed since surfaces were last wet.
7. Windy conditions do not exist that might cause water repellent to be blown onto vegetation or surfaces not intended to be treated.

8. <**Insert restriction**>.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which [**manufacturer**] [**and**] [**Applicator**] agree(s) to repair or replace materials that fail to maintain water repellency specified in "Performance Requirements" Article within specified warranty period.

1. Warranty Period: [**Two**] [**Five**] <**Insert number**> years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PENETRATING WATER REPELLENTS

A. Silane, Penetrating Water Repellent: Clear, containing [**20**] <**Insert number**> percent or more solids of alkyltrialkoxysilanes; with alcohol, mineral spirits, water, or other proprietary solvent carrier; and with 400 g/L or less of VOCs.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Advanced Chemical Technologies, Inc.; [**Sil-Act ATS-100**] [**Sil-Act Multiguard**].
b. BASF Construction Chemicals, LLC; [**Enviroseal 20**] [**Enviroseal 40**] [**Hydrozo 100**] [**Hydrozo 100 Plus**].
c. Chemical Products Industries, Inc.; SW-244-100 VOC.
d. Dayton Superior Corporation; Weather Worker J-29-WB.
e. Degussa Corp; [**Protectosil Aqua-Trete 20**] [**Protectosil Aqua-Trete 40**] [**Protectosil Aqua-Trete Concentrate**] [**Protectosil Aqua-Trete BH-N**] [**Protectosil BH-O**] [**Protectosil Chem-Trete BSM 400**] [**Protectosil Chem-Trete PB 100**].
f. Fox Industries, Inc.; [**FX-424**] [**FX-425**].
g. Kelly-Moore Paint Company Inc.; Kel-Seal 77.
h. LymTal International, Inc.; [**Iso-Flex 618-50 VOC**] [**Iso-Flex 618-100 CRS**].
i. Nox-Crete Products Group; [**Stifel GC**] [**Stifel HC**] [**Stifel SC**] [**Stifel VC**].
j. Pecora Corporation; [**KlereSeal 940-S VOC**] [**KlereSeal 9100-S**].
k. Price Research, Ltd.; [**Price Aqua Seal-40**] [**Price Aqua Silane-20**] [**Price Aqua Silane-40**].
l. PROSOCO, Inc.; [**SL100**] [**SLX100**].
m. Specco Industries, Inc.; Waterstopper S-40 Silane.
n. Tamms Industries, Inc., Euclid Chemical Company (The); Baracade Silane 100.
o. Textured Coatings of America, Inc.; [**Rainstopper 110**] [**Rainstopper 120**] [**Rainstopper 140**] [**Rainstopper 1750 Clear**].
p. Tnemec Inc.; [**Dur A Pell 40**] [**Dur A Pell 100**].
q. Vexcon Chemicals Inc.; [**Certi-Vex Envio Water Proof 100**] [**Certi-Vex Envio Water Proof 500**] [**Certi-Vex Penseal 244 VOC AIM**] [**Certi-Vex Stain**

Repellent AIM] [**Certi-Vex Stain Repellent WB**] [**Powerseal 20**] [**Powerseal 40**].

r. Wacker Chemical Corporation; [**Silres BS 1316**] [**Silres BS Creme C**].

s. <**Insert manufacturer's name; product name or designation**>.

B. Silane, Penetrating Water Repellent: Clear, containing [**20**] <**Insert number**> percent or more solids of alkyltrialkoxysilanes; with alcohol, mineral spirits, water, or other proprietary solvent carrier; and with 600 g/L or less of VOCs.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Advanced Chemical Technologies, Inc.; [**Sil-Act ATS-22 VOC**] [**Sil-Act ATS-42**] [**Sil-Act ATS-42L**] [**Sil-Act ATS-55**] [**Sil-Act ATS-100**] [**Sil-Act Multiguard**].

b. BASF Construction Chemicals, LLC; [**Enviroseal 20**] [**Enviroseal 40**] [**Hydrozo 100**] [**Hydrozo 100 Plus**] [**Hydrozo Clear 40 VOC**] [**Hydrozo Silane 40 VOC**] [**Masterseal SL 40 VOC**] [**Penetrating Sealer 40 VOC**].

c. Chemical Products Industries, Inc.; [**SW-244-100 VOC**] [**SW-244-40 VOC**].

d. ChemMasters; Aquanil Plus 40.

e. Conspec by Dayton Superior; [**Conspec Silane 20 WB**] [**Conspec Silane 40**] [**Conspec Silane 40 WB**].

f. Dayton Superior Corporation; Weather Worker J-29-WB.

g. Degussa Corporation; [**Protectosil Aqua-Trete 20**] [**Protectosil Aqua-Trete 40**] [**Protectosil Aqua-Trete Concentrate**] [**Protectosil Aqua-Trete BH-N**] [**Protectosil BH-O**] [**Protectosil Chem-Trete 40 VOC**] [**Protectosil Chem-Trete BSM 400**] [**Protectosil Chem-Trete PB 100**] [**Protectosil Chem-Trete 4PB VOC**].

h. Fox Industries, Inc.; [**FX-424**] [**FX-425**].

i. H&C Concrete Care Products, Sherwin-Williams Company (The); H&C SL-40.

j. Kelly-Moore Paint Company Inc.; Kel-Seal 77.

k. LymTal International, Inc.; [**Iso-Flex 618-40 VOC**] [**Iso-Flex 618-50 VOC**] [**Iso-Flex 618-100 CRS**].

l. Nox-Crete Products Group; [**Stifel GC**] [**Stifel HC**] [**Stifel SC**] [**Stifel VC**].

m. Pecora Corporation; [**KlereSeal 940-S VOC**] [**KlereSeal 9100-S**].

n. Price Research, Ltd.; [**Price Aqua Seal-40**] [**Price Aqua Silane-20**] [**Price Aqua Silane-40**].

o. PROSOCO, Inc.; [**SL40 -600**] [**SL100**] [**SLX100**].

p. Specco Industries, Inc.; Waterstopper S-40 Silane.

q. Symons by Dayton Superior; [**Silane 40%**] [**Silane 100%**].

r. Tamms Industries, Inc., Euclid Chemical Company (The); [**Baracade Silane 40**] [**Baracade Silane 40 IPA**].

s. Textured Coatings of America, Inc.; [**Rainstopper 110**] [**Rainstopper 120**] [**Rainstopper 140**] [**Rainstopper 1750 Clear**].

t. TK Products, Division of Sierra Corporation; [**TK-590 Tri-Silane**] [**TK-1311 WB**].

u. Tnemec Inc.; [**Deck A Pell 40**] [**Dur A Pell 40**] [**Dur A Pell 100**].

v. Vexcon Chemicals Inc.; [**Certi-Vex Envio Water Proof 100**] [**Certi-Vex Envio Water Proof 500**] [**Certi-Vex Penseal 244 40%**] [**Certi-Vex Penseal 244 VOC AIM**] [**Certi-Vex Stain Repellent**] [**Certi-Vex Stain**

Repellent AIM] [**Certi-Vex Stain Repellent WB**] [**Powerseal 20**] [**Powerseal 40**].

w. Wacker Chemical Corporation; [**Silres BS 1316**] [**Silres BS Creme C**].

x. <**Insert manufacturer's name; product name or designation**>.

C. Siloxane, Penetrating Water Repellent: Clear, containing [**10**] <**Insert number**> percent or more solids of oligomerous alkylalkoxysiloxanes; with alcohol, ethanol, mineral spirits, water, or other proprietary solvent carrier; and with 400 g/L or less of VOCs.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Chemical Products Industries, Inc.; [**CP-250W**] [**CP-500W**].

b. ChemMasters; Aquanil Plus WB.

c. Conproco Corporation; Conpro Shield MX.

d. Dayton Superior Corporation; [**Weather Worker WB (J-26-WB)**] [**Weather Worker WB Heavy Duty (J-27-WB)**].

e. Diedrich Technologies, Inc.; 303-C.

f. Euclid Chemical Company (The), an RPM company; Euco-Guard VOX.

g. H&C Concrete Care Products, Sherwin-Williams Company (The); [**H&C Super V**] [**H&C SX-7**].

h. Price Research, Ltd.; [**Price Aqua Seal-20**] [**Price Aqua Siloxane-#7**].

i. Rainguard Products Company; MicroSeal.

j. SaverSystems; DEFY Water Repellent for Brick.

k. Specco Industries, Inc.; Waterstopper S-10 WB Siloxane.

l. Tamms Industries, Inc., Euclid Chemical Company (The); Baracade M.E.

m. Textured Coatings of America, Inc.; [**Rainstopper 600**] [**Rainstopper 1500**].

n. <**Insert manufacturer's name; product name or designation**>.

D. Siloxane, Penetrating Water Repellent: Clear, containing [**10**] <**Insert number**> percent or more solids of oligomerous alkylalkoxysiloxanes; with alcohol, ethanol, mineral spirits, water, or other proprietary solvent carrier; and with 600 g/L or less of VOCs.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Chemical Products Industries, Inc.; [**CP-250W**] [**CP-500W**].

b. ChemMasters; Aquanil Plus WB.

c. Conproco Corporation; Conpro Shield MX.

d. Conspec by Dayton Superior; Weather Seal WB.

e. Dayton Superior Corporation; [**Weather Worker WB (J-26-WB)**] [**Weather Worker WB Heavy Duty (J-27-WB)**].

f. Diedrich Technologies, Inc.; 303-C.

g. Euclid Chemical Company (The), an RPM company; Euco-Guard VOX.

h. Fabrikem Manufacturing Ltd.; [**Fabrishield 650**] [**Fabrishield 652**] [**Fabrishield 653**].

i. H&C Concrete Care Products, Sherwin-Williams Company (The); [**H&C Super V**] [**H&C SX-7**].

j. Price Research, Ltd.; [**Price Aqua Seal**] [**Price Aqua Seal-20**] [**Price Aqua Siloxane-#7**].
k. PROSOCO, Inc.; [**Limestone & Marble Protector**] [**Natural Stone Treatment**].
l. Rainguard Products Company; MicroSeal.
m. SaverSystems; DEFY Water Repellent for Brick.
n. Specco Industries, Inc.; [**Waterstopper S-10 WB Siloxane**] [**Waterstopper S-20 Siloxane**].
o. Tamms Industries, Inc., Euclid Chemical Company (The); Baracade M.E.
p. Textured Coatings of America, Inc.; [**Rainstopper 600**] [**Rainstopper 1500**].
q. <**Insert manufacturer's name; product name or designation**>.

E. Silane/Siloxane-Blend, Penetrating Water Repellent: Clear, silane and siloxane blend with 400 g/L or less of VOCs.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Advanced Chemical Technologies, Inc.; Sil-Act Dri-Treat.
b. BASF Construction Chemicals, LLC; [**Enviroseal 7**] [**Enviroseal Double 7 for Brick**] [**Enviroseal Double 7 HD**] [**Enviroseal PBT**] [**White Roc 10 WB**].
c. Conproco Corporation; [**Conpro Shield W**] [**Conpro Shield W20**].
d. Degussa Corporation; Protectosil Aqua-Trete EM.
e. Fabrikem Manufacturing Ltd.; Fabrishield 900 Series.
f. Karnak Corporation; [**LL10**] [**LL20**].
g. Kryton International Inc., Kryton Group of Companies (The); Hydrostop WB.
h. L&M Construction Chemicals, Inc.; [**Aquapel**] [**Aquapel Plus**] [**Hydroblock**] [**Hydropel WB**].
i. LymTal International, Inc.; Iso-Flex 628.
j. OKON Co., Inc., Division of ZINSSER Co., Inc., an RPM company; [**S-20**] [**S-40**].
k. Pecora Corporation; [**KlereSeal 910-W**] [**KlereSeal 920-W**].
l. Price Research, Ltd.; [**Price Aqua Seal-77**] [**Price Salt-Sentry WB**].
m. PROSOCO, Inc.; [**Saltguard WB**] [**Siloxane PD**] [**Siloxane WB Concentrate**] [**Weather Seal GP**].
n. Rainguard Products Company; [**Blok-Lok**] [**Regular**] [**Super**].
o. SaverSystems; DEFY All-Purpose Heavy-Duty Water Repellent.
p. Sika Corporation, Inc.; Sikagard 701W.
q. Symons by Dayton Superior; Siloxane/Silane 10%.
r. Tamms Industries, Inc., Euclid Chemical Company (The); [**Baracade WB 244**] [**Chemstop WB Regular**] [**Chemstop WB Heavy Duty**].
s. Tnemec Inc.; [**Dur A Pell 10**] [**Dur A Pell 20**] [**Prime-A-Pell H2O**] [**Prime-A-Pell Plus, Series V662**].
t. Wacker Chemical Corporation; [**Silres BS 1001A**] [**Silres BS 2001**] [**Silres BS SMK 1311**].
u. <**Insert manufacturer's name; product name or designation**>.

F. Silane/Siloxane-Blend, Penetrating Water Repellent: Clear, silane and siloxane blend with 600 g/L or less of VOCs.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. Advanced Chemical Technologies, Inc.; Sil-Act Dri-Treat.
    b. BASF Construction Chemicals, LLC; [**Enviroseal 7**] [**Enviroseal Double 7 for Brick**] [**Enviroseal Double 7 HD**] [**Enviroseal PBT**] [**White Roc 10 WB**].
    c. Conproco Corporation; [**Conpro Shield W**] [**Conpro Shield W20**].
    d. Degussa Corporation; Protectosil Aqua-Trete EM.
    e. Fabrikem Manufacturing Ltd.; [**Fabrishield 760**] [**Fabrishield 761**] [**Fabrishield 762**] [**Fabrishield 763**] [**Fabrishield 900 Series**].
    f. Karnak Corporation; [**LL10**] [**LL20**].
    g. Kryton International Inc., Kryton Group of Companies (The); Hydrostop WB.
    h. Lambert Corporation; Waterban 90.
    i. L&M Construction Chemicals, Inc.; [**Aquapel**] [**Aquapel Plus**] [**Hydroblock**] [**Hydropel WB**].
    j. LymTal International, Inc.; Iso-Flex 628.
    k. OKON Co., Inc., Division of ZINSSER Co., Inc., an RPM company; [**S-20**] [**S-40**].
    l. Pecora Corporation; [**KlereSeal 910-W**] [**KlereSeal 920-W**].
    m. Price Research, Ltd.; [**Price Aqua Seal-77**] [**Price Salt-Sentry WB**].
    n. PROSOCO, Inc.; [**Saltguard**] [**Saltguard WB**] [**Siloxane PD**] [**Siloxane WB Concentrate**] [**Weather Seal GP**].
    o. Rainguard Products Company; [**Blok-Lok**] [**Regular**] [**Super**].
    p. SaverSystems; DEFY All-Purpose Heavy-Duty Water Repellent.
    q. Sika Corporation, Inc.; Sikagard 701W.
    r. Symons by Dayton Superior; Siloxane/Silane 10%.
    s. Tamms Industries, Inc., Euclid Chemical Company (The); [**Baracade WB 244**] [**Chemstop WB Regular**] [**Chemstop WB Heavy Duty**].
    t. TK Products, Division of Sierra Corporation; TK-290 WB Tri-Siloxane.
    u. Tnemec Inc.; [**Dur A Pell 10**] [**Dur A Pell 20**] [**Prime-A-Pell H2O**] [**Prime-A-Pell Plus, Series 662**] [**Prime-A-Pell Plus, Series V662**].
    v. Wacker Chemical Corporation; [**Silres BS 1001A**] [**Silres BS 2001**] [**Silres BS SMK 1311**].
    w. <**Insert manufacturer's name; product name or designation**>.

G. Siliconate, Penetrating Water Repellent: Clear, methyl siliconate water repellent with 400 g/L or less of VOCs.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. BASF Construction Chemicals, LLC; Thoroclear Special.
    b. PROSOCO, Inc.; Natural Stone Treatment WB.
    c. <**Insert manufacturer's name; product name or designation**>.

H. Proprietary-Blend, Penetrating Water Repellent: Clear, consisting of one or several different resins (silanes or siloxanes), polymers, stearates, or oils plus other compounds or products of components; and with 400 g/L or less of VOCs.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. BASF Construction Chemicals, LLC; Enviroseal Surface Guard.
    b. PROSOCO, Inc.; [**Stain Barrier**] [**STMP**].
    c. <**Insert manufacturer's name; product name or designation**>.

I. Proprietary-Blend, Penetrating Water Repellent: Clear, consisting of one or several different resins (silanes or siloxanes), polymers, stearates, or oils plus other compounds or products of components; and with 600 g/L or less of VOCs.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. BASF Construction Chemicals, LLC; [**Enviroseal Surface Guard**] [**Hydrozo Clear Double 7 VOC**] [**White Roc 10 VOC**].
    b. PROSOCO, Inc.; [**Impregnator**] [**Stain Barrier**] [**STMP**].
    c. <**Insert manufacturer's name; product name or designation**>.

2.2 FILM-FORMING WATER REPELLENTS

A. Silicone-Resin Sealer, Film-Forming Water Repellent: Clear, polymerized, silicone-resin water repellent for dense substrates; with a solvent- or waterborne solution containing not less than 3 and up to 5 percent solids by weight; and with 400 g/L or less of VOCs.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. H&C Concrete Care Products, Sherwin-Williams Company (The); H&C WB-50.
    b. Professional Products of Kansas, Inc.; Professional Water Sealant (Regular).
    c. <**Insert manufacturer's name; product name or designation**>.

B. Silicone-Resin Sealer, Film-Forming Water Repellent: Clear, polymerized, silicone-resin water repellent for dense substrates; with a solvent- or waterborne solution containing not less than 3 and up to 5 percent solids by weight; and with 600 g/L or less of VOCs.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. ChemMasters; Aquanil.
    b. H&C Concrete Care Products, Sherwin-Williams Company (The); H&C WB-50.
    c. Professional Products of Kansas, Inc.; Professional Water Sealant (Regular).
    d. <**Insert manufacturer's name; product name or designation**>.

C. Proprietary-Blend, Film-Forming Water Repellent: [**Clear**] [**Pigmented**], consisting of one or several different resins, acrylics, polymers, stearates, or oils plus other compounds or products of components; and with 400 g/L or less of VOCs.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. OKON Co., Inc., Division of ZINSSER Co., Inc., an RPM company; [**Multi-Surface**] [**Okon W-1**] [**Okon W-2**].
b. SaverSystems; DEFY Water Repellent for Split-Face Block.
c. Wacker Chemical Corporation; Silres BS 29 A.
d. ChemMasters; Colorsil.
e. Nox-Crete Products Group; Nox Carb X.
f. Textured Coatings of America, Inc.; [**Rainstopper 400 (Semi-Transparent)**] [**Rainstopper 500 (Opaque)**].
g. <**Insert manufacturer's name; product name or designation**>.

2. Color: [**As indicated by manufacturer's designations**] [**Match Architect's samples**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

D. Proprietary-Blend, Film-Forming Water Repellent: [**Clear**] [**Pigmented**], consisting of one or several different resins, acrylics, polymers, stearates, or oils plus other compounds or products of components; and with 600 g/L or less of VOCs.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. OKON Co., Inc., Division of ZINSSER Co., Inc., an RPM company; [**Multi-Surface**] [**Okon W-1**] [**Okon W-2**].
b. SaverSystems; DEFY Water Repellent for Split-Face Block.
c. Wacker Chemical Corporation; Silres BS 29 A.
d. ChemMasters; Colorsil.
e. Nox-Crete Products Group; Nox Carb.
f. PROSOCO, Inc.; Breathable Masonry Coating II.
g. Textured Coatings of America, Inc.; [**Rainstopper 400 (Semi-Transparent)**] [**Rainstopper 500 (Opaque)**].
h. <**Insert manufacturer's name; product name or designation**>.

2. Color: [**As indicated by manufacturer's designations**] [**Match Architect's samples**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

E. Acrylic, Film-Forming Water Repellent: [**Clear**] [**Pigmented**], breathing coating of acrylic resins; with a waterborne, solvent-borne, or acrylic emulsion solution containing less than 15 percent solids by volume; and with 400 g/L or less of VOCs.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. BASF Construction Chemicals, LLC; White Roc W.
b. Convenience Products, Division of Clayton Corporation; [**Seal-Krete Multi-Surface**] [**Seal-Krete Original**].
c. Nox-Crete Products Group; Sparkl-Seal E.
d. OKON Co., Inc., Division of ZINSSER Co., Inc., an RPM company; Plugger.
e. Nox-Crete Products Group; Acryl Pen X.
f. <**Insert manufacturer's name; product name or designation**>.

2. Color: [**As indicated by manufacturer's designations**] [**Match Architect's samples**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

F. Acrylic, Film-Forming Water Repellent: [**Clear**] [**Pigmented**], breathing coating of acrylic resins; with a waterborne, solvent-borne, or acrylic emulsion solution containing less than 15 percent solids by volume; with 600 g/L or less of VOCs.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Convenience Products, Division of Clayton Corporation; [**Seal-Krete Multi-Surface**] [**Seal-Krete Original**].
b. OKON Co., Inc., Division of ZINSSER Co., Inc., an RPM company; Plugger.
c. BASF Construction Chemicals, LLC; White Roc Toner VOC.
d. Nox-Crete Products Group; Acryl Pen.
e. <**Insert manufacturer's name; product name or designation**>.

2. Color: [**As indicated by manufacturer's designations**] [**Match Architect's samples**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

2.3 MPI-APPROVED WATER REPELLENTS

A. Water Repellent, Clear (Paintable); MPI #34: Penetrating, solvent-borne, clear water-repellent coating, for use on interior or exterior masonry, brick, and concrete surfaces, and that can be recoated with conventional paints; often applied by flooding the surface under low-pressure spray.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. <**Insert manufacturer's name; product name or designation**>.

2. VOC Content: [**600 g/L or less**] [**Less than 151 g/L**] <**Insert limit**>.
3. MPI Green Performance Standard: [**GPS-1**] [**GPS-2**].

B. Water Repellent, Clear (Not Paintable); MPI #117: Penetrating, solvent-borne, silicone-oil type, clear water-repellent for interior or exterior masonry block or brick that will not be recoated with a coating other than the repellent; applied by brush, flooding, spray, or roller.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

   a. <**Insert manufacturer's name; product name or designation**>.

2. VOC Content: [**600 g/L or less**] [**400 g/L or less**] [**Less than 201 g/L**] <**Insert limit**>.
3. MPI Green Performance Standard: [**GPS-1**] [**GPS-2**].

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements and conditions affecting performance of the Work.

1. Verify that surfaces are clean and dry according to water-repellent manufacturer's requirements. Check moisture content in [**three**] <**Insert number**> representative locations by method recommended by manufacturer.
2. Inspect for previously applied treatments that may inhibit penetration or performance of water repellents.
3. Verify that there is no efflorescence or other removable residues that would be trapped beneath the application of water repellent.
4. Verify that required repairs are complete, cured, and dry before applying water repellent.

B. Test pH level according to water-repellent manufacturer's written instructions to ensure chemical bond to silica-containing or siliceous minerals.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Cleaning: Before application of water repellent, clean substrate of substances that could impair penetration or performance of product according to water-repellent manufacturer's written instructions[**and as follows:**][**.**]

1. [**Cast-in-Place Concrete**] [**Precast Concrete**] [**Cast Stone**] [**and**] [**Concrete Unit Masonry**]: Remove oil, curing compounds, laitance, and other substances that inhibit penetration or performance of water repellents [**according to ASTM E 1857**] <**Insert requirement**>.
2. Clay Brick Masonry: [**ASTM D 5703.**] [**Division 04 Section "Maintenance of Unit Masonry."**]
3. Natural Stone: [**ASTM C 1515.**] [**ASTM D 5107.**] [**Division 04 Section "Maintenance of Stone Assemblies."**]
4. Portland Cement Plaster (Stucco): [**ASTM E 1857**] <**Insert requirement**>.

B. Protect adjoining work, including mortar and sealant bond surfaces, from spillage or blow-over of water repellent. Cover adjoining and nearby surfaces of aluminum and glass if there is the possibility of water repellent being deposited on surfaces. Cover live vegetation.

C. Coordination with Mortar Joints: Do not apply water repellent until pointing mortar for joints adjacent to surfaces receiving water-repellent treatment has been installed and cured.

D. Coordination with Sealant Joints: Do not apply water repellent until sealants for joints adjacent to surfaces receiving water-repellent treatment have been installed and cured.

1. Water-repellent work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, water repellent, and sealant materials identical to those required.

3.3 APPLICATION

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect the substrate before application of water repellent and to instruct Applicator on the product and application method to be used.

B. Apply a heavy-saturation coating of water repellent, on surfaces indicated for treatment, using [**15 psi- (103 kPa-) pressure spray with a fan-type spray nozzle**] [**roller**] [**or**] [**brush**] <**Insert requirement**> to the point of saturation. Apply coating in dual passes of uniform, overlapping strokes. Remove excess material; do not allow material to puddle beyond saturation. Comply with manufacturer's written instructions for application procedure unless otherwise indicated.

1. [**Precast Concrete**] [**and**] [**Cast Stone**]: At Contractor's option, first application of water repellent on units may be completed before installing them. Mask mortar and sealant bond surfaces to prevent water repellent from migrating onto joint surfaces.

C. Apply a second saturation coating, repeating first application. Comply with manufacturer's written instructions for limitations on drying time between coats and after rainstorm wetting of surfaces between coats. Consult manufacturer's technical representative if written instructions are not applicable to Project conditions.

3.4 FIELD QUALITY CONTROL

A. Testing of Water-Repellent Material: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when water repellent is being applied:

1. Owner will engage the services of a qualified testing agency to sample water-repellent material being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
2. Testing agency will perform tests for compliance of water-repellent material with product requirements.
3. Owner may direct Contractor to stop applying water repellents if test results show material being used does not comply with product requirements. Contractor shall remove

noncomplying material from Project site, pay for testing, and correct deficiency of surfaces treated with rejected materials, as approved by Architect. <**Insert additional requirements to suit Project**>.

B. Coverage Test: In the presence of Architect, hose down a dry, repellent-treated surface to verify complete and uniform product application. A change in surface color will indicate incomplete application.

1. Notify Architect [**seven**] <**Insert number**> days in advance of the dates and times when surfaces will be tested.
2. Reapply water repellent until coverage test indicates complete coverage.

3.5 CLEANING

A. Immediately clean water repellent from adjoining surfaces and surfaces soiled or damaged by water-repellent application as work progresses. Correct damage to work of other trades caused by water-repellent application, as approved by Architect.

B. Comply with manufacturer's written cleaning instructions.

END OF SECTION 071900

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Foam-plastic board insulation.
2. Cellular-glass insulation.
3. Glass-fiber board insulation.
4. Mineral-wool board insulation.
5. Glass-fiber blanket insulation.
6. Mineral-wool blanket insulation.
7. Loose-fill insulation.
8. Spray-applied cellulosic insulation.
9. Spray polyurethane foam insulation.
10. Radiant barriers.
11. Vapor retarders.

B. Related Sections:

1. Division 04 Section "Unit Masonry" for insulation installed in[**cavity walls and**] masonry cells.
2. Division 06 Section "Sheathing" for foam-plastic board sheathing over wood or steel framing.
3. Division 07 Section "[**Self-Adhering Sheet Waterproofing**] [**Elastomeric Sheet Waterproofing**] [**Thermoplastic Sheet Waterproofing**] [**Hot Fluid-Applied Rubberized Asphalt Waterproofing**] [**Cold Fluid-Applied Waterproofing**]" for insulated drainage panels installed with waterproofing.
4. Division 07 Section "[**Polymer-Based Exterior Insulation and Finish System (EIFS)**] [**Water-Drainage Exterior Insulation and Finish System (EIFS)**]" for insulation specified as part of these systems.
5. Division 07 Section(s) "[**Built-up Asphalt Roofing**] [**Built-up Coal Tar Roofing**] [**Atactic-Polypropylene (APP) Modified Bituminous Membrane Roofing**] [**Styrene-Butadiene-Styrene (SBS) Modified Bituminous Membrane Roofing**] [**Chlorosulfonate-Polyethylene (CSPE) Roofing**] [**Ethylene-Propylene-Diene-Monomer (EPDM) Roofing**] [**Ethylene Interpolymer (KEE) Roofing**] [**Polyvinyl-Chloride (PVC) Roofing**] [**Thermoplastic Polyolefin (TPO) Roofing**] [**Modified Bituminous Protected Membrane Roofing**] [**Fluid-Applied Protected Membrane Roofing**]" [**and**] "[**Coated Foamed Roofing**]" for insulation specified as part of roofing construction.

6. Division 07 Section "Fire-Resistive Joint Systems" for insulation installed as part of a perimeter fire-resistive joint system.
7. Division 09 Section(s) "[**Gypsum Board Shaft Wall Assemblies**] [**Gypsum Plastering**] [**Portland Cement Plastering**] [**Gypsum Veneer Plastering**]" for installation in wood- and metal-framed assemblies of insulation specified by referencing this Section.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. LEED Submittals:

1. Product Data for Credit MR 4.1[**and Credit MR 4.2**]: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

D. Research/Evaluation Reports: For foam-plastic insulation, from [**ICC-ES**] <**Insert applicable model code organization**>.

1.4 QUALITY ASSURANCE

A. 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.

1.5 DELIVERY, STORAGE, AND HANDLING

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

B. Protect foam-plastic board insulation as follows:

1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site before installation time.
3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 FOAM-PLASTIC BOARD INSULATION

A. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and minimum compressive strength indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

a. DiversiFoam Products.
b. Dow Chemical Company (The).
c. Owens Corning.
d. Pactiv Building Products.
e. <**Insert manufacturer's name**>.

2. Type X, 15 psi (104 kPa).
3. Type IV, 25 psi (173 kPa).
4. Type VI, 40 psi (276 kPa).
5. Type VII, 60 psi (414 kPa).
6. Type V, 100 psi (690 kPa).

B. Unfaced Wall Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, [**Type IV, 25-psi (173-kPa)**] [**or**] [**Type VI, 40-psi (276-kPa)**] minimum compressive strength; unfaced; fabricated with shiplap or channel edges and with one side having grooved drainage channels.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

a. DiversiFoam Products.
b. Dow Chemical Company (The).
c. Pactiv Building Products.
d. <**Insert manufacturer's name**>.

C. Geotextile-Faced Wall Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, [**Type IV, 25-psi (173-kPa)**] [**or**] [**Type VI, 40-psi (276-kPa)**] minimum compressive strength; fabricated with tongue-and-groove edges and with one side having grooved drainage channels faced with nonwoven geotextile filter fabric.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Owens Corning.
b. <**Insert manufacturer's name**>.

D. Molded-Polystyrene Board Insulation: ASTM C 578, of type and minimum compressive strength indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

a. DiversiFoam Products.
b. Plymouth Foam, Inc.
c. <**Insert manufacturer's name**>.

2. Type I, 10 psi (69 kPa).
3. Type II, 15 psi (104 kPa).
4. Type VIII, 20 psi (138 kPa).

E. Foil-Faced, Polyisocyanurate Board Insulation: ASTM C 1289, Type I, [**Class 1**] [**or**] [**Class 2**], with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Atlas Roofing Corporation.
b. Dow Chemical Company (The).
c. Rmax, Inc.
d. <**Insert manufacturer's name**>.

F. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

2.2 CELLULAR-GLASS INSULATION

A. Cellular-Glass Insulation: ASTM C 552, [**Type I (flat block)**] [**Type IV (board) faced on both sides with manufacturer's special kraft-paper sheets laminated to glass block with asphalt**].

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Pittsburgh Corning Corporation.
b. <**Insert manufacturer's name**>.

B. Asphalt Coating for Cellular-Glass Block Insulation: Cutback asphalt or asphalt emulsion of type recommended by manufacturer of cellular-glass block insulation.

2.3 GLASS-FIBER BOARD INSULATION

A. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

1. CertainTeed Corporation.
2. Johns Manville.
3. Knauf Insulation.
4. Owens Corning.
5. <**Insert manufacturer's name**>.

B. Unfaced, Flexible Glass-Fiber Board Insulation: ASTM C 612, Type IA; ASTM C 553, Types I, II, and III; or ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84, passing ASTM E 136 for combustion characteristics.

1. Nominal density of 1.0 lb/cu. ft. (16 kg/cu. m), thermal resistivity of 3.7 deg F x h x sq. ft./Btu x in. at 75 deg F (25.7 K x m/W at 24 deg C).
2. Nominal density of not less than 1.5 lb/cu. ft. (24 kg/cu. m) or more than 1.7 lb/cu. ft. (27 kg/cu. m), thermal resistivity of 4 deg F x h x sq. ft./Btu x in. at 75 deg F (27.7 K x m/W at 24 deg C).

C. Foil-Faced, Flexible Glass-Fiber Board Insulation: ASTM C 612, Type IA or ASTM C 553, Types I, II, and III; faced on one side with foil-scrim-kraft vapor retarder; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84.

1. Nominal density of 1.0 lb/cu. ft. (16 kg/cu. m), thermal resistivity of 3.7 deg F x h x sq. ft./Btu x in. at 75 deg F (25.7 K x m/W at 24 deg C).
2. Nominal density of not less than 1.5 lb/cu. ft. (24 kg/cu. m) or more than 1.7 lb/cu. ft. (27 kg/cu. m), thermal resistivity of 4 deg F x h x sq. ft./Btu x in. at 75 deg F (27.7 K x m/W at 24 deg C).

D. Unfaced, Glass-Fiber Board Insulation: ASTM C 612, Type IA; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84[**, passing ASTM E 136 for combustion characteristics**].

1. Nominal density of 2.25 lb/cu. ft. (36 kg/cu. m), thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F (29.8 K x m/W at 24 deg C).
2. Nominal density of 3 lb/cu. ft. (48 kg/cu. m), thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F (29.8 K x m/W at 24 deg C).
3. Nominal density of 4.25 lb/cu. ft. (68 kg/cu. m), thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F (29.8 K x m/W at 24 deg C).
4. Nominal density of 6 lb/cu. ft. (96 kg/cu. m), thermal resistivity of 4.4 deg F x h x sq. ft./Btu x in. at 75 deg F (30.5 K x m/W at 24 deg C).

E. Foil-Faced, Glass-Fiber Board Insulation: ASTM C 612, Type IA; faced on one side with foil-scrim-kraft or foil-scrim-polyethylene vapor retarder, with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84.

1. Nominal density of 2.25 lb/cu. ft. (36 kg/cu. m), thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F (29.8 K x m/W at 24 deg C).
2. Nominal density of 3 lb/cu. ft. (48 kg/cu. m), thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F (29.8 K x m/W at 24 deg C).
3. Nominal density of 4.25 lb/cu. ft. (68 kg/cu. m), thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F (29.8 K x m/W at 24 deg C).
4. Nominal density of 6 lb/cu. ft. (96 kg/cu. m), thermal resistivity of not less than 4.34 deg F x h x sq. ft./Btu x in. at 75 deg F (30.1 K x m/W at 24 deg C).

F. Dark-Surfaced, Glass-Fiber Board Insulation: ASTM C 612, Type IA; faced on one side with black glass-fiber mat or black polymer finish; maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84.

1. Nominal density of 1.5 lb/cu. ft. (24 kg/cu. m), thermal resistivity of 4.2 deg F x h x sq. ft./Btu x in. at 75 deg F (29.1 K x m/W at 24 deg C).
2. Nominal density of 2.25 lb/cu. ft. (36 kg/cu. m), thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F (29.8 K x m/W at 24 deg C).
3. Nominal density of 3 lb/cu. ft. (48 kg/cu. m), thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F (29.8 K x m/W at 24 deg C).
4. Nominal density of 6 lb/cu. ft. (96 kg/cu. m), thermal resistivity of 4.5 deg F x h x sq. ft./Btu x in. at 75 deg F (31.2 K x m/W at 24 deg C).

G. Sustainability Requirements: Provide glass-fiber board insulation as follows:

1. Free of Formaldehyde: Insulation manufactured with 100 percent acrylic binders and no formaldehyde.
2. Low Emitting: Insulation tested according to ASTM D 5116 and shown to emit less than 0.05-ppm formaldehyde.

2.4 MINERAL-WOOL BOARD INSULATION

A. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

1. Fibrex Insulations Inc.
2. Isolatek International.
3. Owens Corning.
4. Roxul Inc.
5. Thermafiber.
6. <**Insert manufacturer's name**>.

B. Unfaced, Mineral-Wool Board Insulation: ASTM C 612; with maximum flame-spread and smoke-developed indexes of 15 and zero, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

1. Nominal density of 4 lb/cu. ft. (64 kg/cu. m), Types IA and IB, thermal resistivity of 4 deg F x h x sq. ft./Btu x in. at 75 deg F (27.7 K x m/W at 24 deg C).
2. Nominal density of 6 lb/cu. ft. (96 kg/cu. m), Type II, thermal resistivity of 4.16 deg F x h x sq. ft./Btu x in. at 75 deg F (28.8 K x m/W at 24 deg C).

3. Nominal density of 8 lb/cu. ft. (128 kg/cu. m), Type III, thermal resistivity of 4.35 deg F x h x sq. ft./Btu x in. at 75 deg F (30.2 K x m/W at 24 deg C).
4. Fiber Color: Darkened, where indicated.

C. Foil-Faced, Mineral-Wool Board Insulation: ASTM C 612; faced on one side with foil-scrim or foil-scrim-polyethylene vapor retarder; with maximum flame-spread and smoke-developed indexes of 25 and 5, respectively, per ASTM E 84.

1. Nominal density of 4 lb/cu. ft. (64 kg/cu. m), Types IA and IB, thermal resistivity of 4 deg F x h x sq. ft./Btu x in. at 75 deg F (27.7 K x m/W at 24 deg C).
2. Nominal density of 6 lb/cu. ft. (96 kg/cu. m), Type II, thermal resistivity of 4.16 deg F x h x sq. ft./Btu x in. at 75 deg F (28.8 K x m/W at 24 deg C).
3. Nominal density of 8 lb/cu. ft. (128 kg/cu. m), Type III, thermal resistivity of 4.35 deg F x h x sq. ft./Btu x in. at 75 deg F (30.2 K x m/W at 24 deg C).

2.5 GLASS-FIBER BLANKET INSULATION

A. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

1. CertainTeed Corporation.
2. Guardian Building Products, Inc.
3. Johns Manville.
4. Knauf Insulation.
5. Owens Corning.
6. <**Insert manufacturer's name**>.

B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

C. Polypropylene-Scrim-Kraft-Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type II (non-reflective faced), Class A (faced surface with a flame-spread index of 25 or less); Category 1 (membrane is a vapor barrier).

D. Kraft-Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type II (non-reflective faced), Class C (faced surface not rated for flame propagation); Category 1 (membrane is a vapor barrier).

E. Reinforced-Foil-Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type III (reflective faced), Class A (faced surface with a flame-spread index of 25 or less); Category 1 (membrane is a vapor barrier), faced with foil scrim, foil-scrim kraft, or foil-scrim polyethylene.

F. Foil-Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type III (reflective faced), Class B (faced surface with a flame-propagation resistance of 0.12 W/sq. cm); Category 1 (membrane is a vapor barrier), faced with foil scrim, foil-scrim kraft, or foil-scrim polyethylene.

G. 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.

H. Sustainability Requirements: Provide glass-fiber blanket insulation as follows:

1. Free of Formaldehyde: Insulation manufactured with 100 percent acrylic binders and no formaldehyde.
2. Low Emitting: Insulation tested according to ASTM D 5116 and shown to emit less than 0.05-ppm formaldehyde.

2.6 MINERAL-WOOL BLANKET INSULATION

A. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

1. Fibrex Insulations Inc.
2. Owens Corning.
3. Roxul Inc.
4. Thermafiber.
5. <**Insert manufacturer's name**>.

B. Unfaced, Mineral-Wool Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

C. Reinforced-Foil-Faced, Mineral-Wool Blanket Insulation: ASTM C 665, Type III (reflective faced), Class A (faced surface with a flame-spread index of 25 or less per ASTM E 84); Category 1 (membrane is a vapor barrier), faced with foil scrim, foil-scrim kraft, or foil-scrim polyethylene.

2.7 LOOSE-FILL INSULATION

A. Cellulosic-Fiber Loose-Fill Insulation: ASTM C 739, chemically treated for flame-resistance, processing, and handling characteristics.

B. Glass-Fiber Loose-Fill Insulation: ASTM C 764, [**Type I for pneumatic application**] [**or**] [**Type II for poured application**]; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84.

2.8 SPRAY-APPLIED CELLULOSIC INSULATION

A. Self-Supported, Spray-Applied Cellulosic Insulation: ASTM C 1149, [**Type I (materials applied with liquid adhesive; suitable for either exposed or enclosed applications),**] [**Type II (materials containing a dry adhesive activated by water during installation; intended only for enclosed or covered applications),**] [**Type III (materials containing an**

adhesive mixed with water during application; intended for application on attic floors),] chemically treated for flame-resistance, processing, and handling characteristics.

2.9 SPRAY POLYURETHANE FOAM INSULATION

A. Closed-Cell Polyurethane Foam Insulation: ASTM C 1029, Type II, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. BASF Corporation.
    b. BaySystems NorthAmerica, LLC.
    c. Dow Chemical Company (The).
    d. ERSystems, Inc.
    e. Gaco Western Inc.
    f. Henry Company.
    g. NCFI; Division of Barnhardt Mfg. Co.
    h. SWD Urethane Company.
    i. Volatile Free, Inc.
    j. <**Insert manufacturer's name**>.

2. Minimum density of 1.5 lb/cu. ft. (24 kg/cu. m), thermal resistivity of 6.2 deg F x h x sq. ft./Btu x in. at 75 deg F (43 K x m/W at 24 deg C).

B. Open-Cell Polyurethane Foam Insulation: 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.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. BaySystems NorthAmerica, LLC.
    b. Demilec (USA) LLC.
    c. Gaco Western Inc.
    d. Icynene Inc.
    e. SWD Urethane Company.
    f. <**Insert manufacturer's name**>.

2. 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).

2.10 RADIANT BARRIERS

A. Sheet Radiant Barriers: ASTM C 1313 and as follows:

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. Fi-Foil Company; Radiant Shield.
    b. Innovative Energy, Inc.; R+Heatshield [**Commercial Solid**] [**Perforated**].
    c. Innovative Insulation, Inc.; Super R [**Premium**] [**Plus**].
    d. TVM Building Products; Reflective [**House Wrap**] [**Vapor Barrier**].
    e. <**Insert manufacturer's name; product name or designation**>.

2. Sheet Construction: [**Foil on one side of substrate**] [**Foil on both sides of substrate**] [**Vacuum metallizing on substrate**].
3. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indexes of [**5 and 10**] <**Insert numbers**>, respectively.
4. Tear Resistance: <**Insert value**>.
5. Water-Vapor Transmission: [**1 perm, maximum**] [**5 perms or greater**].
6. Sheet Width: <**Insert width**>.

B. Interior Radiation Control Coating System: Silver-colored, not thickness-dependent, low-emissivity, [**solvent**] [**water**]-based coating; formulated for adherence to substrates indicated and with a surface emittance value of 0.25 or less as measured per ASTM C 1371.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. SOLEC Corporation; LO/MIT-I.
    b. SOLEC Corporation; LO/MIT-II.
    c. <**Insert manufacturer's name; product name or designation**>.

2.11 VAPOR RETARDERS

A. Polyethylene Vapor Retarders: ASTM D 4397, [**6 mils (0.15 mm)**] [**10 mils (0.25 mm)**] thick, with maximum permeance rating of 0.13 perm (7.5 ng/Pa x s x sq. m).

B. Reinforced-Polyethylene Vapor Retarders: Two outer layers of polyethylene film laminated to an inner reinforcing layer consisting of either nylon cord or polyester scrim and weighing not less than 25 lb/1000 sq. ft. (12 kg/100 sq. m), with maximum permeance rating of 0.0507 perm (2.9 ng/Pa x s x sq. m).

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. Raven Industries Inc.; DURA-SKRIM 6WW.
    b. Reef Industries, Inc.; Griffolyn T-65.
    c. <**Insert manufacturer's name; product name or designation**>.

C. Fire-Retardant, Reinforced-Polyethylene Vapor Retarders: Two outer layers of polyethylene film laminated to an inner reinforcing layer consisting of either nonwoven grid of nylon cord or

polyester scrim and weighing not less than 22 lb/1000 sq. ft. (10 kg/100 sq. m), with maximum permeance rating of 0.1317 perm (7.56 ng/Pa x s x sq. m) and with flame-spread and smoke-developed indexes of not more than 5 and 60, respectively, per ASTM E 84.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. Raven Industries Inc.; DURA-SKRIM 2FR.
    b. Reef Industries, Inc.; Griffolyn T-55 FR.
    c. <**Insert manufacturer's name; product name or designation**>.

D. Foil-Polyester-Film Vapor Retarders: Two layers of 0.5-mil- (0.013-mm-) thick polyester film laminated to an inner layer of 1-mil- (0.025-mm-) thick aluminum foil, with maximum water-vapor transmission rate in flat condition of 0.0 g/h x sq. m and with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. Alumiseal Corporation; Zero Perm Vapor Barrier.
    b. <**Insert manufacturer's name; product name or designation**>.

E. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

F. Vapor-Retarder Fasteners: Pancake-head, self-tapping steel drill screws; with fender washers.

G. Single-Component Nonsag Urethane Sealant: ASTM C 920, Type I, Grade NS, Class 25, Use NT related to exposure, and Use O related to vapor-barrier-related substrates.

H. Adhesive for Vapor Retarders: Product recommended by vapor-retarder manufacturer and has demonstrated capability to bond vapor retarders securely to substrates indicated.

2.12 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with self-locking washer in place.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. AGM Industries, Inc.; Series T TACTOO Insul-Hangers.
    b. Gemco; Spindle Type.
    c. <**Insert manufacturer's name; product name or designation**>.

2. Plate: Perforated, galvanized carbon-steel sheet, 0.030 inch (0.762 mm) thick by 2 inches (50 mm) square.
3. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch (2.67 mm) in diameter; length to suit depth of insulation indicated.

B. Adhesively Attached, Angle-Shaped, Spindle-Type Anchors: Angle welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with self-locking washer in place.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

   a. Gemco; 90-Degree Insulation Hangers.
   b. <**Insert manufacturer's name; product name or designation**>.

2. Angle: Formed from 0.030-inch- (0.762-mm-) thick, perforated, galvanized carbon-steel sheet with each leg 2 inches (50 mm) square.
3. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch (2.67 mm) in diameter; length to suit depth of insulation indicated.

C. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- (0.41-mm-) thick galvanized-steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches (38 mm) square or in diameter.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

   a. AGM Industries, Inc.; [**RC150**] [**SC150**].
   b. Gemco; [**Dome-Cap**] [**R-150**] [**S-150**].
   c. <**Insert manufacturer's name; product name or designation**>.

2. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in the following locations:

   a. Crawl spaces.
   b. Ceiling plenums.
   c. Attic spaces.
   d. Where indicated.
   e. <**Insert location**>.

D. Insulation Standoff: Spacer fabricated from galvanized mild-steel sheet for fitting over spindle of insulation anchor to maintain air space of [**1 inch (25 mm)**] [**2 inches (50 mm)**] [**3 inches (76 mm)**] between face of insulation and substrate to which anchor is attached.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

   a. Gemco; Clutch Clip.

b. <**Insert manufacturer's name; product name or designation**>.

E. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. AGM Industries, Inc.; TACTOO Adhesive.
b. Gemco; Tuff Bond Hanger Adhesive.
c. <**Insert manufacturer's name; product name or designation**>.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation[**or vapor retarders, including removing projections capable of puncturing vapor retarders,**] or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. 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.

3.3 INSTALLATION OF BELOW-GRADE INSULATION

A. On vertical footing and foundation wall surfaces, set insulation units [**using manufacturer's recommended adhesive**] [**loosely laid**] according to manufacturer's written instructions.

1. If not otherwise indicated, extend insulation a minimum of [**24 inches (610 mm)**] [**36 inches (915 mm)**] <**Insert dimension**> below exterior grade line.

B. On horizontal surfaces under slabs, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

1. If not otherwise indicated, extend insulation a minimum of [**24 inches (610 mm)**] [**36 inches (915 mm)**] <**Insert dimension**> in from exterior walls.

3.4 INSTALLATION OF CAVITY-WALL INSULATION

A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches (610 mm) o.c. both ways on inside face, and as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates.

1. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Division 04 Section "Unit Masonry."

B. Cellular-Glass Board Insulation: Install with closely fitting joints using [**adhesive pad**] [**serrated trowel**] attachment method according to manufacturer's written instructions.

3.5 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

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. Foam-Plastic Board Insulation: Seal joints between 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.

C. Glass-Fiber or Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain 3-inch (76-mm) clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
4. Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
5. For metal-framed wall cavities where cavity heights exceed 96 inches (2438 mm), support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
6. For wood-framed construction, install blankets according to ASTM C 1320 and as follows:

a. With faced blankets having stapling flanges, secure insulation by inset, stapling flanges to sides of framing members.

b. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.

7. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation.

a. Exterior Walls: Set units with facing placed toward [**exterior of construction**] [**interior of construction**] [**as indicated on Drawings**].
b. Interior Walls: Set units with facing placed [**toward areas of high humidity**] [**as indicated on Drawings**] <**Insert location**>.

D. Loose-Fill Insulation: Apply according to ASTM C 1015 and manufacturer's written instructions. Level horizontal applications to uniform thickness as indicated, lightly settle to uniform density, but do not compact excessively.

1. For cellulosic-fiber loose-fill insulation, comply with CIMA's Bulletin #2, "Standard Practice for Installing Cellulose Insulation."

E. Spray-Applied Insulation: Apply spray-applied insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.

F. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Loose-Fill Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).
2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.6 INSTALLATION OF INSULATION IN CEILINGS FOR SOUND ATTENUATION

A. Where glass-fiber blankets are indicated for sound attenuation above ceilings, install blanket insulation over entire ceiling area in thicknesses indicated. Extend insulation 48 inches (1219 mm) up either side of partitions.

3.7 INSTALLATION OF RADIANT BARRIERS

A. Install interior radiation control coating system according to ASTM C 1321.

B. Install sheet radiant barriers according to ASTM C 1158.

3.8 INSTALLATION OF INSULATION FOR CONCRETE SUBSTRATES

A. Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:

1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application indicated.
2. Apply insulation standoffs to each spindle to create cavity width indicated between concrete substrate and insulation.
3. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation below indicated thickness.
4. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

3.9 INSTALLATION OF CURTAIN-WALL INSULATION

A. Install board insulation in curtain-wall construction where indicated on Drawings according to curtain-wall manufacturer's written instructions.

1. Hold insulation in place by securing metal clips and straps or integral pockets within window frames, spaced at intervals recommended in writing by insulation manufacturer to hold insulation securely in place without touching spandrel glass. Maintain cavity width of dimension indicated between insulation and glass.
2. Install insulation where it contacts perimeter fire-containment system to prevent insulation from bowing under pressure from perimeter fire-containment system.

3.10 INSTALLATION OF VAPOR RETARDERS

A. Place vapor retarders on side of construction indicated on Drawings. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives or other anchorage system as indicated. Extend vapor retarders to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.

B. Seal vertical joints in vapor retarders over framing by lapping no fewer than two studs.

1. Fasten vapor retarders to wood framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches (406 mm) o.c.
2. Before installing vapor retarders, apply urethane sealant to flanges of metal framing including runner tracks, metal studs, and framing around door and window openings. Seal overlapping joints in vapor retarders with vapor-retarder tape according to vapor-retarder manufacturer's written instructions. Seal butt joints with vapor-retarder tape. Locate all joints over framing members or other solid substrates.
3. Firmly attach vapor retarders to metal framing and solid substrates with vapor-retarder fasteners as recommended by vapor-retarder manufacturer.

C. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders.

D. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

3.11 PROTECTION

A. Protect installed insulation[**and vapor retarders**] 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.

3.12 INSULATION SCHEDULE

A. Insulation Type <**Insert number**>: [**Type IV**] <**Insert Type**> extruded-polystyrene board insulation.

B. Insulation Type <**Insert number**>: [**Type VI**] <**Insert Type**> extruded-polystyrene drainage panels.

C. Insulation Type <**Insert number**>: Fabric-faced, extruded-polystyrene drainage panels.

D. Insulation Type <**Insert number**>: [**Type I**] <**Insert Type**> molded-polystyrene board insulation.

E. Insulation Type <**Insert number**>: Foil-faced, polyisocyanurate board insulation.

F. Insulation Type <**Insert number**>: Cellular-glass insulation.

G. Insulation Type <**Insert number**>: Unfaced, flexible glass-fiber board insulation.

H. Insulation Type <**Insert number**>: Foil-faced, flexible glass-fiber board insulation.

I. Insulation Type <**Insert number**>: Unfaced, glass-fiber board insulation.

J. Insulation Type <**Insert number**>: Foil-faced, glass-fiber board insulation.

K. Insulation Type <**Insert number**>: Glass-mat-faced, glass-fiber board insulation.

L. Insulation Type <**Insert number**>: Unfaced, mineral-wool board insulation.

M. Insulation Type <**Insert number**>: Foil-faced, mineral-wool board insulation.

N. Insulation Type <**Insert number**>: Unfaced, glass-fiber blanket insulation.

O. Insulation Type <**Insert number**>: Faced, glass-fiber blanket insulation.

P. Insulation Type <**Insert number**>: Unfaced, mineral-wool blanket insulation.

Q. Insulation Type <**Insert number**>: Faced, mineral-wool blanket insulation.

R. Insulation Type <**Insert number**>: Cellulosic-fiber loose-fill insulation.

S. Insulation Type <**Insert number**>: Glass-fiber loose-fill insulation.

T. Insulation Type <**Insert number**>: Spray-applied cellulosic insulation.

U. Insulation Type <**Insert number**>: Polyurethane spray foam insulation.

END OF SECTION 072100

SECTION 072500 - WEATHER BARRIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Building paper.
2. Building wrap.
3. Flexible flashing.

B. Related Requirements:

1. Division 06 Section "Sheathing" for sheathing joint and penetration treatment.
2. Division 07 Section "Modified Bituminous Sheet Air Barriers" for sheet air barrier applied over wall sheathing.

1.3 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.

1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For [**water-resistive barrier**] [**and**] [**flexible flashing**], from ICC-ES.

PART 2 - PRODUCTS

2.1 WATER-RESISTIVE BARRIER

A. Building Paper: ASTM D 226, Type 1 (No. 15 asphalt-saturated organic felt), unperforated.

B. Building Paper: Water-vapor-permeable, asphalt-saturated kraft building paper.

1. Water vapor transmission not less than 35 g/sq. m x 24 hr per ASTM D 779.
2. Water resistance not less than [**20 minutes**] [**1 hour**] per ASTM F 1249.

C. 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**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Dow Chemical Company (The); Styrofoam Weathermate Plus Brand Housewrap.
b. DuPont (E. I. du Pont de Nemours and Company); Tyvek [**CommercialWrap**] [**StuccoWrap**] [**HomeWrap**] [**HomeWrap and HeaderWrap**].
c. Ludlow Coated Products; [**Air Stop Housewrap**] [**Barricade Building Wrap**] [**EnergyWrap Housewrap**] [**R-Wrap Protective House Wrap**].
d. Pactiv, Inc.; GreenGuard [**Classic Wrap**] [**RainDrop**] [**Ultra Wrap**] [**Value Wrap**].
e. Raven Industries Inc.; Fortress Pro Weather Protective Barrier.
f. Reemay, Inc.; Typar HouseWrap.
g. <**Insert manufacturer's name; product name or designation**>.

2. Water-Vapor Permeance: Not less than [**500**] [**150**] [**125**] [**50**] <**Insert number**> 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 (0.02 L/s x sq. m at 75 Pa) when tested according to ASTM E 2178.
4. Allowable UV Exposure Time: Not less than three months.

D. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

2.2 MISCELLANEOUS MATERIALS

A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, [**butyl rubber**] [**or**] [**rubberized-asphalt**] 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 (0.6 mm)] [0.030 inch (0.8 mm)] [0.040 inch (1.0 mm)].

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

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. Raven Industries Inc.; Fortress Flashshield.
e. Advanced Building Products Inc.; Wind-o-wrap.
f. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
g. Fiberweb, Clark Hammerbeam Corp.; Aquaflash 500.
h. Fortifiber Building Systems Group; [**Fortiflash 25**] [**Fortiflash 40**].

i. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; [**Vycor Plus Self-Adhered Flashing**] [**Vycor V40 Self-Adhered Flashing**].
j. MFM Building Products Corp.; Window Wrap.
k. Polyguard Products, Inc.; [**Polyguard JT-20 Tape**] [**Polyguard JT-30 Tape**].
l. Sandell Manufacturing Co., Inc.; Presto-Seal.
m. <**Insert manufacturer's name; product name or designation**>.

B. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.

C. Nails and Staples: ASTM F 1667.

PART 3 - EXECUTION

3.1 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 (13 mm) 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 (100-mm) overlap unless otherwise indicated.

C. Building Paper: Apply horizontally with a 2-inch (50-mm) overlap and a 6-inch (150-mm) end lap; fasten to sheathing with galvanized staples or roofing nails.

D. 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.

3.2 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 (100 mm) except that at flashing flanges of other construction, laps need not exceed flange width.
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

SECTION 076100 - SHEET METAL ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Standing-seam metal roofing

1.2 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[**, battens**], 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.

1.3 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.

1.4 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.

1.5 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.

1.6 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.

PART 2 - PRODUCTS

2.1 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 guage.
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
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.

2.2 UNDERLAYMENT MATERIALS

A. Felts: ASTM D 226, Type II (No. 30), asphalt-saturated organic felts.

B. Slip Sheet: Building paper, 3-lb/100 sq. ft. minimum, rosin sized.

2.3 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for 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.

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.

2.4 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.

2.5 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.

PART 3 - EXECUTION

3.1 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.

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.

3.2 UNDERLAYMENT INSTALLATION

A. Felt Underlayment: Install felt underlayment on roof sheathing under sheet metal roofing. Use adhesive for temporary anchorage to minimize use of mechanical fasteners under sheet metal roofing. Apply at locations indicated, in shingle fashion to shed water, with lapped joints of not less than 2 inches.

1. Apply from eave to ridge.
2. Apply on roof not covered by self-adhering sheet underlayment. Lap edges of self-adhering sheet underlayment not less than 3 inches, in shingle fashion to shed water.

B. Apply slip sheet before installing sheet metal roofing.

3.3 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.

3.4 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.
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.

3.5 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

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Manufactured Products:

a. Manufactured through-wall flashing[**and counterflashing**].
b. Manufactured reglets[**and counterflashing**].

2. Formed Products:

a. Formed roof drainage sheet metal fabrications.
b. Formed low-slope roof sheet metal fabrications.
c. Formed steep-slope roof sheet metal fabrications.
d. Formed wall sheet metal fabrications.
e. Formed equipment support flashing.
f. Formed overhead-piping safety pans.

B. Related Sections:

1. Division 06 Section "[**Rough Carpentry**] [**Miscellaneous Rough Carpentry**]" for wood nailers, curbs, and blocking.
2. Division 07 Section "<**Insert Section title for roof shingles, shakes, or tiles**>" for installing sheet metal flashing and trim integral with roofing.
3. Division 07 Section "<**Insert Section title for type of membrane roofing**>" for installing sheet metal flashing and trim integral with membrane roofing.
4. Division 07 Section "Metal Roof Panels" for sheet metal flashing and trim integral with metal roof panels.
5. Division 07 Section "Metal Wall Panels" for sheet metal flashing and trim integral with metal wall panels.
6. Division 07 Section "Sheet Metal Roofing" for custom-formed sheet metal flashing and trim integral with sheet metal roofing.
7. Division 07 Section "Roof Specialties" for manufactured roof specialties not part of sheet metal flashing and trim.
8. Division 07 Section "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.
9. Division 07 Section "Expansion Control" for manufactured sheet metal expansion-joint covers.

1.3 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Fabricate and install [**roof edge flashing**] [**and**] [**copings**] capable of resisting the following forces according to recommendations in FMG Loss Prevention Data Sheet 1-49:

1. Wind Zone 1: For velocity pressures of 10 to 20 lbf/sq. ft. (0.48 to 0.96 kPa): 40-lbf/sq. ft. (1.92-kPa) perimeter uplift force, 60-lbf/sq. ft. (2.87-kPa) corner uplift force, and 20-lbf/sq. ft. (0.96-kPa) outward force.
2. Wind Zone 1: For velocity pressures of 21 to 30 lbf/sq. ft. (1.00 to 1.44 kPa): 60-lbf/sq. ft. (2.87-kPa) perimeter uplift force, 90-lbf/sq. ft. (4.31-kPa) corner uplift force, and 30-lbf/sq. ft. (1.44-kPa) outward force.
3. Wind Zone 2: For velocity pressures of 31 to 45 lbf/sq. ft. (1.48 to 2.15 kPa): 90-lbf/sq. ft. (4.31-kPa) perimeter uplift force, 120-lbf/sq. ft. (5.74-kPa) corner uplift force, and 45-lbf/sq. ft. (2.15-kPa) outward force.
4. Wind Zone 3: For velocity pressures of 46 to 104 lbf/sq. ft. (2.20 to 4.98 kPa): 208-lbf/sq. ft. (9.96-kPa) perimeter uplift force, 312-lbf/sq. ft. (14.94-kPa) corner uplift force, and 104-lbf/sq. ft. (4.98-kPa) outward force.

C. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes.

1. Temperature Change (Range): [**120 deg F (67 deg C), ambient; 180 deg F (100 deg C)**] <**Insert temperature range**>, material surfaces.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:

1. Identification of material, thickness, weight, and finish for each item and location in Project.
2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
3. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
4. Details of termination points and assemblies, including fixed points.
5. Details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction.
6. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.

7. Details of special conditions.
8. Details of connections to adjoining work.
9. Detail formed flashing and trim at a scale of not less than [**1-1/2 inches per 12 inches (1:10)**] [**3 inches per 12 inches (1:5)**] <**Insert scale**>.

C. Samples for Initial Selection: For each type of sheet metal flashing, trim, and accessory indicated with factory-applied color finishes involving color selection.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:

1. Sheet Metal Flashing: 12 inches (300 mm) long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches (300 mm) long and in required profile. Include fasteners and other exposed accessories.
3. Accessories and Miscellaneous Materials: Full-size Sample.
4. Anodized Aluminum Samples: Samples to show full range to be expected for each color required.

E. Qualification Data: For qualified fabricator.

F. Maintenance Data: For sheet metal flashing, trim, and accessories to include in maintenance manuals.

G. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

B. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

C. Copper Sheet Metal Standard: Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical roof eave, including [**built-in gutter**] [**fascia**] [**fascia trim**] [**apron flashing**] <**Insert item**>, approximately [**10 feet (3.0 m)**] <**Insert dimension**> long, including supporting construction cleats, seams, attachments[**, underlayment,**] and accessories.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

E. Preinstallation Conference: Conduct conference at [**Project site**] <**Insert location**>.

1. Meet with Owner, Architect, Owner's insurer if applicable, Installer, and installers whose work interfaces with or affects sheet metal flashing and trim including installers of roofing materials, roof accessories, unit skylights, and roof-mounted equipment.
2. Review methods and procedures related to sheet metal flashing and trim.
3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
4. Review special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect sheet metal flashing.
5. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

1.7 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 specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: [**20**] [**10**] <**Insert number**> years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.

B. Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 or H01 temper.

1. Non-Patinated Exposed Finish: Mill.
2. Non-Patinated, Exposed, Lacquered Finish: Finish designations for copper alloys comply with the system defined in NAAMM's "Metal Finishes Manual for Architectural and Metal Products."

    a. Brushed Satin (Lacquered): M32-06x (Mechanical Finish: directionally textured, medium satin; with clear organic coating); coating of "Incralac," [**waterborne,**] [**solvent-borne,**] methyl methacrylate copolymer lacquer with UV inhibitor, applied by air spray in two coats per manufacturer's written instructions to a total thickness of 1 mil (0.025 mm).
    b. Mirror Polished (Lacquered): M22-06x (Mechanical Finish: buffed, specular; with clear organic coating); coating of "Incralac," [**waterborne,**] [**solvent-borne,**] air-drying, methyl methacrylate copolymer lacquer with UV inhibitor, applied by air spray in two coats per manufacturer's written instructions to a total thickness of 1 mil (0.025 mm).

3. Pre-Patinated Copper-Sheet Finish: [**Dark brown**] [**Verdigris**] <**Insert color**>, pre-patinated according to ASTM B 882.

C. 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: [**Mill**] [**One-side bright mill**] [**Standard one-side bright**] [**Standard two-side bright**] finish.
2. Alclad Finish: Metallurgically bonded surfacing to both sides, forming a composite aluminum sheet with reflective luster.
3. Surface: [**Smooth, flat**] [**Embossed**].
4. 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).
5. Clear Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
6. Color Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.

    a. Color: [**Champagne**] [**Light bronze**] [**Medium bronze**] [**Dark bronze**] [**Black**] <**Insert color**>.
    b. Color: [**Match Architect's sample**] [**As selected by Architect from full range of industry colors and color densities**].
    c. Color Range: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

7. 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. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

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. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
c. Four-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat and clear coats. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
d. Mica Fluoropolymer: AAMA 620. Two-coat fluoropolymer finish with suspended mica flakes containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
e. Metallic Fluoropolymer: AAMA 620. Three-coat fluoropolymer finish with suspended metallic flakes containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
f. FEVE Fluoropolymer: AAMA 620. Two-coat fluoropolymer finish containing 100 percent fluorinated ethylene vinyl ether resin in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
g. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil (0.005 mm) for primer and 0.8 mil (0.02 mm) for topcoat.
h. Plastisol: Epoxy primer and vinyl plastisol topcoat; with a dry film thickness of not less than 0.2 mil (0.005 mm) for primer and 3.8 mils (0.97 mm) for topcoat.

8. Color: [**As indicated by manufacturer's designations**] [**Match Architect's samples**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.
9. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).

D. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304, dead soft, fully annealed.

1. Finish: [**2D (dull, cold rolled)**] [**2B (bright, cold rolled)**] [**3 (coarse, polished directional satin)**] [**4 (polished directional satin)**] <**Insert finish**>.
2. Surface: [**Smooth, flat**] [**Embossed**].

E. Zinc-Tin Alloy-Coated Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, dead-soft, fully annealed stainless-steel sheet of minimum uncoated thickness indicated; coated on both sides with a zinc-tin alloy (50 percent zinc, 50 percent tin), with factory-applied gray preweathering.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Follansbee Steel; TCS II.
b. <**Insert manufacturer's name; product name or designation**>.

F. Zinc-Tin Alloy-Coated Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 temper, of minimum uncoated weight (thickness) indicated; coated on both sides with a zinc-tin alloy (50 percent zinc, 50 percent tin).

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Revere Copper Products, Inc.; FreedomGray.
b. <**Insert manufacturer's name; product name or designation**>.

G. 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. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation; structural quality.
2. 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.
3. Surface: [**Smooth, flat**] [**Embossed**] [**and mill phosphatized for field painting**] [**and with manufacturer's standard clear acrylic coating on both sides**].
4. 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. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
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. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
c. Four-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat and clear coats. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
d. Mica Fluoropolymer: AAMA 621. Two-coat fluoropolymer finish with suspended mica flakes containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
e. Metallic Fluoropolymer: AAMA 621. Three-coat fluoropolymer finish with suspended metallic flakes containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
f. FEVE Fluoropolymer: AAMA 621. Two-coat fluoropolymer finish containing 100 percent fluorinated ethylene vinyl ether resin in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
g. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil (0.005 mm) for primer and 0.8 mil (0.02 mm) for topcoat.

h. Plastisol: Epoxy primer and vinyl plastisol topcoat; with a dry film thickness of not less than 0.2 mil (0.005 mm) for primer and 3.8 mils (0.97 mm) for topcoat.

5. Color: [**As indicated by manufacturer's designations**] [**Match Architect's samples**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.
6. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).

H. Zinc Sheet: Zinc, 99 percent pure, alloyed with a maximum of 1 percent copper and titanium; with manufacturer's standard factory-applied, flexible, protective back coating.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Rheinzink America Inc.; RHEINZINK ProRoofing.
b. Umicore Building Products USA Inc.; VM ZINC PLUS.
c. <**Insert manufacturer's name; product name or designation**>.

2. Finish: [**Bright rolled**] [**Preweathered gray**] [**Preweathered black**].

2.2 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).
3. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Carlisle Coatings & Waterproofing Inc.; CCW WIP 300HT.
b. Grace Construction Products, a unit of W. R. Grace & Co.; Ultra.
c. Henry Company; Blueskin PE200 HT.
d. Metal-Fab Manufacturing, LLC; MetShield.
e. Owens Corning; WeatherLock Metal High Temperature Underlayment.
f. <**Insert manufacturer's name; product name or designation**>.

D. Slip Sheet: Building paper, 3-lb/100 sq. ft. (0.16-kg/sq. m) minimum, rosin sized.

2.3 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[**or manufactured item**] 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[**or manufactured item**].

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**] [**Zinc-Tin Alloy-Coated 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 Zinc-Tin Alloy-Coated Stainless-Steel Sheet: Series 300 stainless steel.
6. Fasteners for [**Zinc-Coated (Galvanized)**] [**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.
7. Fasteners for Zinc 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-Tin Alloy-Coated [**Stainless Steel**] [**Copper**]: ASTM B 32, 100 percent tin.
4. 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.
5. For Zinc: ASTM B 32, 40 percent tin and 60 percent lead with low antimony, as recommended by manufacturer.

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 [**polyurethane**] [**polysulfide**] [**silicone**] 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.

I. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.4 MANUFACTURED SHEET METAL FLASHING AND TRIM

A. Through-Wall Ribbed Sheet Metal Flashing: Manufacture through-wall sheet metal flashing for embedment in masonry with ribs at 3-inch (75-mm) intervals along length of flashing to provide an integral mortar bond. Manufacture through-wall flashing with [**snaplock receiver on exterior face to receive counterflashing**] [**interlocking counterflashing on exterior face, of same metal as reglet**].

1. Copper: [**10 oz. (0.34 mm thick)**] <**Insert weight (thickness)**> minimum for fully concealed flashing; [**16 oz. (0.55 mm thick)**] <**Insert weight (thickness)**> elsewhere.

a. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

1) Cheney Flashing Company; Cheney Flashing (Dovetail).
2) Cheney Flashing Company; Cheney Flashing (Sawtooth).
3) Hohmann & Barnard, Inc.; STF Sawtooth Flashing.
4) Keystone Flashing Company, Inc.; Keystone Three-Way Interlocking Thruwall Flashing.
5) Sandell Manufacturing Company, Inc.; Pre-Formed Metal Flashing.
6) <**Insert manufacturer's name; product name or designation**>.

2. Stainless Steel: [**0.016 inch (0.40 mm)**] <**Insert thickness**> thick.

a. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

1) Cheney Flashing Company; Cheney Flashing (Dovetail).
2) Cheney Flashing Company; Cheney Flashing (Sawtooth).
3) Hohmann & Barnard, Inc.; STF Sawtooth Flashing.
4) Keystone Flashing Company, Inc.; Keystone Three-Way Interlocking Thruwall Flashing.
5) Sandell Manufacturing Company, Inc.; Pre-Formed Metal Flashing.
6) <**Insert manufacturer's name; product name or designation**>.

B. 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**] [**with interlocking counterflashing on exterior face, of same metal as reglet**].

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:
2. Basis-of-Design Product: Subject to compliance with requirements, provide [**product indicated on Drawings**] <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

    a. Cheney Flashing Company.
    b. Fry Reglet Corporation.
    c. Heckmann Building Products Inc.
    d. Hickman, W. P. Company.
    e. Hohmann & Barnard, Inc.; STF Sawtooth Flashing.
    f. Keystone Flashing Company, Inc.
    g. National Sheet Metal Systems, Inc.
    h. Sandell Manufacturing Company, Inc.
    i. <**Insert manufacturer's name**>.

3. Material: [**Stainless steel, 0.019 inch (0.48 mm) thick**] [**Copper, 16 oz./sq. ft. (0.55 mm thick)**] [**Aluminum, 0.024 inch (0.61 mm) thick**] [**Galvanized steel, 0.022 inch (0.56 mm) thick**].
4. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
5. Stucco Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
6. Concrete Type: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
7. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
8. Accessories:

    a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
    b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

9. Finish: [**Mill**] [**With manufacturer's standard color coating**] <**Insert finish**>.

2.5 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. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
2. Obtain field measurements for accurate fit before shop fabrication.
3. 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.
4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

C. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

D. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.

E. 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.

F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

G. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual"[**and by FMG Loss Prevention Data Sheet 1-49**] for application, but not less than thickness of metal being secured.

H. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

I. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.[**Rivet joints where necessary for strength.**]

J. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer.[**Rivet joints where necessary for strength.**]

K. Do not use graphite pencils to mark metal surfaces.

2.6 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. Gutter Style: SMACNA designation [**A**] [**B**] [**C**] [**D**] [**E**] [**F**] [**G**] [**H**] [**I**] [**J**] [**K**] [**L**].
2. Expansion Joints: [**Lap type**] [**Butt type**] [**Butt type with cover plate**] [**Built in**].
3. Accessories: [**Continuous removable leaf screen with sheet metal frame and hardware cloth screen**] [**Wire ball downspout strainer**] [**Valley baffles**].
4. Gutters with Girth up to 15 Inches (380 mm): Fabricate from the following materials:

    a. Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
    b. Aluminum: [**0.032 inch (0.81 mm)**] <**Insert thickness**> thick.
    c. Stainless Steel: [**0.016 inch (0.40 mm)**] <**Insert thickness**> thick.
    d. Zinc-Tin Alloy-Coated Stainless Steel: [**0.015 inch (0.38 mm)**] <**Insert thickness**> thick.
    e. Zinc-Tin Alloy-Coated Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
    f. Galvanized Steel: [**0.022 inch (0.56 mm)**] <**Insert thickness**> thick.
    g. Aluminum-Zinc Alloy-Coated Steel: [**0.022 inch (0.56 mm)**] <**Insert thickness**> thick.
    h. Zinc: [**0.032 inch (0.80 mm)**] [**0.039 inch (1.00 mm)**] <**Insert thickness**> thick.

5. Gutters with Girth 16 to 20 Inches (410 to 510 mm): Fabricate from the following materials:

    a. Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
    b. Aluminum: [**0.040 inch (1.02 mm)**] <**Insert thickness**> thick.
    c. Stainless Steel: [**0.019 inch (0.48 mm)**] <**Insert thickness**> thick.
    d. Zinc-Tin Alloy-Coated Stainless Steel: [**0.018 inch (0.46 mm)**] <**Insert thickness**> thick.
    e. Zinc-Tin Alloy-Coated Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
    f. Galvanized Steel: [**0.028 inch (0.71 mm)**] <**Insert thickness**> thick.
    g. Aluminum-Zinc Alloy-Coated Steel: [**0.028 inch (0.71 mm)**] <**Insert thickness**> thick.
    h. Zinc: [**0.039 inch (1.00 mm)**] [**0.048 inch (1.25 mm)**] <**Insert thickness**> thick.

6. Gutters with Girth 21 to 25 Inches (530 to 640 mm): Fabricate from the following materials:

    a. Copper: [**20 oz./sq. ft. (0.68 mm thick)**] <**Insert weight (thickness)**>.
    b. Aluminum: [**0.050 inch (1.27 mm)**] <**Insert thickness**> thick.
    c. Stainless Steel: [**0.025 inch (0.64 mm)**] <**Insert thickness**> thick.
    d. Zinc-Tin Alloy-Coated Stainless Steel: [**0.024 inch (0.61 mm)**] <**Insert thickness**> thick.
    e. Zinc-Tin Alloy-Coated Copper: [**20 oz./sq. ft. (0.68 mm thick)**] <**Insert weight (thickness)**>.
    f. Galvanized Steel: [**0.034 inch (0.86 mm)**] <**Insert thickness**> thick.
    g. Aluminum-Zinc Alloy-Coated Steel: [**0.034 inch (0.86 mm)**] <**Insert thickness**> thick.
    h. Zinc: [**0.048 inch (1.25 mm)**] [**0.059 inch (1.50 mm)**] <**Insert thickness**> thick.

7. Gutters with Girth 26 to 30 Inches (660 to 760 mm): Fabricate from the following materials:

a. Copper: [**24 oz./sq. ft. (0.82 mm thick)**] <**Insert weight (thickness)**>.
b. Aluminum: [**0.063 inch (1.60 mm)**] <**Insert thickness**> thick.
c. Stainless Steel: [**0.031 inch (0.79 mm)**] <**Insert thickness**> thick.
d. Zinc-Tin Alloy-Coated Copper: [**24 oz./sq. ft. (0.82 mm thick)**] <**Insert weight (thickness)**>.
e. Galvanized Steel: [**0.040 inch (1.02 mm)**] <**Insert thickness**> thick.
f. Aluminum-Zinc Alloy-Coated Steel: [**0.040 inch (1.02 mm)**] <**Insert thickness**> thick.

8. Gutters with Girth 31 to 35 Inches (790 to 890 mm): Fabricate from the following materials:

a. Copper: [**24 oz./sq. ft. (0.82 mm thick)**] <**Insert weight (thickness)**>.
b. Stainless Steel: [**0.038 inch (0.95 mm)**] <**Insert thickness**> thick.
c. Zinc-Tin Alloy-Coated Copper: [**25 oz./sq. ft. (0.87 mm thick)**] <**Insert weight (thickness)**>.
d. Galvanized Steel: [**0.052 inch (1.32 mm)**] <**Insert thickness**> thick.
e. Aluminum-Zinc Alloy-Coated Steel: [**0.052 inch (1.32 mm)**] <**Insert thickness**> thick.

B. Built-in Gutters: Fabricate to cross section indicated, with riveted and soldered joints, complete with end pieces, outlet tubes, and other special accessories as required. Fabricate in minimum 96-inch- (2400-mm-) long sections. Fabricate expansion joints and accessories from same metal as gutters unless otherwise indicated.

1. Fabricate gutters with built-in expansion joints[**and gutter-end expansion joints at walls**].
2. Accessories: [**Continuous removable leaf screen with sheet metal frame and hardware cloth screen**] [**Bronze wire ball downspout strainer**] [**Wire ball downspout strainer**].
3. Fabricate from the following materials:

a. Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
b. Stainless Steel: [**0.016 inch (0.40 mm)**] <**Insert thickness**> thick.
c. Zinc-Tin Alloy-Coated Stainless Steel: [**0.015 inch (0.38 mm)**] <**Insert thickness**> thick.
d. Zinc-Tin Alloy-Coated Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
e. Zinc: [**0.032 inch (0.80 mm)**] [**0.039 inch (1.00 mm)**] <**Insert thickness**> thick.

C. Downspouts: Fabricate [**round**] [**rectangular**] [**open-face**] downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.

1. Fabricated Hanger Style: SMACNA figure designation [**1-35A**] [**1-35B**] [**1-35C**] [**1-35D**] [**1-35E**] [**1-35F**] [**1-35G**] [**1-35H**] [**1-35I**] [**1-35J**].
2. Manufactured Hanger Style: SMACNA figure designation [**1-34A**] [**1-34B**] [**1-34C**] [**1-34D**] [**1-34E**].
3. Hanger Style: <**Insert description**>.
4. Fabricate from the following materials:

a. Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.

b. Aluminum: [**0.024 inch (0.61 mm)**] <**Insert thickness**> thick.
c. Stainless Steel: [**0.016 inch (0.40 mm)**] <**Insert thickness**> thick.
d. Zinc-Tin Alloy-Coated Stainless Steel: [**0.015 inch (0.38 mm)**] <**Insert thickness**> thick.
e. Zinc-Tin Alloy-Coated Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
f. Galvanized Steel: [**0.022 inch (0.56 mm)**] <**Insert thickness**> thick.
g. Aluminum-Zinc Alloy-Coated Steel: [**0.022 inch (0.56 mm)**] <**Insert thickness**> thick.
h. Zinc: [**0.032 inch (0.80 mm)**] [**0.039 inch (1.00 mm)**] <**Insert thickness**> thick.

D. Parapet Scuppers: Fabricate scuppers of dimensions required with closure flange trim to exterior, 4-inch- (100-mm-) wide wall flanges to interior, and base extending 4 inches (100 mm) beyond cant or tapered strip into field of roof.[**Fasten gravel guard angles to base of scupper.**] Fabricate from the following materials:

1. Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
2. Aluminum: [**0.032 inch (0.81 mm)**] <**Insert thickness**> thick.
3. Stainless Steel: [**0.019 inch (0.48 mm)**] <**Insert thickness**> thick.
4. Zinc-Tin Alloy-Coated Stainless Steel: [**0.018 inch (0.46 mm)**] <**Insert thickness**> thick.
5. Zinc-Tin Alloy-Coated Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
6. Galvanized Steel: [**0.028 inch (0.71 mm)**] <**Insert thickness**> thick.
7. Aluminum-Zinc Alloy-Coated Steel: [**0.028 inch (0.71 mm)**] <**Insert thickness**> thick.
8. Zinc: [**0.032 inch (0.80 mm)**] [**0.039 inch (1.00 mm)**] <**Insert thickness**> thick.

E. Conductor Heads: Fabricate conductor heads with flanged back and stiffened top edge and of dimensions and shape indicated complete with outlet tubes[**, exterior flange trim,**] [**and**] [**built-in overflows**]. Fabricate from the following materials:

1. Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
2. Aluminum: [**0.032 inch (0.81 mm)**] <**Insert thickness**> thick.
3. Stainless Steel: [**0.016 inch (0.40 mm)**] <**Insert thickness**> thick.
4. Zinc-Tin Alloy-Coated Stainless Steel: [**0.015 inch (0.38 mm)**] <**Insert thickness**> thick.
5. Zinc-Tin Alloy-Coated Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
6. Galvanized Steel: [**0.028 inch (0.71 mm)**] <**Insert thickness**> thick.
7. Aluminum-Zinc Alloy-Coated Steel: [**0.028 inch (0.71 mm)**] <**Insert thickness**> thick.
8. Zinc: [**0.032 inch (0.80 mm)**] [**0.039 inch (1.00 mm)**] <**Insert thickness**> thick.

F. Splash Pans: Fabricate from the following materials:

1. Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
2. Aluminum: [**0.040 inch (1.02 mm)**] <**Insert thickness**> thick.
3. Stainless Steel: [**0.019 inch (0.48 mm)**] <**Insert thickness**> thick.
4. Zinc-Tin Alloy-Coated Stainless Steel: [**0.018 inch (0.46 mm)**] <**Insert thickness**> thick.
5. Zinc-Tin Alloy-Coated Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.

6. Zinc: [**0.032 inch (0.80 mm)**] [**0.039 inch (1.00 mm)**] <**Insert thickness**> thick.

2.7 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Roof-Edge Flashing (Gravel Stop)[**and Fascia Cap**]: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 10-foot- (3-m-) long, sections. Furnish with 6-inch- (150-mm-) wide, joint cover plates.

1. Joint Style: [**Lap, 4 inches (100 mm) wide**] [**Butt, with 12-inch- (300-mm-) wide, concealed backup plate**] [**Butt, with 6-inch- (150-mm-) wide, exposed cover plates**] [**Butt, with 12-inch- (300-mm-) wide, concealed backup plate and 6-inch- (150-mm-) wide, exposed cover plates**].
2. Fabricate with scuppers spaced [**10 feet (3 m)**] <**Insert spacing**> apart, of dimensions required with 4-inch- (100-mm-) wide flanges and base extending 4 inches (100 mm) beyond cant or tapered strip into field of roof. Fasten gravel guard angles to base of scupper.
3. Fabricate from the following materials:

    a. Copper: [**20 oz./sq. ft. (0.68 mm thick)**] <**Insert weight (thickness)**>.
    b. Aluminum: [**0.050 inch (1.27 mm)**] <**Insert thickness**> thick.
    c. Stainless Steel: [**0.019 inch (0.48 mm)**] <**Insert thickness**> thick.
    d. Zinc-Tin Alloy-Coated Stainless Steel: [**0.018 inch (0.46 mm)**] <**Insert thickness**> thick.
    e. Zinc-Tin Alloy-Coated Copper: [**20 oz./sq. ft. (0.68 mm thick)**] <**Insert weight (thickness)**>.
    f. Galvanized Steel: [**0.028 inch (0.71 mm)**] <**Insert thickness**> thick.
    g. Aluminum-Zinc Alloy-Coated Steel: [**0.028 inch (0.71 mm)**] <**Insert thickness**> thick.
    h. Zinc: [**0.048 inch (1.25 mm)**] [**0.059 inch (1.50 mm)**] <**Insert thickness**> thick.

B. Copings: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 10-foot- (3-m-) long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and[**drill elongated holes for fasteners on**] interior leg. Miter corners, seal, and solder or weld watertight.

1. Coping Profile: SMACNA figure designation [**3-4A**] [**3-4B**] [**3-4C**] [**3-4D**] [**3-4E**] [**3-4F**] [**3-4G**].
2. Joint Style: [**Butt, with 12-inch- (300-mm-) wide, concealed backup plate**] [**Butt, with 6-inch- (150-mm-) wide, exposed cover plates**] [**Butt, with 12-inch- (300-mm-) wide, concealed backup plate and 6-inch- (150-mm-) wide, exposed cover plates**].
3. Fabricate from the following materials:

    a. Copper: [**24 oz./sq. ft. (0.82 mm thick)**] <**Insert weight (thickness)**>.
    b. Aluminum: [**0.050 inch (1.27 mm)**] <**Insert thickness**> thick.
    c. Stainless Steel: [**0.025 inch (0.64 mm)**] <**Insert thickness**> thick.
    d. Zinc-Tin Alloy-Coated Stainless Steel: [**0.024 inch (0.61 mm)**] <**Insert thickness**> thick.
    e. Zinc-Tin Alloy-Coated Copper: [**24 oz./sq. ft. (0.82 mm thick)**] <**Insert weight (thickness)**>.
    f. Galvanized Steel: [**0.040 inch (1.02 mm)**] <**Insert thickness**> thick.

g. Aluminum-Zinc Alloy-Coated Steel: [**0.040 inch (1.02 mm)**] <**Insert thickness**> thick.
h. Zinc: [**0.048 inch (1.25 mm)**] [**0.059 inch (1.50 mm)**] <**Insert thickness**> thick.

C. [**Roof**] [**and**] [**Roof to Wall Transition**] [**Roof to Roof Edge Flashing (Gravel Stop) Transition**] [**Roof to Roof Edge Flashing (Gravel Stop) and Fascia Cap Transition**] Expansion-Joint Cover: Fabricate from the following materials:

1. Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
2. Aluminum: [**0.050 inch (1.27 mm)**] <**Insert thickness**> thick.
3. Stainless Steel: [**0.025 inch (0.64 mm)**] <**Insert thickness**> thick.
4. Zinc-Tin Alloy-Coated Stainless Steel: [**0.024 inch (0.61 mm)**] <**Insert thickness**> thick.
5. Zinc-Tin Alloy-Coated Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
6. Galvanized Steel: [**0.034 inch (0.86 mm)**] <**Insert thickness**> thick.
7. Aluminum-Zinc Alloy-Coated Steel: [**0.034 inch (0.86 mm)**] <**Insert thickness**> thick.
8. Zinc: [**0.032 inch (0.80 mm)**] [**0.039 inch (1.00 mm)**] <**Insert thickness**> thick.

D. Base Flashing: Fabricate from the following materials:

1. Copper: [**20 oz./sq. ft. (0.68 mm thick)**] <**Insert weight (thickness)**>.
2. Aluminum: [**0.040 inch (1.02 mm)**] <**Insert thickness**> thick.
3. Stainless Steel: [**0.019 inch (0.48 mm)**] <**Insert thickness**> thick.
4. Zinc-Tin Alloy-Coated Stainless Steel: [**0.018 inch (0.46 mm)**] <**Insert thickness**> thick.
5. Zinc-Tin Alloy-Coated Copper: [**20 oz./sq. ft. (0.68 mm thick)**] <**Insert weight (thickness)**>.
6. Galvanized Steel: [**0.028 inch (0.71 mm)**] <**Insert thickness**> thick.
7. Aluminum-Zinc Alloy-Coated Steel: [**0.028 inch (0.71 mm)**] <**Insert thickness**> thick.
8. Zinc: [**0.032 inch (0.80 mm)**] [**0.039 inch (1.00 mm)**] <**Insert thickness**> thick.

E. Counterflashing: Fabricate from the following materials:

1. Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
2. Aluminum: [**0.032 inch (0.81 mm)**] <**Insert thickness**> thick.
3. Stainless Steel: [**0.019 inch (0.48 mm)**] <**Insert thickness**> thick.
4. Zinc-Tin Alloy-Coated Stainless Steel: [**0.018 inch (0.46 mm)**] <**Insert thickness**> thick.
5. Zinc-Tin Alloy-Coated Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
6. Galvanized Steel: [**0.022 inch (0.56 mm)**] <**Insert thickness**> thick.
7. Aluminum-Zinc Alloy-Coated Steel: [**0.022 inch (0.56 mm)**] <**Insert thickness**> thick.
8. Zinc: [**0.032 inch (0.80 mm)**] [**0.039 inch (1.00 mm)**] <**Insert thickness**> thick.

F. Flashing Receivers: Fabricate from the following materials:

1. Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
2. Aluminum: [**0.032 inch (0.81 mm)**] <**Insert thickness**> thick.
3. Stainless Steel: [**0.016 inch (0.40 mm)**] <**Insert thickness**> thick.

4. Zinc-Tin Alloy-Coated Stainless Steel: [**0.015 inch (0.38 mm)**] <**Insert thickness**> thick.
5. Zinc-Tin Alloy-Coated Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
6. Galvanized Steel: [**0.022 inch (0.56 mm)**] <**Insert thickness**> thick.
7. Aluminum-Zinc Alloy-Coated Steel: [**0.022 inch (0.56 mm)**] <**Insert thickness**> thick.
8. Zinc: [**0.032 inch (0.80 mm)**] [**0.039 inch (1.00 mm)**] <**Insert thickness**> thick.

G. Roof-Penetration Flashing: Fabricate from the following materials:

1. Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
2. Stainless Steel: [**0.019 inch (0.48 mm)**] <**Insert thickness**> thick.
3. Zinc-Tin Alloy-Coated Stainless Steel: [**0.018 inch (0.46 mm)**] <**Insert thickness**> thick.
4. Zinc-Tin Alloy-Coated Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
5. Galvanized Steel: [**0.028 inch (0.71 mm)**] <**Insert thickness**> thick.
6. Aluminum-Zinc Alloy-Coated Steel: [**0.028 inch (0.71 mm)**] <**Insert thickness**> thick.
7. Zinc: [**0.032 inch (0.80 mm)**] [**0.039 inch (1.00 mm)**] <**Insert thickness**> thick.

H. Roof-Drain Flashing: Fabricate from the following materials:

1. Copper: [**12 oz./sq. ft. (0.41 mm thick)**] <**Insert weight (thickness)**>.
2. Stainless Steel: [**0.016 inch (0.40 mm)**] <**Insert thickness**> thick.
3. Zinc-Tin Alloy-Coated Stainless Steel: [**0.015 inch (0.38 mm)**] <**Insert thickness**> thick.

2.8 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

A. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following materials:

1. Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
2. Aluminum: [**0.032 inch (0.81 mm)**] <**Insert thickness**> thick.
3. Stainless Steel: [**0.016 inch (0.40 mm)**] <**Insert thickness**> thick.
4. Zinc-Tin Alloy-Coated Stainless Steel: [**0.015 inch (0.38 mm)**] <**Insert thickness**> thick.
5. Zinc-Tin Alloy-Coated Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
6. Galvanized Steel: [**0.022 inch (0.56 mm)**] <**Insert thickness**> thick.
7. Aluminum-Zinc Alloy-Coated Steel: [**0.022 inch (0.56 mm)**] <**Insert thickness**> thick.
8. Zinc: [**0.032 inch (0.80 mm)**] [**0.039 inch (1.00 mm)**] <**Insert thickness**> thick.

B. Valley Flashing: Fabricate from the following materials:

1. Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
2. Stainless Steel: [**0.019 inch (0.48 mm)**] <**Insert thickness**> thick.
3. Zinc-Tin Alloy-Coated Stainless Steel: [**0.018 inch (0.46 mm)**] <**Insert thickness**> thick.
4. Zinc-Tin Alloy-Coated Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.

5. Galvanized Steel: [**0.028 inch (0.71 mm)**] <**Insert thickness**> thick.
6. Aluminum-Zinc Alloy-Coated Steel: [**0.028 inch (0.71 mm)**] <**Insert thickness**> thick.
7. Zinc: [**0.032 inch (0.80 mm)**] [**0.039 inch (1.00 mm)**] <**Insert thickness**> thick.

C. Drip Edges: Fabricate from the following materials:

1. Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
2. Aluminum: [**0.032 inch (0.81 mm)**] <**Insert thickness**> thick.
3. Stainless Steel: [**0.016 inch (0.40 mm)**] <**Insert thickness**> thick.
4. Zinc-Tin Alloy-Coated Stainless Steel: [**0.015 inch (0.38 mm)**] <**Insert thickness**> thick.
5. Zinc-Tin Alloy-Coated Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
6. Galvanized Steel: [**0.022 inch (0.56 mm)**] <**Insert thickness**> thick.
7. Aluminum-Zinc Alloy-Coated Steel: [**0.022 inch (0.56 mm)**] <**Insert thickness**> thick.
8. Zinc: [**0.032 inch (0.80 mm)**] [**0.039 inch (1.00 mm)**] <**Insert thickness**> thick.

D. Eave, Rake[**, Ridge, and Hip**] Flashing: Fabricate from the following materials:

1. Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
2. Aluminum: [**0.032 inch (0.81 mm)**] <**Insert thickness**> thick.
3. Stainless Steel: [**0.016 inch (0.40 mm)**] <**Insert thickness**> thick.
4. Zinc-Tin Alloy-Coated Stainless Steel: [**0.015 inch (0.38 mm)**] <**Insert thickness**> thick.
5. Zinc-Tin Alloy-Coated Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
6. Galvanized Steel: [**0.022 inch (0.56 mm)**] <**Insert thickness**> thick.
7. Aluminum-Zinc Alloy-Coated Steel: [**0.022 inch (0.56 mm)**] <**Insert thickness**> thick.
8. Zinc: [**0.032 inch (0.80 mm)**] [**0.039 inch (1.00 mm)**] <**Insert thickness**> thick.

E. Counterflashing: Fabricate from the following materials:

1. Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
2. Aluminum: [**0.032 inch (0.81 mm)**] <**Insert thickness**> thick.
3. Stainless Steel: [**0.019 inch (0.48 mm)**] <**Insert thickness**> thick.
4. Zinc-Tin Alloy-Coated Stainless Steel: [**0.018 inch (0.46 mm)**] <**Insert thickness**> thick.
5. Zinc-Tin Alloy-Coated Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
6. Galvanized Steel: [**0.022 inch (0.56 mm)**] <**Insert thickness**> thick.
7. Aluminum-Zinc Alloy-Coated Steel: [**0.022 inch (0.56 mm)**] <**Insert thickness**> thick.
8. Zinc: [**0.032 inch (0.80 mm)**] [**0.039 inch (1.00 mm)**] <**Insert thickness**> thick.

F. Flashing Receivers: Fabricate from the following materials:

1. Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
2. Aluminum: [**0.032 inch (0.81 mm)**] <**Insert thickness**> thick.
3. Stainless Steel: [**0.016 inch (0.40 mm)**] <**Insert thickness**> thick.
4. Zinc-Tin Alloy-Coated Stainless Steel: [**0.015 inch (0.38 mm)**] <**Insert thickness**> thick.

5. Zinc-Tin Alloy-Coated Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
6. Galvanized Steel: [**0.022 inch (0.56 mm)**] <**Insert thickness**> thick.
7. Aluminum-Zinc Alloy-Coated Steel: [**0.022 inch (0.56 mm)**] <**Insert thickness**> thick.
8. Zinc: [**0.032 inch (0.80 mm)**] [**0.039 inch (1.00 mm)**] <**Insert thickness**> thick.

G. Roof-Penetration Flashing: Fabricate from the following materials:

1. Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
2. Stainless Steel: [**0.019 inch (0.48 mm)**] <**Insert thickness**> thick.
3. Zinc-Tin Alloy-Coated Stainless Steel: [**0.018 inch (0.46 mm)**] <**Insert thickness**> thick.
4. Zinc-Tin Alloy-Coated Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
5. Galvanized Steel: [**0.028 inch (0.71 mm)**] <**Insert thickness**> thick.
6. Aluminum-Zinc Alloy-Coated Steel: [**0.028 inch (0.71 mm)**] <**Insert thickness**> thick.
7. Zinc: [**0.032 inch (0.80 mm)**] [**0.039 inch (1.00 mm)**] <**Insert thickness**> thick.

2.9 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:

1. Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
2. Stainless Steel: [**0.016 inch (0.40 mm)**] <**Insert thickness**> thick.
3. Zinc-Tin Alloy-Coated Stainless Steel: [**0.015 inch (0.38 mm)**] <**Insert thickness**> thick.
4. Zinc-Tin Alloy-Coated Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
5. Zinc: [**0.032 inch (0.80 mm)**] [**0.039 inch (1.00 mm)**] <**Insert thickness**> thick.

B. Opening Flashings in Frame Construction: Fabricate head, sill,[**jamb,**] and similar flashings to extend [**4 inches (100 mm)**] <**Insert extension**> beyond wall openings. Form head and sill flashing with 2-inch- (50-mm-) high, end dams. Fabricate from the following materials:

1. Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
2. Aluminum: [**0.032 inch (0.81 mm)**] <**Insert thickness**> thick.
3. Stainless Steel: [**0.016 inch (0.40 mm)**] <**Insert thickness**> thick.
4. Zinc-Tin Alloy-Coated Stainless Steel: [**0.015 inch (0.38 mm)**] <**Insert thickness**> thick.
5. Zinc-Tin Alloy-Coated Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
6. Galvanized Steel: [**0.022 inch (0.56 mm)**] <**Insert thickness**> thick.
7. Aluminum-Zinc Alloy-Coated Steel: [**0.022 inch (0.56 mm)**] <**Insert thickness**> thick.
8. Zinc: [**0.032 inch (0.80 mm)**] [**0.039 inch (1.00 mm)**] <**Insert thickness**> thick.

C. Wall Expansion-Joint Cover: Fabricate from the following materials:

1. Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
2. Aluminum: [**0.040 inch (1.02 mm)**] <**Insert thickness**> thick.
3. Stainless Steel: [**0.019 inch (0.48 mm)**] <**Insert thickness**> thick.
4. Zinc-Tin Alloy-Coated Stainless Steel: [**0.018 inch (0.46 mm)**] <**Insert thickness**> thick.
5. Zinc-Tin Alloy-Coated Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
6. Galvanized Steel: [**0.028 inch (0.71 mm)**] <**Insert thickness**> thick.
7. Aluminum-Zinc Alloy-Coated Steel: [**0.028 inch (0.71 mm)**] <**Insert thickness**> thick.
8. Zinc: [**0.032 inch (0.80 mm)**] [**0.039 inch (1.00 mm)**] <**Insert thickness**> thick.

2.10 MISCELLANEOUS SHEET METAL FABRICATIONS

A. Equipment Support Flashing: Fabricate from the following materials:

1. Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
2. Stainless Steel: [**0.019 inch (0.48 mm)**] <**Insert thickness**> thick.
3. Zinc-Tin Alloy-Coated Stainless Steel: [**0.018 inch (0.46 mm)**] <**Insert thickness**> thick.
4. Zinc-Tin Alloy-Coated Copper: [**16 oz./sq. ft. (0.55 mm thick)**] <**Insert weight (thickness)**>.
5. Galvanized Steel: [**0.028 inch (0.71 mm)**] <**Insert thickness**> thick.
6. Aluminum-Zinc Alloy-Coated Steel: [**0.028 inch (0.71 mm)**] <**Insert thickness**> thick.

B. Overhead-Piping Safety Pans: Fabricate from the following materials:

1. Copper: [**24 oz./sq. ft. (0.82 mm thick)**] <**Insert weight (thickness)**>.
2. Stainless Steel: [**0.025 inch (0.64 mm)**] <**Insert thickness**> thick.
3. Zinc-Tin Alloy-Coated Stainless Steel: [**0.024 inch (0.61 mm)**] <**Insert thickness**> thick.
4. Zinc-Tin Alloy-Coated Copper: [**24 oz./sq. ft. (0.82 mm thick)**] <**Insert weight (thickness)**>.
5. Galvanized Steel: [**0.040 inch (1.02 mm)**] <**Insert thickness**> thick.
6. Aluminum-Zinc Alloy-Coated Steel: [**0.040 inch (1.02 mm)**] <**Insert thickness**> thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of the Work.

1. Verify compliance with requirements for installation tolerances of substrates.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

A. General: Install underlayment as indicated on Drawings.

B. Polyethylene Sheet: Install polyethylene sheet with adhesive for anchorage to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped and taped joints of not less than 2 inches (50 mm).

C. Felt Underlayment: Install felt underlayment with adhesive for temporary anchorage to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches (50 mm).

D. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Apply primer if required by underlayment manufacturer. 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.

3.3 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. 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.
7. Do not use graphite pencils to mark metal surfaces.

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.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of [**10 feet (3 m)**] <**Insert dimension**> 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**] <**Insert size requirement**>.

E. Seal joints as shown and as required for watertight construction.

1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

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. Pre-tinning is not required for [**zinc-tin alloy-coated stainless steel**] [**and**] [**zinc-tin alloy-coated copper**].
3. 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.
4. 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.
5. Copper Soldering: Tin edges of uncoated copper sheets using solder for copper.

G. Rivets: Rivet joints in [**uncoated aluminum**] [**zinc**] where indicated and where necessary for strength.

3.4 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. Fasten gutter spacers to front and back of gutter.
2. Loosely lock straps to front gutter bead and anchor to roof deck.
3. Anchor and loosely lock back edge of gutter to continuous [**cleat**] [**eave or apron flashing**].
4. Anchor back of gutter that extends onto roof deck with cleats spaced not more than [**24 inches (600 mm)**] <**Insert dimension**> apart.
5. Anchor gutter with spikes and ferrules spaced not more than [**24 inches (600 mm)**] [**30 inches (750 mm)**] <**Insert dimension**> apart.
6. Install gutter with expansion joints at locations indicated, but not exceeding, [**50 feet (15.24 m)**] <**Insert dimension**> apart. Install expansion-joint caps.
7. Install continuous gutter screens on gutters with noncorrosive fasteners, [**removable**] [**hinged to swing open**] for cleaning gutters.

C. Built-in Gutters: Join sections with riveted and soldered or lapped joints sealed with sealant. Provide for thermal expansion. Slope to downspouts. Provide end closures and seal watertight with sealant.

1. Install felt underlayment layer in built-in gutter trough and extend to drip edge at eaves and under felt underlayment on roof sheathing. Lap sides a minimum of 2 inches (50 mm) over underlying course. Lap ends a minimum of 4 inches (100 mm). Stagger end laps between succeeding courses at least 72 inches (1830 mm). Fasten with roofing nails. Install slip sheet over felt underlayment.
2. Anchor and loosely lock back edge of gutter to continuous [**cleat**] [**eave or apron flashing**].
3. Anchor back of gutter that extends onto roof deck with cleats spaced not more than [**24 inches (600 mm)**] <**Insert dimension**> apart.
4. Install gutter with expansion joints at locations indicated, but not exceeding, [**50 feet (15.24 m)**] <**Insert dimension**> apart. Install expansion-joint caps.

D. Downspouts: Join sections with 1-1/2-inch (38-mm) telescoping joints.

1. 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.
2. Provide elbows at base of downspout to direct water away from building.
3. Connect downspouts to underground drainage system indicated.

E. Splash Pans: Install where downspouts discharge on [**low-slope roofs**] <**Insert surface**>. Set in [**asphalt roofing cement**] [**elastomeric sealant**] compatible with [**roofing membrane**] <**Insert material**>.

F. 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.

1. Anchor scupper closure trim flange to exterior wall and [**solder**] [**or**] [**seal with elastomeric sealant**] to scupper.

2. Loosely lock front edge of scupper with conductor head.
3. [**Solder**] [**or**] [**seal with elastomeric sealant**] exterior wall scupper flanges into back of conductor head.

G. Conductor Heads: Anchor securely to wall with elevation of conductor head rim 1 inch (25 mm) below [**scupper**] [**gutter**] discharge.

H. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints a minimum of 4 inches (100 mm) in direction of water flow.

3.5 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements[**, sheet metal manufacturer's written installation instructions,**] 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)**] <**Insert spacing**> centers.

C. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at [**24-inch (600-mm)**] [**16-inch (400-mm)**] <**Insert spacing**> centers.

D. Copings: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated.

1. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at [**24-inch (600-mm)**] [**16-inch (400-mm)**] <**Insert spacing**> centers.
2. Anchor interior leg of coping with washers and screw fasteners through slotted holes at [**24-inch (600-mm)**] <**Insert spacing**> centers.

E. Copings: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated.

1. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at [**24-inch (600-mm)**] [**16-inch (400-mm)**] <**Insert spacing**> centers.
2. Anchor interior leg of coping with screw fasteners and washers at [**24-inch (600-mm)**] [**20-inch (500-mm)**] <**Insert spacing**> centers.

F. 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.

G. 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. Secure in a waterproof manner by means of [**snap-in installation and sealant or lead wedges and sealant**] [**interlocking folded seam or blind rivets and sealant**] [**anchor and washer at 36-inch (900-mm) centers**].

H. 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.

3.6 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. Through-Wall Flashing: Installation of through-wall flashing is specified in Division 04 Section "[**Unit Masonry**] [**Stone Masonry**]."

C. Reglets: Installation of reglets is specified in [**Division 03 Section "Cast-in-Place Concrete**] [**Division 04 Section "Unit Masonry**]."

D. Opening Flashings in Frame Construction: Install continuous head, sill,[**jamb,**] and similar flashings to extend [**4 inches (100 mm)**] <**Insert extension**> beyond wall openings.

3.7 MISCELLANEOUS FLASHING INSTALLATION

A. Overhead-Piping Safety Pans: Suspend pans independent from structure above as indicated on Drawings. Pipe and install drain line to plumbing waste or drainage system.

B. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

3.8 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.9 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 flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.

E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 076200

SECTION 077200 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Roof curbs.
2. Equipment supports.
3. Roof hatches.
4. Hatch-type heat and smoke vents.
5. Dropout-type heat and smoke vents.
6. Gravity ventilators.
7. Pipe supports.
8. Roof walkways.
9. Preformed flashing sleeves.

B. Related Sections:

1. Division 05 Section "Metal Fabrications" for metal vertical ladders, ships' ladders, and stairs for access to roof hatches.
2. Division 05 Section "Pipe and Tube Railings" for safety railing systems not attached to roof-hatch curbs.
3. Division 07 steep-slope roofing Sections for ridge vents.
4. Division 07 low-slope roofing Sections for roofing accessories.
5. Division 07 Section "Metal Roof Panels" for ridge vents and snow guards for metal roof panels.
6. Division 07 Section "Sheet Metal Roofing" for shop- and field-formed roof curbs and snow guards for sheet metal roofing.
7. Division 07 Section "Sheet Metal Flashing and Trim" for shop- and field-formed metal flashing, roof-drainage systems, roof expansion-joint covers, and miscellaneous sheet metal trim and accessories.
8. Division 07 Section "Roof Specialties" for manufactured fasciae, copings, gravel stops, gutters and downspouts, and counterflashing.
9. Division 07 Section "Manufactured Roof Expansion Joints" for manufactured roof expansion-joint covers.
10. Division 08 Section "Unit Skylights" for single- and double-glazed domed plastic skylights with curb frame.
11. Division 23 Section "HVAC Power Ventilators" for power roof-mounted ventilators.
12. Division 28 Section [**"Digital, Addressable Fire-Alarm System"**] [**"Zoned (DC Loop) Fire-Alarm System"**] for interconnects to automatically operated heat and smoke vents.

1.3 PERFORMANCE REQUIREMENTS

A. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

1.4 SUBMITTALS

A. Product Data: For each type of roof accessory indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof accessories. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.

C. Samples: For each exposed product and for each color and texture specified, prepared on Samples of size to adequately show color.

D. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:

1. Size and location of roof accessories specified in this Section.
2. Method of attaching roof accessories to roof or building structure.
3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.
4. Required clearances.

E. Operation and Maintenance Data: For roof accessories to include in operation and maintenance manuals.

F. Warranty: Sample of special warranty.

1.5 COORDINATION

A. Coordinate layout and installation of roof accessories with [**roofing membrane and base flashing and**]interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.

B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1.6 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: [**20**] [**10**] <**Insert number**> years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 METAL MATERIALS

A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation[**and mill phosphatized for field painting where indicated**].

1. Mill-Phosphatized Finish: Manufacturer's standard for field painting.
2. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil (0.005 mm).
3. Exposed Coil-Coated Finish: 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.

    a. Two-Coat Fluoropolymer Finish: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.

4. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil (0.025 mm) for topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).
5. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil (0.013 mm).

B. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, AZ50 (AZM150) coated.

1. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil (0.005 mm).
2. Exposed Coil-Coated Finish: 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.

    a. Two-Coat Fluoropolymer Finish: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.

3. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil (0.025 mm) for topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).
4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil (0.013 mm).

C. Aluminum Sheet: ASTM B 209 (ASTM B 209M), manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.

1. Mill Finish: As manufactured.
2. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil (0.005 mm).
3. Clear Anodic Finish: AAMA 611, [**AA-M12C22A41, Class I, 0.018 mm**] [**AA-M12C22A31, Class II, 0.010 mm**] or thicker.
4. Color Anodic Finish: AAMA 611, [**AA-M12C22A42/A44, Class I, 0.018 mm**] [**AA-M12C22A32/A34, Class II, 0.010 mm**] or thicker.
5. Exposed Coil-Coated Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

    a. Two-Coat Fluoropolymer Finish: AAMA 620. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.

6. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
7. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil (0.013 mm).

D. Aluminum Extrusions and Tubes: ASTM B 221 (ASTM B 221M), manufacturer's standard alloy and temper for type of use, finished to match assembly where used, otherwise mill finished.

E. Copper Sheet: ASTM B 370, manufacturer's standard temper.

F. Stainless-Steel Sheet and Shapes: ASTM A 240/A 240M or ASTM A 666, Type 304.

G. Steel Shapes: ASTM A 36/A 36M, hot-dip galvanized according to ASTM A 123/A 123M unless otherwise indicated.

H. Steel Tube: ASTM A 500, round tube.

I. Galvanized-Steel Tube: ASTM A 500, round tube, hot-dip galvanized according to ASTM A 123/A 123M.

J. Steel Pipe: ASTM A 53/A 53M, galvanized.

2.2 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. Acrylic Glazing: ASTM D 4802, thermoformable, monolithic sheet, manufacturer's standard, Type UVA (formulated with UV absorber), Finish 1 (smooth or polished).

C. Polycarbonate Glazing: Thermoformable, monolithic polycarbonate sheets manufactured by extrusion process, burglar-resistance rated according to UL 972 with an average impact strength of [**12 to 16 ft-lbf/in. (640 to 854 J/m)**] <**Insert value**> of width when tested according to ASTM D 256, Method A (Izod).

D. Cellulosic-Fiber Board Insulation: ASTM C 208, Type II, Grade 1, thickness as indicated.

E. Glass-Fiber Board Insulation: ASTM C 726, thickness as indicated.

F. Polyisocyanurate Board Insulation: ASTM C 1289, thickness as indicated.

G. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction,[**containing no arsenic or chromium,**] and complying with AWPA C2; not less than 1-1/2 inches (38 mm) thick.

H. Security Grilles: [**3/4-inch (19-mm)**] <**Insert dimension**> diameter, ASTM A 1011/A 1011M steel bars spaced [**6 inches (150 mm)**] <**Insert dimension**> o.c. in one direction and [**12 inches (300 mm)**] <**Insert dimension**> o.c. in the other; factory finished as follows:

1. Surface Preparation: Remove mill scale and rust, if any, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
2. Factory Priming for Field-Painted Finish: Apply shop primer specified below immediately after surface preparation and pretreatment.
3. Shop Primer: Manufacturer's or fabricator's standard, fast-curing, lead- and chromate-free, universal primer; selected for resistance to normal atmospheric corrosion, for compatibility with substrate and field-applied finish paint system indicated, and for capability to provide a sound foundation for field-applied topcoats under prolonged exposure.

I. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

J. Underlayment:

1. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
2. Polyethylene Sheet: 6-mil- (0.15-mm-) thick polyethylene sheet complying with ASTM D 4397.
3. Slip Sheet: Building paper, 3-lb/100 sq. ft. (0.16-kg/sq. m) minimum, rosin sized.

K. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:

1. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153/A 153M or ASTM F 2329.
2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
3. Fasteners for Copper Sheet: Copper, hardware bronze, or passivated Series 300 stainless steel.
4. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.

L. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.

M. Elastomeric Sealant: ASTM C 920, elastomeric [**polyurethane**] [**silicone**] polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.

N. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.

O. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.3 ROOF CURBS

A. Roof Curbs: Internally reinforced roof-curb units[**with integral spring-type vibration isolators and**] capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings; with welded or mechanically fastened and sealed corner joints,[**integral metal cant,**] [**stepped integral metal cant raised the thickness of roof insulation,**] and integrally formed deck-mounting flange at perimeter bottom.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:
2. Basis-of-Design Product: Subject to compliance with requirements, provide [**product indicated on Drawings**] <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

    a. AES Industries, Inc.
    b. Curbs Plus, Inc.
    c. Custom Solution Roof and Metal Products.
    d. Greenheck Fan Corporation.
    e. LM Curbs.
    f. Metallic Products Corp.
    g. Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc.
    h. Pate Company (The).
    i. Roof Products, Inc.
    j. Safe Air of Illinois.
    k. Thybar Corporation.
    l. Vent Products Co., Inc.
    m. <**Insert manufacturer's name**>.

B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.

C. Loads: <**Insert load requirements**>.

D. Material: [**Zinc-coated (galvanized)**] [**Aluminum-zinc alloy-coated**] steel sheet, [**0.052 inch (1.32 mm)**] [**0.079 inch (2.01 mm)**] <**Insert dimension**> thick.

1. Finish: [**Mill phosphatized**] [**Factory prime coating**] [**Two-coat fluoropolymer**] [**Baked enamel or powder coat**] <**Insert finish**>.
2. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

E. Material: Aluminum sheet, [**0.090 inch (2.28 mm)**] <**Insert dimension**> thick.

1. Finish: [**Mill**] [**Factory prime coating**] [**Clear anodic**] [**Color anodic**] [**Two-coat fluoropolymer**] [**Baked enamel or powder coat**] <**Insert finish**>.
2. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] [**Light bronze**] [**Medium bronze**] [**Dark bronze**] <**Insert color**>.

F. Material: Stainless-steel sheet, [**0.078 inch (1.98 mm)**] <**Insert dimension**> thick.

1. Finish: [**Manufacturer's standard**] [**No. 2D, directional polish finish**] <**Insert finish**>.

G. Construction:

1. Insulation: Factory insulated with [**1-1/2-inch- (38-mm-)**] <**Insert dimension**> thick [**cellulosic**] [**glass**]-fiber board insulation.
2. Liner: Same material as curb, of manufacturer's standard thickness and finish.
3. Factory-installed wood nailer at top of curb, continuous around curb perimeter.
4. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
5. Fabricate curbs to minimum height of [**12 inches (300 mm)**] <**Insert dimension**> unless otherwise indicated.
6. Top Surface: Level around perimeter with roof slope accommodated by sloping the deck-mounting flange.
7. Sloping Roofs: Where roof slope exceeds 1:48, fabricate curb with perimeter curb height tapered to accommodate roof slope so that top surface of perimeter curb is level. Equip unit with water diverter or cricket on side that obstructs water flow.
8. Security Grille: Provide where indicated.

2.4 EQUIPMENT SUPPORTS

A. Equipment Supports: Internally reinforced metal equipment supports capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings; with welded or mechanically fastened and sealed corner joints,[**integral metal cant,**] [**stepped integral metal cant raised the thickness of roof insulation,**] and integrally formed deck-mounting flange at perimeter bottom.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

2. Basis-of-Design Product: Subject to compliance with requirements, provide [**product indicated on Drawings**] <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

    a. AES Industries, Inc.
    b. Curbs Plus, Inc.
    c. Custom Solution Roof and Metal Products.
    d. Greenheck Fan Corporation.
    e. LM Curbs.
    f. Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc.
    g. Pate Company (The).
    h. Roof Products, Inc.
    i. Thybar Corporation.
    j. Vent Products Co., Inc.
    k. <**Insert manufacturer's name**>.

B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.

C. Loads: <**Insert load requirements**>.

D. Material: [**Zinc-coated (galvanized)**] [**Aluminum-zinc alloy-coated**] steel sheet, [**0.052 inch (1.32 mm)**] [**0.079 inch (2.01 mm)**] <**Insert dimension**> thick.

1. Finish: [**Mill phosphatized**] [**Factory prime coating**] [**Two-coat fluoropolymer**] [**Baked enamel or powder coat**] <**Insert finish**>.
2. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

E. Material: Aluminum sheet, [**0.090 inch (2.28 mm)**] <**Insert dimension**> thick.

1. Finish: [**Mill**] [**Factory prime coating**] [**Clear anodic**] [**Color anodic**] [**Two-coat fluoropolymer**] [**Baked enamel or powder coat**] <**Insert finish**>.
2. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] [**Light bronze**] [**Medium bronze**] [**Dark bronze**] <**Insert color**>.

F. Material: Stainless-steel sheet, [**0.078 inch (1.98 mm)**] <**Insert dimension**> thick.

1. Finish: [**Manufacturer's standard**] [**No. 2D, directional polish finish**] <**Insert finish**>.

G. Construction:

1. Insulation: Factory insulated with [**1-1/2-inch- (38-mm-)**] <**Insert dimension**> thick [**cellulosic**] [**glass**]-fiber board insulation.
2. Liner: Same material as equipment support, of manufacturer's standard thickness and finish.
3. Factory-installed continuous wood nailers [**3-1/2 inches (90 mm)**] [**5-1/2 inches (140 mm)**] <**Insert dimension**> wide at tops of equipment supports.
4. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as equipment support.

5. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
6. Fabricate equipment supports to minimum height of [**12 inches (300 mm)**] <**Insert dimension**> unless otherwise indicated.
7. Sloping Roofs: Where roof slope exceeds 1:48, fabricate each support with height to accommodate roof slope so that tops of supports are level with each other. Equip supports with water diverters or crickets on sides that obstruct water flow.
8. Security Grille: Provide where indicated.

2.5 ROOF HATCH

A. Roof Hatches: Metal roof-hatch units with lids and insulated [**single**] [**double**]-walled curbs, welded or mechanically fastened and sealed corner joints, continuous lid-to-curb counterflashing and weathertight perimeter gasketing,[**integral metal cant,**] [**stepped integral metal cant raised the thickness of roof insulation,**] and integrally formed deck-mounting flange at perimeter bottom.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:
2. Basis-of-Design Product: Subject to compliance with requirements, provide [**product indicated on Drawings**] <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

    a. AES Industries, Inc.
    b. Babcock-Davis.
    c. Bilco Company (The).
    d. Bristolite Skylights.
    e. Custom Solution Roof and Metal Products.
    f. Dur-Red Products.
    g. Hi Pro International, Inc.
    h. J. L. Industries, Inc.
    i. Metallic Products Corp.
    j. Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc.
    k. Naturalite Skylight Systems; Vistawall Group (The).
    l. Nystrom.
    m. O'Keeffe's Inc.
    n. Pate Company (The).
    o. Precision Ladders, LLC.
    p. <**Insert manufacturer's name**>.

B. Type and Size: Single-leaf lid, [**30 by 36 inches (750 by 900 mm)**] [**30 by 54 inches (750 by 1370 mm)**] [**30 by 96 inches (750 by 2440 mm)**] <**Insert dimensions**>.

C. Type and Size: Double-leaf lid, [**72 by 96 inches (1830 by 2440 mm)**] <**Insert dimensions**>.

D. Loads: Minimum [**40-lbf/sq. ft. (1.9-kPa)**] <**Insert value**> external live load and [**20-lbf/sq. ft. (0.95-kPa)**] <**Insert value**> internal uplift load.

1. Dome Glazing: Minimum [**40-lbf/sq. ft. (1.9-kPa)**] <**Insert value**> external live load and [**20-lbf/sq. ft. (0.95-kPa)**] <**Insert value**> internal uplift load.

E. Hatch Material: [**Zinc-coated (galvanized)**] [**Aluminum-zinc alloy-coated**] steel sheet, [**0.079 inch (2.01 mm)**] <**Insert dimension**> thick.

1. Finish: [**Mill phosphatized**] [**Factory prime coating**] [**Two-coat fluoropolymer**] [**Baked enamel or powder coat**] <**Insert finish**>.
2. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

F. Hatch Material: Aluminum sheet, [**0.090 inch (2.28 mm)**] <**Insert dimension**> thick.

1. Finish: [**Mill**] [**Factory prime coating**] [**Clear anodic**] [**Color anodic**] [**Two-coat fluoropolymer**] [**Baked enamel or powder coat**] <**Insert finish**>.
2. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] [**Light bronze**] [**Medium bronze**] [**Dark bronze**] <**Insert color**>.

G. Hatch Material: Stainless-steel sheet, [**0.078 inch (1.98 mm)**] <**Insert dimension**> thick.

1. Finish: [**Manufacturer's standard**] [**No. 2D, directional polish finish**] <**Insert finish**>.

H. Construction:

1. Insulation: [**Cellulosic-fiber**] [**Glass-fiber**] [**Polyisocyanurate**] board.
2. Hatch Lid: Opaque, insulated, and double walled, with manufacturer's standard metal liner of same material and finish as outer metal lid.
3. Hatch Lid: Glazed, insulated, and double walled, with manufacturer's standard metal liner of same material and finish as outer metal lid.
4. Curb Liner: Manufacturer's standard, of same material and finish as metal curb.
5. On ribbed or fluted metal roofs, form flange at perimeter bottom to conform to roof profile.
6. Fabricate curbs to minimum height of [**12 inches (300 mm)**] <**Insert dimension**> unless otherwise indicated.
7. Sloping Roofs: Where slope or roof deck exceeds 1:48, fabricate curb with perimeter curb height that is [**constant**] [**tapered to accommodate roof slope so that top surfaces of perimeter curb are level**]. Equip hatch with water diverter or cricket on side that obstructs water flow.

I. Hatch-Lid Glazing: [**Single**] [**Double**] [**acrylic**] [**polycarbonate**] glazing of thickness capable of resisting indicated loads.

1. Single-Dome Color: [**Colorless, transparent**] [**White, translucent**] [**Gray tinted, transparent**] [**Bronze tinted, transparent**] <**Insert requirement**>.
2. Outer Double-Dome Color: [**Colorless, transparent**] [**White, translucent**] [**Gray tinted, transparent**] [**Bronze tinted, transparent**] <**Insert requirement**>.
3. Inner Double-Dome Color: [**Colorless, transparent**] [**White, translucent**] [**Gray tinted, transparent**] [**Bronze tinted, transparent**] <**Insert requirement**>.

J. Hardware: [**Galvanized**] [**Stainless**]-steel spring latch with turn handles, butt- or pintle-type hinge system, and padlock hasps inside and outside.

1. Provide two-point latch on lids larger than 84 inches (2130 mm).
2. Provide remote-control operation.

K. Safety Railing System: Roof-hatch manufacturer's standard system including rails, clamps, fasteners, safety barrier at railing opening, and accessories required for a complete installation; attached to roof hatch and complying with 29 CFR 1910.23 requirements and authorities having jurisdiction.

1. Height: [**42 inches (1060 mm)**] <**Insert dimension**> above finished roof deck.
2. Posts and Rails: Galvanized-steel pipe, 1-1/4 inches (31 mm) in diameter or galvanized-steel tube, 1-5/8 inches (41 mm) in diameter.
3. Flat Bar: Galvanized steel, 2 inches (50 mm) high by 3/8 inch (9 mm) thick.
4. Maximum Opening Size: System constructed to prevent passage of a sphere 21 inches (533 mm) in diameter.
5. Chain Passway Barrier: Galvanized proof coil chain with quick link on fixed end.
6. Self-Latching Gate: Fabricated of same materials and rail spacing as safety railing system. Provide manufacturer's standard hinges and self-latching mechanism.
7. Post and Rail Tops and Ends: Weather resistant, closed or plugged with prefabricated end fittings.
8. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members.
9. Fabricate joints exposed to weather to be watertight.
10. Fasteners: Manufacturer's standard, finished to match railing system.
11. Finish: [**Manufacturer's standard**] <**Insert finish**>.

    a. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

L. Ladder-Assist Post: Roof-hatch manufacturer's standard device for attachment to roof-access ladder.

1. Operation: Post locks in place on full extension; release mechanism returns post to closed position.
2. Height: [**42 inches (1060 mm)**] <**Insert dimension**> above finished roof deck.
3. Material: [**Steel tube**] [**Stainless steel**] [**Aluminum**].
4. Post: [**1-5/8-inch- (41-mm-)**] <**Insert dimension**> diameter pipe.
5. Finish: [**Manufacturer's standard baked enamel or powder coat**] <**Insert finish**>.

    a. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

2.6 HEAT AND SMOKE VENTS

A. Hatch-Type Heat and Smoke Vents: Manufacturer's standard, with [**single**] [**double**]-walled insulated curbs, welded or mechanically fastened and sealed corner joints, integral condensation

gutter, and cap flashing. Fabricate with insulated double-walled lid and continuous weathertight perimeter lid gaskets, and equip with automatic self-lifting mechanisms and UL-listed [**fusible links rated at 165 deg F (74 deg C)**] [**fire-suppression system**] [**smoke-detection system**].

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:
2. Basis-of-Design Product: Subject to compliance with requirements, provide [**product indicated on Drawings**] <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

    a. Babcock-Davis.
    b. Bilco Company (The).
    c. Bristolite Skylights.
    d. Dur-Red Products.
    e. Hi Pro International, Inc.
    f. J. L. Industries, Inc.
    g. Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc.
    h. Naturalite Skylight Systems; Vistawall Group (The).
    i. Nystrom.
    j. O'Keeffe's Inc.
    k. Pate Company (The).
    l. Western Canwell.
    m. <**Insert manufacturer's name**>.

3. Type and Size: Single-leaf lid, [**30 by 36 inches (750 by 900 mm)**] [**30 by 54 inches (750 by 1370 mm)**] [**30 by 96 inches (750 by 2440 mm)**] <**Insert dimensions**>.
4. Type and Size: Double-leaf lid, [**72 by 96 inches (1830 by 2440 mm)**] <**Insert dimensions**>.
5. Loads: Minimum [**40-lbf/sq. ft. (1.9-kPa)**] <**Insert value**> external live load and [**30-lbf/sq. ft. (1.4-kPa)**] <**Insert value**> internal uplift load.

    a. When release is actuated, lid shall open against [**10-lbf/sq. ft. (0.5-kPa)**] <**Insert value**> snow or wind load and lock in position.
    b. Hatch-Lid Glazing: Minimum [**40-lbf/sq. ft. (1.9-kPa)**] <**Insert value**> external live load and [**20-lbf/sq. ft. (0.95-kPa)**] <**Insert value**> internal uplift load.

6. Heat and Smoke Vent Standard: Provide units that have been tested and [**listed to comply with UL 793**] [**and**] [**are FM Approved**].
7. Curb, Framing, and Lid Material: [**Zinc-coated (galvanized)**] [**Aluminum-zinc alloy-coated**] steel sheet, [**0.079 inch (2.01 mm)**] <**Insert dimension**> thick.

    a. Finish: [**Mill phosphatized**] [**Factory prime coating**] [**Two-coat fluoropolymer**] [**Baked enamel or powder coat**] <**Insert finish**>.
    b. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

8. Curb, Framing, and Lid Material: Aluminum sheet, [**0.090 inch (2.28 mm)**] <**Insert dimension**> thick.

a. Finish: [**Mill**] [**Factory prime coating**] [**Clear anodic**] [**Color anodic**] [**Two-coat fluoropolymer**] [**Baked enamel or powder coat**] <**Insert finish**>.
b. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] [**Light bronze**] [**Medium bronze**] [**Dark bronze**] <**Insert color**>.

9. Curb, Framing, and Lid Material: Stainless-steel sheet, [**0.078 inch (1.98 mm)**] <**Insert dimension**> thick.

a. Finish: [**Manufacturer's standard**] [**No. 2D, directional polish finish**] <**Insert finish**>.

10. Construction:

a. Insulation: [**Cellulosic-fiber**] [**Glass-fiber**] [**Polyisocyanurate**] board.
b. Hatch Lid: Opaque, insulated, and double walled, with manufacturer's standard metal liner of same material and finish as outer metal lid.
c. Hatch Lid: Glazed, insulated, and double walled, with manufacturer's standard metal liner of same material and finish as outer metal lid.
d. Exterior Curb Liner: Manufacturer's standard, of same material and finish as metal curb.
e. Fabricate curbs to minimum height of [**12 inches (300 mm)**] <**Insert dimension**> unless otherwise indicated.
f. Sloping Roofs: Where slope or roof deck exceeds 1:48, fabricate curb with perimeter curb height that is [**constant**] [**tapered to accommodate roof slope so that top surfaces of perimeter curb are level**]. Equip hatch with water diverter or cricket on side that obstructs water flow.
g. Security Grille: Provide where indicated.

11. Hatch-Lid Glazing: [**Single**] [**Double**] [**acrylic**] [**polycarbonate**] glazing of thickness capable of resisting indicated loads; [**colorless, transparent**] [**white, translucent**] <**Insert color requirement**>.
12. Hardware: Manufacturer's standard, corrosion resistant or hot-dip galvanized; with hinges, hold-open devices, and independent manual-release devices for [**inside**] [**and**] [**outside**] operation of lids.

B. Dropout-Type Heat and Smoke Vents: Manufacturer's standard, gravity operated and automatic; with [**single**] [**double**]-walled insulated curbs and frame, welded or mechanically fastened and sealed corner joints, integral condensation gutter, cap flashing, and heat-sensitive dome glazing that will deform and drop out of vent opening according to heat and smoke vent standard indicated.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:
2. Basis-of-Design Product: Subject to compliance with requirements, provide [**product indicated on Drawings**] <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

a. Construction Specialties, Inc.
b. Naturalite Skylight Systems; Vistawall Group (The).

c. Pate Company (The).
d. Plasteco, Inc.
e. <**Insert manufacturer's name**>.

3. Loads: Minimum [**40-lbf/sq. ft. (1.9-kPa)**] <**Insert value**> external live load and [**30-lbf/sq. ft. (1.4-kPa)**] <**Insert value**> internal uplift load.

   a. Dome Glazing: Minimum [**40-lbf/sq. ft. (1.9-kPa)**] <**Insert value**> external live load and [**20-lbf/sq. ft. (0.95-kPa)**] <**Insert value**> internal uplift load.

4. Heat and Smoke Vent Standard: Provide units that have been tested and [**listed to comply with UL 793**] [**and**] [**are FM Approved**].
5. Curb and Framing Material: [**Zinc-coated (galvanized)**] [**Aluminum-zinc alloy-coated**] steel sheet, [**0.079 inch (2.01 mm)**] <**Insert dimension**> thick.

   a. Finish: [**Mill phosphatized**] [**Factory prime coating**] [**Two-coat fluoropolymer**] [**Baked enamel or powder coat**] <**Insert finish**>.
   b. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

6. Curb and Framing Material: Aluminum sheet, [**0.090 inch (2.28 mm)**] <**Insert dimension**> thick.

   a. Finish: [**Mill**] [**Factory prime coating**] [**Clear anodic**] [**Color anodic**] [**Two-coat fluoropolymer**] [**Baked enamel or powder coat**] <**Insert finish**>.
   b. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] [**Light bronze**] [**Medium bronze**] [**Dark bronze**] <**Insert color**>.

7. Curb and Framing Material: Stainless-steel sheet, [**0.078 inch (1.98 mm)**] <**Insert dimension**> thick.

   a. Finish: [**Manufacturer's standard**] [**No. 2D, directional polish finish**] <**Insert finish**>.

8. Construction:

   a. Insulation: [**Cellulosic-fiber**] [**Glass-fiber**] [**Polyisocyanurate**] board.
   b. Exterior Curb Liner: Manufacturer's standard, of same material and finish as metal curb.
   c. Fabricate curbs to minimum height of [**12 inches (300 mm)**] <**Insert dimension**> unless otherwise indicated.
   d. Sloping Roofs: Where slope of roof deck exceeds 1:48, fabricate curb with perimeter curb height that is [**constant**] [**tapered to accommodate roof slope so that top surfaces of perimeter curb are level**]. Equip unit with water diverter or cricket on side that obstructs water flow.

9. Dome Glazing: [**Single**] [**Double**] [**acrylic**] [**polycarbonate**] glazing of thickness capable of resisting indicated loads.

a. Single-Dome Color: [**Colorless, transparent**] [**White, translucent**] [**Gray tinted, transparent**] [**Bronze tinted, transparent**] <**Insert requirement**>.
b. Outer Double-Dome Color: [**Colorless, transparent**] [**White, translucent**] [**Gray tinted, transparent**] [**Bronze tinted, transparent**] <**Insert requirement**>.
c. Inner Double-Dome Color: [**Colorless, transparent**] [**White, translucent**] [**Gray tinted, transparent**] [**Bronze tinted, transparent**] <**Insert requirement**>.

10. Hardware: Manufacturer's standard, corrosion resistant or hot-dip galvanized; with hinges, hold-open devices, and independent manual-release devices for [**inside**] [**and**] [**outside**] operation of lids.

2.7 GRAVITY VENTILATORS

A. Low-Profile, Cylindrical-Style Gravity Ventilators: Manufacturer's standard, fabricated as indicated, with manufacturer's standard welded or sealed mechanical joints.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:
2. Basis-of-Design Product: Subject to compliance with requirements, provide [**product indicated on Drawings**] <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

a. Active Ventilation Products, Inc.
b. Greenheck Fan Corporation.
c. Loren Cook Company.
d. Metallic Products Corp.
e. Thaler Metal USA Inc.
f. <**Insert manufacturer's name**>.

3. Construction: Integral base flange, vent cylinder, cylinder bird screen, and [**rain cap**] [**hood**].
4. Dimensions: [**As indicated on Drawings**] <**Insert dimensions**>.
5. Configuration: [**As indicated on Drawings**] <**Insert requirements**>.
6. Bird Screens: Manufacturer's standard mesh with rewireable frame.
7. Insect Screens: Manufacturer's standard mesh with rewireable frame.
8. Vent Cylinder, Base Flange, and [**Rain-Cap**] [**Hood**] Material: [**Zinc-coated (galvanized) steel**] [**Aluminum**] [**Copper**] [**Stainless-steel**] sheet, of manufacturer's standard thickness.
9. Finish: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert finish**>.

B. Louvered Penthouse-Style Gravity Ventilators: Manufacturer's standard, fabricated as indicated, with manufacturer's standard welded or sealed mechanical joints.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

2. Basis-of-Design Product: Subject to compliance with requirements, provide [**product indicated on Drawings**] <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

    a. Dur-Red Products.
    b. Greenheck Fan Corporation.
    c. Loren Cook Company.
    d. Safe Air of Illinois.
    e. Vent Products Co., Inc.
    f. <**Insert manufacturer's name**>.

3. Construction: Integral frame with base flange, weathertight cap[**with clear acrylic dome**] [**with white translucent acrylic dome**], and weatherproof sidewall louvers.
4. Dimensions: [**As indicated on Drawings**] <**Insert dimensions**>.
5. Configuration: [**As indicated on Drawings**] <**Insert requirements**>.
6. Bird Screens: Manufacturer's standard mesh with rewireable frame.
7. Insect Screens: Manufacturer's standard mesh with rewireable frame.
8. Frame, Base Flange, Cap, and Louver Material: [**Zinc-coated (galvanized) steel**] [**Aluminum**] [**Stainless-steel**] sheet, of manufacturer's standard thickness.
9. Finish: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert finish**>.

C. Turbine-Style Gravity Ventilators: Manufacturer's standard, fabricated as indicated, with manufacturer's standard welded or sealed mechanical joints:

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:
2. Basis-of-Design Product: Subject to compliance with requirements, provide [**product indicated on Drawings**] <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

    a. Air Vent, Inc.; a Gibraltar company.
    b. Metallic Products Corp.
    c. <**Insert manufacturer's name**>.

3. Provide integral weathertight base cap, outlet duct, and rotating louvered turbine.
4. Dimensions: [**As indicated on Drawings**] <**Insert dimensions**>.
5. Configuration: [**As indicated on Drawings**] <**Insert requirements**>.
6. Bird Screens: Manufacturer's standard mesh with rewireable frame.
7. Insect Screens: Manufacturer's standard mesh with rewireable frame.
8. Weathertight Base Cap, Outlet Duct, and Turbine Material: [**Zinc-coated (galvanized) steel**] [**Aluminum**] sheet, of manufacturer's standard thickness.
9. Finish: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert finish**>.

2.8 PIPE SUPPORTS

A. Pipe Supports: Adjustable-height, extruded-aluminum tube, filled with urethane insulation; [**2 inches (50 mm)**] <**Insert dimension**> in diameter; with aluminum baseplate, EPDM base seal,

manufacturer's recommended hardware for mounting to structure or structural roof deck as indicated, and extruded-aluminum carrier assemblies; suitable for quantity of pipe runs and sizes.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:
2. Basis-of-Design Product: Subject to compliance with requirements, provide [**product indicated on Drawings**] <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

    a. Thaler Metal USA Inc.
    b. <**Insert manufacturer's name**>.

3. Pipe Support Height: As indicated on Drawings.
4. Roller Assembly: With stainless-steel roller, sized for supported pipes.
5. Pipe Support Flashing: Manufacturer's standard [**insulated**] sleeve flashing with integral base flange; [**aluminum sheet, 0.063 inch (1.60 mm) thick**] [**copper sheet, 16 oz. (0.55 mm) thick**].
6. Finish: [**Manufacturer's standard**] <**Insert finish**>.

B. [**Terrace**]Lighting Supports: Epoxy-coated, hollow steel pipe support, filled with urethane insulation; with epoxy-coated steel baseplate, EPDM base seal, manufacturer's recommended hardware for mounting to structure or structural roof deck as indicated, and threaded stainless-steel cap.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:
2. Basis-of-Design Product: Subject to compliance with requirements, provide [**product indicated on Drawings**] <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

    a. Thaler Metal USA Inc.
    b. <**Insert manufacturer's name**>.

3. Height: [**14 inches (356 mm)**] [**18 inches (457 mm)**] <**Insert dimension**>.
4. Lighting Pole Mounting: [**Stainless-steel lighting pole adapter**] [**Epoxy-coated steel plate with stainless-steel studs**].
5. Pipe Support Flashing: Manufacturer's standard[**insulated**] sleeve flashing with integral base flange; [**aluminum sheet, 0.063 inch (1.60 mm) thick**] [**copper sheet, 16 oz. (0.55 mm) thick**].
6. Finish: [**Manufacturer's standard**] <**Insert finish**>.

C. Light-Duty Pipe Supports: Extruded-aluminum base assembly and Type 304 stainless-steel roller assembly for pipe sizes indicated, including manufacturer's recommended load-distributing baseplate.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

2. Basis-of-Design Product: Subject to compliance with requirements, provide [**product indicated on Drawings**] <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

   a. Thaler Metal USA Inc.
   b. <**Insert manufacturer's name**>.

3. Finish: [**Manufacturer's standard**] <**Insert finish**>.

D. Duct Supports: Extruded-aluminum, urethane-insulated supports, [**2 inches (50 mm)**] <**Insert dimension**> in diameter; with manufacturer's recommended hardware for mounting to structure or structural roof deck.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:
2. Basis-of-Design Product: Subject to compliance with requirements, provide [**product indicated on Drawings**] <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

   a. Thaler Metal USA Inc.
   b. <**Insert manufacturer's name**>.

3. Finish: [**Manufacturer's standard**] <**Insert finish**>.

2.9 ROOF WALKWAYS

A. Roof Walkway: Metal planking formed from multiple C-shaped channels with upper surface punched in serrated diamond or rectangular shapes to produce raised slip-resistant surface and drainage holes. Provide support framing, brackets, connectors, nosings, and other accessories and components needed for complete installation. Include step units or stairs of similar construction for changes in elevation. Equip with safety railings that are acceptable to authorities having jurisdiction, where height of walkway or stairs requires them.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:
2. Basis-of-Design Product: Subject to compliance with requirements, provide [**product indicated on Drawings**] <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

   a. GS Metals Corp.
   b. Miro Industries, Inc.
   c. PHP Systems/Design.
   d. Unistrut Corporation.
   e. <**Insert manufacturer's name**>.

3. Plank Width: [**4-3/4 inches (121 mm)**] [**7 inches (178 mm)**] [**9-1/2 inches (241 mm)**] [**11-3/4 inches (298 mm)**] [**18-3/4 inches (476 mm)**] [**24 inches (610 mm)**] [**As indicated**].

4. Walkway Width: [**As indicated**] <**Insert dimension**>.
5. Channel Depth: [**1-1/2 inches (38 mm)**] [**2 inches (50 mm)**] [**2-1/2 inches (64 mm)**] [**3 inches (76 mm)**] [**As indicated**].
6. Metal Material: [**0.079-inch- (2.01-mm-) thick zinc-coated (galvanized) steel sheet**] [**0.108-inch- (2.74-mm-) thick zinc-coated (galvanized) steel sheet**] [**0.062-inch- (1.59-mm-) thick stainless-steel sheet**] [**0.078-inch- (1.98-mm-) thick stainless-steel sheet**] [**0.080-inch- (2.03-mm-) thick aluminum sheet**] [**0.100-inch- (2.54-mm-) thick aluminum sheet**] <**Insert material and thickness**>.
7. Support Stands: Manufacturer's standard, with protective pads compatible with roofing material.
8. Support Pads: Continuous wood isolation pads, pressure-preservative treated as specified in Division 06 Section [**"Rough Carpentry"**] [**"Miscellaneous Rough Carpentry"**] attach roof-walkway supports to pads so that supports are separated from roof membrane surface and walkway support loads are distributed evenly.
9. Finish: [**Manufacturer's standard**] <**Insert finish**>.

2.10 PREFORMED FLASHING SLEEVES

A. Exhaust Vent Flashing: Double-walled metal flashing sleeve or boot, insulation filled, with integral deck flange, [**12 inches (300 mm)**] <**Insert dimension**> high, with removable metal hood and [**slotted**] [**perforated**] metal collar.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:
2. Basis-of-Design Product: Subject to compliance with requirements, provide [**product indicated on Drawings**] <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

    a. Custom Solution Roof and Metal Products.
    b. Thaler Metal USA Inc.
    c. <**Insert manufacturer's name**>.

3. Metal: [**Aluminum sheet, 0.063 inch (1.60 mm) thick**] [**Copper sheet, 16 oz. (0.55 mm) thick**] <**Insert material and thickness**>.
4. Diameter: [**As indicated**] [**3 inches (76 mm)**] [**4 inches (100 mm)**] [**5 inches (125 mm)**] [**6 inches (150 mm)**] [**7 inches (175 mm)**] [**8 inches (200 mm)**] [**9 inches (225 mm)**] [**10 inches (250 mm)**] <**Insert dimension**>.
5. Finish: [**Manufacturer's standard**] <**Insert finish**>.

B. Vent Stack Flashing: Metal flashing sleeve, uninsulated, with integral deck flange.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:
2. Basis-of-Design Product: Subject to compliance with requirements, provide [**product indicated on Drawings**] <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

    a. Custom Solution Roof and Metal Products.

b. Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc.
c. Thaler Metal USA Inc.
d. <**Insert manufacturer's name**>.

3. Metal: [**Aluminum sheet, 0.063 inch (1.60 mm) thick**] [**Copper sheet, 16 oz. (0.55 mm) thick**] <**Insert material and thickness**>.
4. Height: [**7 inches (175 mm)**] [**13 inches (330 mm)**] [**19 inches (480 mm)**] <**Insert dimension**>.
5. Diameter: [**As indicated**] [**2 inches (50 mm)**] [**3 inches (76 mm)**] [**4 inches (100 mm)**] [**5 inches (125 mm)**] [**6 inches (150 mm)**] <**Insert dimension**>.
6. Finish: [**Manufacturer's standard**] <**Insert finish**>.

2.11 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

C. Verify dimensions of roof openings for roof accessories.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install roof accessories according to manufacturer's written instructions.

1. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.
2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.

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**] [**stainless-steel**] roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing roof accessories 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.
3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.

C. Roof Curb Installation: Install each roof curb so top surface is level.

D. Equipment Support Installation: Install equipment supports so top surfaces are level with each other.

E. Roof-Hatch Installation:

1. Install roof hatch so top surface of hatch curb is level.
2. Verify that roof hatch operates properly. Clean, lubricate, and adjust operating mechanism and hardware.
3. Attach safety railing system to roof-hatch curb.
4. Attach ladder-assist post according to manufacturer's written instructions.

F. Heat and Smoke Vent Installation:

1. Install heat and smoke vent so top perimeter surfaces are level.
2. Install and test heat and smoke vents and their components for proper operation according to NFPA 204.

G. Gravity Ventilator Installation: Verify that gravity ventilators operate properly and have unrestricted airflow. Clean, lubricate, and adjust operating mechanisms.

H. Pipe Support Installation: Install pipe supports so top surfaces are in contact with and provide equally distributed support along length of supported item.

I. Security Grilles: Weld bar intersections and[**, using tamper-resistant bolts, attach the**] ends of bars to structural frame or primary curb walls.

J. Roof Walkway Installation:

1. Verify that locations of access and servicing points for roof-mounted equipment are served by locations of roof walkways.
2. Remove ballast from top surface of low-slope roofing at locations of contact with roof-walkway supports.
3. Install roof walkway support pads prior to placement of roof walkway support stands onto low-slope roofing.
4. Redistribute removed ballast after installation of support pads.

K. Preformed Flashing-Sleeve Installation: Secure flashing sleeve to roof membrane according to flashing-sleeve manufacturer's written instructions.

L. Seal joints with [**elastomeric**] [**or**] [**butyl**] sealant as required by roof accessory manufacturer.

3.3 REPAIR AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780.

B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Division 09 painting Sections.

C. Clean exposed surfaces according to manufacturer's written instructions.

D. Clean off excess sealants.

E. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077200

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Urethane joint sealants.
3. Latex joint sealants.
4. Acoustical joint sealants.

1.2 SUBMITTALS

A. Product Data: For each joint-sealant product indicated, labeled with location where product is intended to be used.

A. See Section 01 81 13 GREEN BUILDING REQUIREMENTS for related requirements.

1. Product Data for Section 5.504: For sealants and sealant primers, documentation including printed statement of VOC content.

B. Warranties.

1.3 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Part 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

C. 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.

D. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

E. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

2.2 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.

2.3 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.

2.4 LATEX JOINT SEALANTS

A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

2.5 ACOUSTICAL JOINT SEALANTS

A. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining 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.

2.6 JOINT SEALANT BACKING

A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

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 for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.7 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, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Masonry.
    c. Unglazed surfaces of ceramic tile.
    d. Exterior insulation and finish systems.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

    a. Metal.
    b. Glass.
    c. Porcelain enamel.
    d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by 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.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind 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.

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 in subparagraphs 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 profile per Figure 8A in ASTM C 1193, unless otherwise indicated.

G. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

3.4 CLEANING

A. 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.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.

1. Joint Locations:

a. Construction joints in cast-in-place concrete where indicated.
b. Joints between plant-precast architectural concrete paving units.
c. Tile control and expansion joints.
d. Joints between different materials listed above.

e. Perimeter joints between materials listed above and frames of doors windows and louvers, if not otherwise designated by product manufacturer installation instructions.
f. Other joints as indicated.

2. Join Sealant: Silicone.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

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 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Standard hollow metal [**doors**] [**and**] [**frames**].
2. Custom hollow metal [**doors**] [**and**] [**frames**].

B. Related Sections:

1. Division 04 Section "Unit Masonry" for embedding anchors for hollow metal work into masonry construction.
2. Division 08 Section "Stainless-Steel Doors and Frames" for hollow metal doors and frames manufactured from stainless steel.
3. Division 08 Section "Detention Doors and Frames" for hollow metal doors and frames for detention facilities.
4. Division 08 Section "Sound Control Door Assemblies" for packaged, acoustical hollow metal door and frame assemblies with STC ratings of 35 or more.
5. Division 08 Section [**"Door Hardware"**] [**"Door Hardware (Scheduled by Describing Products)"**] for door hardware for hollow metal doors.
6. Division 09 Sections [**"Exterior Painting"**] [**and**] [**"Interior Painting"**] for field painting hollow metal doors and frames.
7. Division 13 Section "Radiation Protection" for lead-lined, hollow metal doors and frames.
8. Division 26 Sections for electrical connections including conduit and wiring for door controls and operators.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings.

B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

C. Custom Hollow Metal Work: Hollow metal work fabricated according to ANSI/NAAMM-HMMA 861.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, [**fire-resistance rating,**] [**temperature-rise ratings,**] and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door design.
2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Details of moldings, removable stops, and glazing.
9. Details of conduit and preparations for power, signal, and control systems.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification:

1. For each type of exposed finish required, prepared on Samples of not less than 3 by 5 inches (75 by 125 mm).
2. For the following items, prepared on Samples about [**12 by 12 inches (305 by 305 mm)**] <**Insert size**> to demonstrate compliance with requirements for quality of materials and construction:

a. Doors: Show vertical-edge, top, and bottom construction; core construction; and hinge and other applied hardware reinforcement. Include separate section showing glazing if applicable.
b. Frames: Show profile, corner joint, floor and wall anchors, and silencers. Include separate section showing fixed hollow metal panels and glazing if applicable.

E. Other Action Submittals:

1. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.

F. Oversize Construction Certification: For assemblies required to be fire rated and exceeding limitations of labeled assemblies.

G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of hollow metal door and frame assembly.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.

B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at [**positive pressure**] [**as close to neutral pressure as possible**] according to [**NFPA 252**] [**UBC Standard 7-2**] [**or**] [**UL 10B**] [**UL 10C**].

1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
2. Temperature-Rise Limit: [**Where indicated**] [**At vertical exit enclosures and exit passageways**], provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.

C. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to [**NFPA 257 or UL 9**] [**UBC Standard 7-4**]. Label each individual glazed lite.

D. Smoke-Control Door Assemblies: Comply with [**NFPA 105 or UL 1784**] [**UBC Standard 7-2**].

E. Preinstallation Conference: Conduct conference at [**Project site**] <**Insert location**>.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to finish of factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch- (102-mm-) high wood blocking. Do not store in a manner that traps excess humidity.

1. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.8 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

1. Amweld Building Products, LLC.
2. Benchmark; a division of Therma-Tru Corporation.
3. Ceco Door Products; an Assa Abloy Group company.
4. Curries Company; an Assa Abloy Group company.
5. Deansteel Manufacturing Company, Inc.
6. Firedoor Corporation.
7. Fleming Door Products Ltd.; an Assa Abloy Group company.
8. Habersham Metal Products Company.
9. Karpen Steel Custom Doors & Frames.
10. Kewanee Corporation (The).
11. Mesker Door Inc.
12. Pioneer Industries, Inc.
13. Security Metal Products Corp.
14. Steelcraft; an Ingersoll-Rand company.
15. Windsor Republic Doors.
16. <**Insert manufacturer's name**>.

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum [**A40 (ZF120)**] [**G60 (Z180) or A60 (ZF180)**] metallic coating.

D. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z (12G) coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

F. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow metal frames of type indicated.

G. Grout: ASTM C 476, except with a maximum slump of 4 inches (102 mm), as measured according to ASTM C 143/C 143M.

H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. (96- to 192-kg/cu. m) density; with maximum flame-spread and smoke-development indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

I. Glazing: Comply with requirements in Division 08 Section "Glazing."

J. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 STANDARD HOLLOW METAL DOORS

A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.

1. Design: [**Flush panel**] [**Embossed panel**] [**As indicated**] <**Insert design**>.
2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core.

    a. Fire Door Core: As required to provide fire-protection[**and temperature-rise**] ratings indicated.
    b. Thermal-Rated (Insulated) Doors: Where indicated, provide doors fabricated with thermal-resistance value (R-value) of not less than [**4.0 deg F x h x sq. ft./Btu (0.704 K x sq. m/W)**] [**6.0 deg F x h x sq. ft./Btu (1.057 K x sq. m/W)**] [**12.3 deg F x h x sq. ft./Btu (2.166 K x sq. m/W)**] <**Insert R-value**> when tested according to ASTM C 1363.

        1) Locations: [**Exterior doors**] [**and**] [**interior doors where indicated**].

3. Vertical Edges for Single-Acting Doors: [**Beveled edge**] [**Square edge**] [**Manufacturer's standard**].

    a. Beveled Edge: 1/8 inch in 2 inches (3 mm in 50 mm).

4. Vertical Edges for Double-Acting Doors: Round vertical edges with 2-1/8-inch (54-mm) radius.
5. Top and Bottom Edges: Closed with flush or inverted 0.042-inch- (1.0-mm-) thick, end closures or channels of same material as face sheets.

6. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."

B. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Level 1 and Physical Performance Level C (Standard Duty), [**Model 1 (Full Flush)**] [**Model 2 (Seamless)**].

   a. Width: [**1-3/4 inches (44.5 mm)**] [**1-3/8 inches (34.9 mm)**] [**As indicated on Drawings**].

2. Level 2 and Physical Performance Level B (Heavy Duty), [**Model 1 (Full Flush)**] [**Model 2 (Seamless)**].
3. Level 3 and Physical Performance Level A (Extra Heavy Duty), [**Model 1 (Full Flush)**] [**Model 2 (Seamless)**] [**Model 3 (Stile and Rail)**].
4. Level 4 and Physical Performance Level A (Maximum Duty), [**Model 1 (Full Flush)**] [**Model 2 (Seamless)**].

C. Interior Doors: Face sheets fabricated from cold-rolled steel sheet[**unless metallic-coated sheet is indicated**]. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Level 1 and Physical Performance Level C (Standard Duty), [**Model 1 (Full Flush)**] [**Model 2 (Seamless)**].

   a. Width: [**1-3/4 inches (44.5 mm)**] [**1-3/8 inches (34.9 mm)**] [**As indicated on Drawings**].

2. Level 2 and Physical Performance Level B (Heavy Duty), [**Model 1 (Full Flush)**] [**Model 2 (Seamless)**].
3. Level 3 and Physical Performance Level A (Extra Heavy Duty), [**Model 1 (Full Flush)**] [**Model 2 (Seamless)**] [**Model 3 (Stile and Rail)**].
4. Level 4 and Physical Performance Level A (Maximum Duty), [**Model 1 (Full Flush)**] [**Model 2 (Seamless)**].

D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

E. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.4 STANDARD HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

B. Exterior Frames: Fabricated from metallic-coated steel sheet.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as [**knocked down**] [**face welded**] [**full profile welded**] unless otherwise indicated.
3. Frames for Level 1 Steel Doors: 0.042-inch- (1.0-mm-) thick steel sheet.
4. Frames for Level 2 Steel Doors: 0.053-inch- (1.3-mm-) thick steel sheet.
5. Frames for Level 3 Steel Doors: 0.053-inch- (1.3-mm-) thick steel sheet.
6. Frames for Level 4 Steel Doors: 0.067-inch- (1.7-mm-) thick steel sheet.

C. Interior Frames: Fabricated from cold-rolled steel sheet[**unless metallic-coated sheet is indicated**].

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as [**knocked down**] [**face welded**] [**full profile welded**] unless otherwise indicated.
3. Fabricate knocked-down, drywall slip-on frames for in-place gypsum board partitions.
4. Frames for Level 1 Steel Doors: 0.042-inch- (1.0-mm-) thick steel sheet.
5. Frames for Level 2 Steel Doors: 0.053-inch- (1.3-mm-) thick steel sheet.
6. Frames for Level 3 Steel Doors: 0.053-inch- (1.3-mm-) thick steel sheet.
7. Frames for Level 4 Steel Doors: 0.067-inch- (1.7-mm-) thick steel sheet.
8. Frames for Wood Doors: [**0.042-inch- (1.0-mm-)**] [**0.053-inch- (1.3-mm-)**] [**0.067-inch- (1.7-mm-)**] thick steel sheet.
9. Frames for Borrowed Lights: [**0.042-inch- (1.0-mm-) thick steel sheet**] [**0.053-inch- (1.3-mm-) thick steel sheet**] [**0.067-inch- (1.7-mm-) thick steel sheet**] [**Same as adjacent door frame**].

D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.

2.5 CUSTOM HOLLOW METAL DOORS

A. General: Provide doors not less than 1-3/4 inches (44.5 mm) thick, of seamless hollow construction unless otherwise indicated. Construct doors with smooth surfaces without visible joints or seams on exposed faces. Comply with ANSI/NAAMM-HMMA 861.

B. Exterior Door Face Sheets: Fabricated from metallic-coated steel sheet, minimum 0.053 inch (1.3 mm) thick.

C. Interior Door Face Sheets: Fabricated from cold-rolled steel sheet[**unless metallic-coated sheet is indicated**], minimum 0.042 inch (1.0 mm) thick.

D. Core Construction: Provide thermal-resistance-rated cores for [**exterior doors**] [**and**] [**interior doors where indicated**].

1. Steel-Stiffened Core: 0.026-inch- (0.7-mm-) thick, steel vertical stiffeners of same material as face sheets extending full-door height, with vertical webs spaced not more than 6 inches (152 mm) apart, spot welded to face sheets a maximum of 5 inches (127 mm) o.c. Spaces filled between stiffeners with glass- or mineral-fiber insulation.

a. Fire Door Core: As required to provide fire-protection[**and temperature-rise**] ratings indicated.
b. Thermal-Rated (Insulated) Doors: Where indicated, provide doors fabricated with thermal-resistance value (R-value) of not less than [**4.0 deg F x h x sq. ft./Btu (0.704 K x sq. m/W)**] [**6.0 deg F x h x sq. ft./Btu (1.057 K x sq. m/W)**] <**Insert R-value**> when tested according to ASTM C 1363.

E. Vertical Edges for Single-Acting Doors: Beveled 1/8 inch in 2 inches (3 mm in 50 mm).

F. Vertical Edges for Double-Acting Doors: Round vertical edges with 2-1/8-inch (54-mm) radius.

G. Top and Bottom Channels: Closed with continuous channels, minimum 0.053 inch (1.3 mm) thick, of same material as face sheets and spot welded to both face sheets.

H. Hardware Reinforcement: Fabricate according to ANSI/NAAMM-HMMA 861 with reinforcing plates from same material as door face sheets.

2.6 CUSTOM HOLLOW METAL FRAMES

A. General: Fabricate frames of construction indicated. Close contact edges of corner joints tight with faces mitered and stops butted or mitered. Continuously weld faces and soffits and finish faces smooth. Comply with ANSI/NAAMM-HMMA 861.

1. Door Frames for Openings 48 Inches (1219 mm) Wide or Less: Fabricated from 0.053-inch- (1.3-mm-) thick steel sheet.
2. Door Frames for Openings More Than 48 Inches (1219 mm) Wide: Fabricated from 0.067-inch- (1.7-mm-) thick steel sheet.
3. [**Sidelight**] [**and**] [**Transom**] Frames: Fabricated from same thickness material as adjacent door frame.
4. Borrowed-Light Frames: Fabricated from 0.053-inch- (1.3-mm-) thick steel sheet.

B. Exterior Frames: Formed from metallic-coated steel sheet.

C. Interior Frames: Fabricated from cold-rolled steel sheet[**unless metallic-coated sheet is indicated**].

D. Hardware Reinforcement: Fabricate according to ANSI/NAAMM-HMMA 861 with reinforcing plates from same material as frame.

E. Head Reinforcement: Provide minimum 0.093-inch- (2.3-mm-) thick, steel channel or angle stiffener for opening widths more than 48 inches (1219 mm).

2.7 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch (1.0 mm) thick, with corrugated or perforated straps not less than 2

inches (50 mm) wide by 10 inches (250 mm) long; or wire anchors not less than 0.177 inch (4.5 mm) thick.

2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.
3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
4. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-(9.5-mm-) diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch (1.0 mm) thick, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch (50-mm) height adjustment. Terminate bottom of frames at finish floor surface.

2.8 HOLLOW METAL PANELS

A. Provide hollow metal panels of same materials, construction, and finish as specified for adjoining hollow metal work.

2.9 STOPS AND MOLDINGS

A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch (0.8 mm) thick, fabricated from same material as door face sheet in which they are installed.

B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated.

C. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch (0.8 mm) thick, fabricated from same material as frames in which they are installed.

D. Terminated Stops: Where indicated on interior door frames, terminate stops 6 inches (152 mm) above finish floor with a [**45**] [**90**]-degree angle cut, and close open end of stop with steel sheet closure. Cover opening in extension of frame with welded-steel filler plate, with welds ground smooth and flush with frame.

1. Provide terminated stops [**where indicated**] [**unless otherwise indicated**].

2.10 LOUVERS

A. Provide louvers for interior doors, where indicated, that comply with SDI 111C, with blades or baffles formed of 0.020-inch- ((0.5-mm-)) thick, cold-rolled steel sheet set into 0.032-inch-(0.8-mm-) thick steel frame.

1. Sightproof Louver: Stationary louvers constructed with inverted V-shaped or Y-shaped blades.

2. Lightproof Louver: Stationary louvers constructed with baffles to prevent light from passing from one side to the other, any angle.
3. Fire-Rated Automatic Louvers: Louvers constructed with movable blades closed by actuating fusible link, and listed and labeled for use in fire-rated door assemblies of type and fire-resistance rating indicated by same testing and inspecting agency that established fire-resistance rating of door assembly.

2.11 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Ceiling Struts: Minimum 1/4-inch-thick by 1-inch- (6.4-mm-thick by 25.4-mm-) wide steel.

C. Grout Guards: Formed from same material as frames, not less than 0.016 inch (0.4 mm) thick.

2.12 FABRICATION

A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Tolerances: Fabricate hollow metal work to tolerances indicated in [**SDI 117**] [**ANSI/NAAMM-HMMA 861**].

C. Hollow Metal Doors:

1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
2. Glazed Lites: Factory cut openings in doors.
3. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch (19 mm) beyond edge of door on which astragal is mounted.

D. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
2. [**Sidelight**] [**and**] [**Transom Bar**] Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
4. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
5. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.

6. Jamb Anchors: Provide number and spacing of anchors as follows:

   a. Masonry Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:

      1) Two anchors per jamb up to 60 inches (1524 mm) high.
      2) Three anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
      3) Four anchors per jamb from 90 to 120 inches (2286 to 3048 mm) high.
      4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 120 inches (3048 mm) high.

   b. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:

      1) Three anchors per jamb up to 60 inches (1524 mm) high.
      2) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
      3) Five anchors per jamb from 90 to 96 inches (2286 to 2438 mm) high.
      4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 96 inches (2438 mm) high.
      5) Two anchors per head for frames above 42 inches (1066 mm) wide and mounted in metal-stud partitions.

   c. Compression Type: Not less than two anchors in each jamb.
   d. Postinstalled Expansion Type: Locate anchors not more than 6 inches (152 mm) from top and bottom of frame. Space anchors not more than 26 inches (660 mm) o.c.

7. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.

   a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
   b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

E. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.

F. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."

1. Locate hardware as indicated, or if not indicated, according to [**ANSI/SDI A250.8**] [**ANSI/NAAMM-HMMA 861**].
2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.

4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

G. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
4. Provide loose stops and moldings on inside of hollow metal work.
5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.13 STEEL FINISHES

A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

B. Factory-Applied Paint Finish: Manufacturer's standard, complying with ANSI/SDI A250.3 for performance and acceptance criteria.

2.14 Color and Gloss: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**].

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:

1. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
2. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
3. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
4. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a perpendicular line from head to floor.

C. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with [**ANSI/SDI A250.11**] [**HMMA 840**].

1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

a. At fire-protection-rated openings, install frames according to NFPA 80.
b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
c. Install frames with removable glazing stops located on secure side of opening.
d. Install door silencers in frames before grouting.
e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
g. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
5. Concrete Walls: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
8. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
9. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.

C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:

a. Jambs and Head: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
b. Between Edges of Pairs of Doors: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch (9.5 mm).
d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch (19 mm).

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
3. Smoke-Control Doors: Install doors according to [**NFPA 105**] [**UBC Standard 7-2**].

D. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (50 mm) o.c. from each corner.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 081113

SECTION 081416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Solid-core doors[**and transom panels**] with [**wood-veneer**] [**medium-density-overlay**] [**hardboard or MDF**] [**and**] [**plastic-laminate**] faces.
2. Hollow-core doors with [**wood-veneer**] [**hardboard or MDF**] [**and**] [**plastic-laminate**] faces.
3. [**Shop priming**] [**Factory finishing**] flush wood doors.
4. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Sections:

1. Division 06 Section "[**Interior Finish Carpentry**] [**Interior Architectural Woodwork**]" for wood door frames[**including fire-rated wood door frames**].
2. Division 06 Section "[**Interior Architectural Woodwork**] [**Wood Paneling**]" for requirements for veneers from the same flitches for both flush wood doors and wood paneling.
3. Division 08 Section "Glazing" for glass view panels in flush wood doors.
4. Division 09 Sections [**"Exterior Painting"**] [**"Interior Painting"**] [**and**] [**"Staining and Transparent Finishing"**] for field finishing doors.
5. Division 13 Section "Radiation Protection" for lead-lined flush wood doors.

1.3 SUBMITTALS

A. Product Data: For each type of door indicated. Include details of core and edge construction[**, louvers,**] and trim for openings.[**Include factory-finishing specifications.**]

B. LEED Submittals:

1. Certificates for Credit MR 7: Chain-of-custody certificates certifying that flush wood doors comply with forest certification requirements.[**Include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body.**]

a. Include statement indicating costs for each certified wood product.

2. Product Data for Credit EQ 4.4: For adhesives and composite wood products, documentation indicating that product contains no urea formaldehyde.

C. Shop Drawings: 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.
5. Indicate fire-protection ratings for fire-rated doors.

D. Samples for Initial Selection: For [**plastic-laminate door faces**] [**and**] [**factory-finished doors**].

E. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches (200 by 250 mm), for each material and finish.[**For each wood species and transparent finish, provide set of three samples showing typical range of color and grain to be expected in the finished work.**]
2. Plastic laminate, 6 inches (150 mm) square, for each color, texture, and pattern selected.
3. Corner sections of doors, approximately 8 by 10 inches (200 by 250 mm), 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.

4. Louver blade and frame sections, 6 inches (150 mm) long, for each material and finish specified.
5. Frames for light openings, 6 inches (150 mm) long, for each material, type, and finish required.

F. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

B. Source Limitations: Obtain flush wood doors[**and wood paneling**] from single manufacturer.

C. Quality Standard: In addition to requirements specified, comply with [**AWI's "Architectural Woodwork Quality Standards Illustrated."**] [**WDMA I.S.1-A, "Architectural Wood Flush Doors."**] [**WI's "Manual of Millwork."**]

1. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.
2. Provide WI-Certified Compliance Certificate indicating that doors comply with requirements of grades specified.
3. Provide WI-Certified Compliance Certificate for installation.

D. Forest Certification: Provide doors made with [**cores**] [**veneers**] [**not less than 70 percent of wood products**] [**all wood products**] obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

E. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at [**positive pressure**] [**as close to neutral pressure as possible**] according to [**NFPA 252**] [**UBC Standard 7-2**] [**or**] [**UL 10B**] [**UL 10C**].

1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
2. Temperature-Rise Limit: [**Where indicated**] [**At vertical exit enclosures and exit passageways**], provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.

F. Preinstallation Conference: Conduct conference at [**Project site**] <**Insert location**>.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in [**plastic bags or cardboard cartons**] [**cardboard cartons and wrap bundles of doors in plastic sheeting**].

C. Mark each door on[**top and**] bottom rail with opening number used on Shop Drawings.

1.6 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.

B. 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 temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between [**25 and 55**] [**43 and 70**] [**17 and 50**] <**Insert humidity range**> percent during the remainder of the construction period.

1.7 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 1/4 inch (6.4 mm) in a 42-by-84-inch (1067-by-2134-mm) section.
b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 76.2-mm) 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 Exterior Doors: [**Two**] [**Five**] <**Insert number**> years from date of Substantial Completion.
4. Warranty Period for Solid-Core Interior Doors: Life of installation.
5. Warranty Period for Hollow-Core Interior Doors: [**One**] [**Two**] <**Insert number**> year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

1. Algoma Hardwoods, Inc.
2. Ampco, Inc.
3. Buell Door Company Inc.
4. Chappell Door Co.
5. Eagle Plywood & Door Manufacturing, Inc.
6. Eggers Industries.
7. Graham; an Assa Abloy Group company.
8. Haley Brothers, Inc.
9. Ideal Architectural Doors & Plywood.
10. Ipik Door Company.
11. Lambton Doors.
12. Marlite.
13. Marshfield Door Systems, Inc.
14. Mohawk Flush Doors, Inc.; a Masonite company.
15. Oshkosh Architectural Door Company.
16. Poncraft Door Company.
17. Vancouver Door Company.
18. VT Industries Inc.
19. <**Insert manufacturer's name**>.

2.2 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: [**Extra Heavy Duty**] [**Heavy Duty**] [**Standard Duty**] [**As indicated**].

C. WDMA I.S.1-A Performance Grade:

1. Heavy Duty unless otherwise indicated.
2. Extra Heavy Duty: [**Classrooms**] [**public toilets**] [**janitor's closets**] [**assembly spaces**] [**exits**] [**patient rooms**] <**Insert locations**> [**and where indicated**].
3. Standard Duty: [**Closets (not including janitor's closets)**] [**private toilets**] <**Insert locations**> [**and where indicated**].

D. Particleboard-Core Doors:

1. Particleboard: ANSI A208.1, [**Grade LD-1**] [**or**] [**Grade LD-2**] [**, made with binder containing no urea-formaldehyde resin**].
2. Particleboard: Straw-based particleboard complying with ANSI A208.1, Grade LD-2 or M-2, except for density.
3. Blocking: Provide wood blocking in particleboard-core doors [**as needed to eliminate through-bolting hardware.**] [**as follows:**]

    a. 5-inch (125-mm) top-rail blocking, in doors indicated to have closers.
    b. 5-inch (125-mm) bottom-rail blocking, in exterior doors and doors indicated to have kick, mop, or armor plates.
    c. 5-inch (125-mm) midrail blocking, in doors indicated to have exit devices.

4. Provide doors with [**glued-wood-stave**] [**structural-composite-lumber**] [**either glued-wood-stave or structural-composite-lumber**] cores instead of particleboard cores for doors indicated to receive exit devices.

E. Structural-Composite-Lumber-Core Doors:

1. Structural Composite Lumber: WDMA I.S.10.

    a. Screw Withdrawal, Face: 700 lbf (3100 N).
    b. Screw Withdrawal, Edge: 400 lbf (1780 N).

F. 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.
2. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals.[**Provide stiles with concealed intumescent seals.**] Comply with specified requirements for exposed edges.
3. Pairs: Provide formed-steel edges and astragals[**with intumescent seals**].

a. Finish steel edges and astragals with baked enamel[**same color as doors**].
b. Finish steel edges and astragals to match door hardware (locksets or exit devices).

G. 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.**] [**as follows:**]

a. 5-inch (125-mm) top-rail blocking.
b. 5-inch (125-mm) bottom-rail blocking, in doors indicated to have protection plates.
c. 5-inch (125-mm) midrail blocking, in doors indicated to have armor plates.
d. [**4-1/2-by-10-inch (114-by-250-mm) lock blocks**] [**5-inch (125-mm) midrail blocking**], in doors indicated to have exit devices.

3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

H. Hollow-Core Doors:

1. Construction: [**Institutional**] [**Standard**] hollow core.
2. Blocking: Provide wood blocking with minimum dimensions as follows:

a. 5-by-18-inch (125-by-460-mm) lock blocks[**at both stiles**].
b. 5-inch (125-mm) top- [**and bottom-**]rail blocking.
c. 10-inch (250-mm) [**top- and**]bottom-rail blocking.
d. 2-1/2-inch (64-mm) midrail blocking.

2.3 VENEERED-FACED DOORS FOR TRANSPARENT FINISH

A. Exterior Solid-Core Doors <**Insert drawing designation**>:

1. Grade: [**Premium, with Grade AA faces**] [**Premium, with Grade A faces**] [**Custom (Grade A faces)**] [**Economy (Grade B faces)**].
2. Species: [**Anigre**] [**Select white ash**] [**Figured select white ash**] [**Select white birch**] [**Cherry**] [**Select red gum**] [**Figured select red gum**] [**Select white maple**] [**Red oak**] [**Persimmon**] [**Sapele**] [**Sycamore**] [**Walnut**] [**White oak**] [**Ucuuba (Virola Duckei)**] [**Cupiuba (Goupia glabra)**] <**Insert species**>.
3. Cut: [**Rotary cut**] [**Plain sliced (flat sliced)**] [**Quarter sliced**] [**Rift cut**].
4. Match between Veneer Leaves: [**Book**] [**Slip**] [**Pleasing**] match.
5. Assembly of Veneer Leaves on Door Faces: [**Center-balance**] [**Balance**] [**Running**] match.
6. Pair and Set Match: Provide for doors hung in same opening[**or separated only by mullions**].
7. Exposed Vertical[**and Top**] Edges: [**Same species as faces or a compatible species**] [**Same species as faces**] [**Applied wood-veneer edges of same species as faces and**

covering edges of faces] [**Applied wood edges of same species as faces and covering edges of crossbands**].

8. Core: [**Particleboard**] [**Glued wood stave**] [**Structural composite lumber**] [**Either glued wood stave or structural composite lumber**].
9. Construction: [**Five**] [**Five or seven**] plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering.[**Faces are bonded to core using a hot press.**]
10. Adhesives: Type I per WDMA TM-6.
11. WDMA I.S.1-A Performance Grade: [**Extra Heavy**] [**Heavy**] Duty.

B. Interior Solid-Core Doors <**Insert drawing designation**>:

1. Grade: [**Premium, with Grade AA faces**] [**Premium, with Grade A faces**] [**Custom (Grade A faces)**] [**Economy (Grade B faces)**].
2. Species: [**Anigre**] [**Select white ash**] [**Figured select white ash**] [**Select white birch**] [**Cherry**] [**Select red gum**] [**Figured select red gum**] [**Select white maple**] [**Red oak**] [**Persimmon**] [**Sapele**] [**Sycamore**] [**Walnut**] [**White oak**] [**Ucuuba (Virola Duckei)**] [**Cupiuba (Goupia glabra)**] <**Insert species**>.
3. Cut: [**Rotary cut**] [**Plain sliced (flat sliced)**] [**Quarter sliced**] [**Rift cut**].
4. Match between Veneer Leaves: [**Book**] [**Slip**] [**Pleasing**] match.
5. Assembly of Veneer Leaves on Door Faces: [**Center-balance**] [**Balance**] [**Running**] match.
6. Pair and Set Match: Provide for doors hung in same opening[**or separated only by mullions**].
7. Room Match: Match door faces within each separate room or area of building. Corridor-door faces do not need to match where they are separated by [**10 feet (3 m)**] [**20 feet (6 m)**] <**Insert distance**> or more.
8. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.
9. Transom Match: [**Continuous match**] [**End match**] [**As indicated**].
10. Blueprint Match: Where indicated, provide doors with faces produced from same flitches as adjacent wood paneling and arranged to provide blueprint match with wood paneling. Comply with requirements in [**Division 06 Section "Interior Architectural Woodwork."**] [**Division 06 Section "Wood Paneling."**]
11. Exposed Vertical[**and Top**] Edges: [**Same species as faces or a compatible species**] [**Same species as faces**] [**Applied wood-veneer edges of same species as faces and covering edges of faces**] [**Applied wood edges of same species as faces and covering edges of crossbands**].
12. Core: [**Particleboard**] [**Glued wood stave**] [**Structural composite lumber**] [**Either glued wood stave or structural composite lumber**] [**Either glued or nonglued wood stave or structural composite lumber**].
13. Construction: [**Five**] [**Five or seven**] plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering.[**Faces are bonded to core using a hot press.**]
14. Construction: Seven plies, either bonded or nonbonded construction.
15. WDMA I.S.1-A Performance Grade: [**Extra Heavy Duty**] [**Heavy Duty**] [**Standard Duty**] [**As indicated**].

C. Interior Hollow-Core Doors <**Insert drawing designation**>:

1. Grade: [**Premium, with Grade AA faces**] [**Premium, with Grade A faces**] [**Custom (Grade A faces)**] [**Economy (Grade B faces)**].
2. Species: [**Anigre**] [**Select white ash**] [**Figured select white ash**] [**Select white birch**] [**Cherry**] [**Select red gum**] [**Figured select red gum**] [**Select white maple**] [**Red oak**] [**Persimmon**] [**Sapele**] [**Sycamore**] [**Walnut**] [**White oak**] [**Ucuuba (Virola Duckei)**] [**Cupiuba (Goupia glabra)**] <**Insert species**>.
3. Cut: [**Rotary cut**] [**Plain sliced (flat sliced)**] [**Quarter sliced**] [**Rift cut**].
4. Match between Veneer Leaves: [**Book**] [**Slip**] [**Pleasing**] match.
5. Assembly of Veneer Leaves on Door Faces: [**Center-balance**] [**Balance**] [**Running**] match.
6. Pair and Set Match: Provide for doors hung in same opening[**or separated only by mullions**].
7. Exposed Vertical[**and Top**] Edges: [**Same species as faces or a compatible species**] [**Same species as faces**] [**Applied wood-veneer edges of same species as faces and covering edges of faces**] [**Applied wood edges of same species as faces and covering edges of crossbands**].
8. Construction: Seven plies.
9. WDMA I.S.1-A Performance Grade: [**Heavy Duty**] [**Standard Duty**] [**As indicated**].

2.4 DOORS FOR OPAQUE FINISH

A. Exterior Solid-Core Doors <**Insert drawing designation**>:

1. Grade: [**Premium**] [**Custom**] [**Economy**].
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**] [**or**] [**directly to high-density hardboard crossbands**].

3. Exposed Vertical[**and Top**] Edges: Any closed-grain hardwood.
4. Core: [**Particleboard**] [**Glued wood stave**] [**Structural composite lumber**] [**Either glued wood stave or structural composite lumber**].
5. Construction: [**Five**] [**Five or seven**] plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering.[**Faces are bonded to core using a hot press.**]
6. Adhesives: Type I per WDMA TM-6.
7. WDMA I.S.1-A Performance Grade: [**Extra Heavy**] [**Heavy**] Duty.

B. Interior Solid-Core Doors <**Insert drawing designation**>:

1. Grade: [**Premium**] [**Custom**] [**Economy**].
2. Faces: [**Medium-density overlay**] [**Any closed-grain hardwood of mill option**] [**Hardboard or MDF**].

    a. Apply medium-density overlay to [**standard-thickness, closed-grain, hardwood face veneers**] [**or**] [**directly to high-density hardboard crossbands**].
    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: [**Particleboard**] [**Glued wood stave**] [**Structural composite lumber**] [**Either glued wood stave or structural composite lumber**] [**Either glued or nonglued wood stave or structural composite lumber**].
5. Construction: [**Three**] [**Five**] [**Five or seven**] plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering.[**Faces are bonded to core using a hot press.**]
6. Construction: [**Three**] [**Seven**] plies, either bonded or nonbonded construction.
7. WDMA I.S.1-A Performance Grade: [**Extra Heavy Duty**] [**Heavy Duty**] [**Standard Duty**] [**As indicated**].

C. Interior Hollow-Core Doors <**Insert drawing designation**>:

1. Grade: [**Premium**] [**Custom**] [**Economy**].
2. Faces: [**Medium-density overlay**] [**Any closed-grain hardwood of mill option**] [**Hardboard or MDF**].

    a. Hardboard Faces: AHA A135.4, Class 1 (tempered) or Class 2 (standard).
    b. MDF Faces: ANSI A208.2, Grade 150 or 160.

3. Exposed Vertical[**and Top**] Edges: Any closed-grain hardwood.
4. Construction: [**Three**] [**Seven**] plies.
5. WDMA I.S.1-A Performance Grade: [**Heavy Duty**] [**Standard Duty**] [**As indicated**].

2.5 PLASTIC-LAMINATE-FACED DOORS

A. Interior Solid-Core Doors <**Insert drawing designation**>:

1. Grade: [**Premium**] [**Custom**] [**Economy**].
2. Plastic-Laminate Faces: High-pressure decorative laminates complying with NEMA LD 3, [**Grade HGS**] [**Grade HSH**].
3. Colors, Patterns, and Finishes: [**As indicated**] [**As selected by Architect from laminate manufacturer's full range of products**].
4. Exposed Vertical[**and Top**] Edges: [**Hardwood edges for staining to match faces**] [**Hardwood edges for painting**] [**Plastic laminate that matches faces, applied before faces**] [**Impact-resistant polymer edging, applied after faces**].

    a. Polymer Edging Color: [**Beige**] [**Brown**] [**Same color as faces**].

5. Core: [**Particleboard**] [**Glued wood stave**] [**Structural composite lumber**] [**Either glued wood stave or structural composite lumber**].
6. Construction: Three plies. Stiles and rails are bonded to core, then entire unit abrasive planed before faces are applied.[**Faces are bonded to core using a hot press.**]
7. Construction: Five plies. Stiles and rails are bonded to core, then entire unit abrasive planed before faces and crossbands are applied.[**Faces are bonded to core using a hot press.**]
8. WDMA I.S.1-A Performance Grade: [**Extra Heavy Duty**] [**Heavy Duty**] [**Standard Duty**] [**As indicated**].

B. Interior Hollow-Core Doors <**Insert drawing designation**>:

1. Grade: [**Premium**] [**Custom**] [**Economy**].
2. Plastic-Laminate Faces: High-pressure decorative laminates complying with NEMA LD 3, [**Grade HGS**] [**Grade HSH**].
3. Colors, Patterns, and Finishes: [**As indicated**] [**As selected by Architect from laminate manufacturer's full range of products**].
4. Exposed Vertical[**and Top**] Edges: [**Hardwood edges for staining to match faces**] [**Hardwood edges for painting**] [**Plastic laminate that matches faces, applied before faces**] [**Impact-resistant polymer edging, applied after faces**].

    a. Polymer Edging Color: [**Beige**] [**Brown**] [**Same color as faces**].

5. Construction: Plastic-laminate faces glued directly to core.
6. WDMA I.S.1-A Performance Grade: [**Heavy Duty**] [**Standard Duty**] [**As indicated**].

2.6 LOUVERS AND LIGHT FRAMES

A. Wood Louvers: Door manufacturer's standard solid-wood louvers unless otherwise indicated.

1. Wood Species: [**Same species as door faces**] [**Species compatible with door faces**] [**Any closed-grain hardwood**].

B. Metal Louvers:

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. Air Louvers Inc.
    b. Anemostat; 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.
    h. <**Insert manufacturer's name**>.

2. Blade Type: [**Vision-proof, inverted V**] [**Vision-proof, inverted Y**] [**Darkroom-type, double inverted V**].
3. Metal and Finish: Hot-dip galvanized steel, 0.040 inch (1.0 mm) thick, [**factory primed for paint finish**] [**with baked-enamel- or powder-coated finish**].
4. Metal and Finish: Extruded aluminum with Class II, clear anodic finish, AA-M12C22A31.
5. Metal and Finish: Extruded aluminum with [**light bronze**] [**medium bronze**] [**dark bronze**] [**black**], Class II, color anodic finish, AA-M12C22A32/A34.

C. Louvers for Fire-Rated Doors: Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire-protection rating of 1-1/2 hours and less.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. Air Louvers Inc.
    b. Anemostat; 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.
    h. <**Insert manufacturer's name**>.

2. Metal and Finish: Hot-dip galvanized steel, 0.040 inch (1.0 mm) thick, [**factory primed for paint finish**] [**with baked-enamel- or powder-coated finish**].

D. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads as follows unless otherwise indicated.

1. Wood Species: [**Same species as door faces**] [**Species compatible with door faces**] [**Any closed-grain hardwood**].
2. Profile: [**Flush rectangular beads**] [**Recessed tapered beads**] [**Recessed tapered beads with exposed banding**] [**Lipped tapered beads**] [**Manufacturer's standard shape**].
3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.

E. Wood-Veneered Beads for Light Openings in Fire-Rated Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire-protection rating indicated. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.

F. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048-inch- (1.2-mm-) thick, cold-rolled steel sheet; [**factory primed for paint finish**] [**with baked-enamel- or powder-coated finish**]; and approved for use in doors of fire-protection rating indicated.

2.7 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

1. Comply with requirements in NFPA 80 for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.

1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
2. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

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.

1. Fabricate door and transom panels with full-width, solid-lumber[**, rabbeted,**] meeting rails. Provide factory-installed spring bolts for concealed attachment into jambs of metal door frames.

D. Openings: Cut and trim openings through doors in factory.

1. Light Openings: Trim openings with moldings of material and profile indicated.
2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Division 08 Section "Glazing."
3. Louvers: Factory install louvers in prepared openings.

E. Exterior Doors: Factory treat exterior doors with water repellent after fabrication has been completed but before [**shop priming**] [**factory finishing**].

1. Flash top of outswinging doors (with manufacturer's standard metal flashing).

2.8 SHOP PRIMING

A. Doors for Opaque Finish: Shop prime doors with one coat of wood primer specified in Division 09 Section [**"Exterior Painting"**] [**"Interior Painting"**]. Seal all four edges, edges of cutouts, and mortises with primer.

B. Doors for Transparent Finish: Shop prime doors with stain (if required), other required pretreatments, and first coat of finish as specified in Division 09 Section "[**Exterior Painting**] [**Interior Painting**] [**Staining and Transparent Finishing**]." Seal all four edges, edges of cutouts, and mortises with first coat of finish.

2.9 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[**top and**] bottom edges, edges of cutouts, and mortises.

B. Finish doors at factory.

C. Finish doors at factory that are indicated to receive transparent finish. Field finish doors indicated to receive opaque finish.

D. Finish doors at factory where indicated in schedules or on Drawings as factory finished.

E. Transparent Finish:

1. Grade: [**Premium**] [**Custom**].
2. Finish: AWI [**conversion varnish**] [**or**] [**catalyzed polyurethane**] <**Insert finish designation**> system.
3. Finish: WDMA [**TR-4 conversion varnish**] [**or**] [**TR-6 catalyzed polyurethane**] <**Insert finish designation**>.
4. Finish: WI System [**4 clear conversion varnish**] [**5 catalyzed polyurethane**] [**or**] [**8 UV-curable coating**] <**Insert finish designation**>.
5. Staining: [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] [**None required**].
6. Effect: [**Open-grain finish**] [**Filled finish**] [**Semifilled finish, produced by applying an additional finish coat to partially fill the wood pores**].
7. Sheen: [**Satin**] [**Semigloss**].

F. Opaque Finish:

1. Grade: [**Premium**] [**Custom**].
2. Finish: AWI [**conversion varnish**] [**or**] [**catalyzed polyurethane**] <**Insert finish designation**> system.
3. Finish: WDMA [**OP-4 conversion varnish**] [**or**] [**OP-6 catalyzed polyurethane**] <**Insert finish designation**>.
4. Finish: WI System [**4 conversion varnish**] [**5 catalyzed polyurethane**] [**or**] [**8 UV-curable coating**] <**Insert finish designation**>.
5. Color: [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**].
6. Sheen: [**Satin**] [**Semigloss**] [**Gloss**].

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames before hanging doors.

1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Hardware: For installation, see Division 08 Section "Door Hardware."

B. 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.

C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; 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 (3.2 mm) at heads, jambs, and between pairs of doors. Provide 1/8 inch (3.2 mm) 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 (6.4 mm) from bottom of door to top of threshold unless otherwise indicated.

a. Comply with NFPA 80 for fire-rated doors.

2. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.
3. Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock edge; trim stiles and rails only to extent permitted by labeling agency.

D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 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 081433 - STILE AND RAIL WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Exterior stile and rail wood doors[**and sidelites**].
2. Interior stile and rail wood doors.
3. Interior fire-rated, stile and rail wood doors.
4. Interior fire-rated, wood door[**and sidelite**] frames.
5. [**Priming**] [**Finishing**] stile and rail wood doors.
6. Fitting stile and rail wood doors to frames and machining for hardware.
7. Prehanging doors in frames.

B. Related Sections:

1. Division 06 Section "Interior Architectural Woodwork" for requirements for veneers from the same flitches for both architectural woodwork and stile and rail wood doors.
2. Division 06 Section "Wood Paneling" for requirements for veneers from the same flitches for both wood paneling and stile and rail wood doors.
3. Division 09 Section "[**Exterior Painting**] [**Interior Painting**] [**Staining and Transparent Finishing**]" for field finishing stile and rail doors.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

1. Include details of construction[**and glazing**].
2. Include factory finishing specifications.

B. LEED Submittals:

1. Certificates for Credit MR 7: Chain-of-custody certificates certifying that wood used for stile and rail wood doors complies with forest certification requirements.[**Include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body.**]

    a. Include statement indicating costs for each certified wood product.

2. Product Data for Credit EQ 4.4: For adhesives and composite wood materials, documentation indicating that products contain no urea formaldehyde.

C. Shop Drawings: For stile and rail wood doors. Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data, including those for stiles, rails, panels, and moldings (sticking); and other pertinent data[**.**][**, including the following:**]

1. Dimensions of doors for factory fitting.
2. Locations and dimensions of mortises and holes for hardware.
3. Requirements for veneer matching.
4. Doors to be factory finished, and finish requirements.
5. Fire ratings for fire-rated doors.

D. Samples for Initial Selection: For factory-finished doors.

E. Samples for Verification: Corner sections of doors, approximately [**8 by 10 inches (200 by 250 mm)**] <**Insert dimensions**>, with door faces and edgings representing typical range of color and grain for each species of veneer and solid lumber required.[**Finish Sample with same materials proposed for factory-finished doors.**]

F. Product Certificates: For each type of door, from manufacturer.

G. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

B. Source Limitations: Obtain [**stile and rail wood doors**] [**each type of stile and rail wood door**] from single manufacturer.

C. Source Limitations: Obtain[**custom**] stile and rail wood doors from same fabricator as work in Division 06 Section "[**Interior Architectural Woodwork**] [**Wood Paneling**]."

D. Source Limitations: Provide[**custom**] stile and rail wood doors finished in same shop as work in Division 06 Section "[**Interior Architectural Woodwork**] [**Wood Paneling**]."

E. Forest Certification: Provide doors made with [**veneers**] [**not less than 70 percent of wood products**] [**all wood products**] obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

F. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at [**positive pressure**] [**as close to neutral pressure as possible**] according to [**NFPA 252**] [**UBC Standard 7-2**] [**or**] [**UL 10B**] [**UL 10C**].

1. Temperature-Rise Limit: [**Where indicated**] [**At vertical exit enclosures and exit passageways**], provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.

G. Safety Glass: Provide products complying with testing requirements in 16 CFR 1201, for Category II materials, unless those of Category I are expressly indicated and permitted.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's written instructions and requirements of quality standard referenced in Part 2.

B. Package doors individually in opaque plastic bags or cardboard cartons.

C. Mark each door on top and bottom edge with opening number used on Shop Drawings.

1.6 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 temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

B. 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 temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between [**25 and 55**] [**43 and 70**] [**17 and 50**] <**Insert humidity range**> percent during the remainder of the construction period.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship, or have warped (bow, cup, or twist) more than 1/4 inch (6.4 mm) in a 42-by-84-inch (1067-by-2134-mm) section.

1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
2. Warranty shall be in effect during the following period of time from date of Substantial Completion:

   a. Exterior Doors: [**None**] [**One year**] [**Two years**] [**Five years**].
   b. Interior Doors: [**One year**] [**Five years**] [**Life of installation**].
   c. Insulating[**Leaded**] Glass Vision Panels: [**Three**] [**Five**] years.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Use only materials that comply with referenced standards and other requirements specified.

1. Assemble exterior doors and sidelites, including components, with wet-use adhesives complying with ASTM D 5572 for finger joints and with ASTM D 5751 for joints other than finger joints.
2. Assemble interior doors, frames, and sidelites, including components, with either dry-use or wet-use adhesives complying with ASTM D 5572 for finger joints and with ASTM D 5751 for joints other than finger joints.

B. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea-formaldehyde resins.

C. Panel Products: Any of the following:

1. Particleboard made from wood particles[**, with binder containing no urea-formaldehyde resin**], complying with ANSI A208.1, Grade M-2.
2. Particleboard made from straw, complying with ANSI A208.1, Grade M-2, except for density.
3. Medium-density fiberboard made from wood fiber[**, with binder containing no urea-formaldehyde resin**], complying with ANSI A208.2, Grade 130.
4. Hardboard, complying with AHA A135.4.
5. Veneer core plywood[**, made with adhesive containing no urea-formaldehyde resin**].

2.2 EXTERIOR STILE AND RAIL WOOD DOORS

A. Exterior Stile and Rail Wood Doors[**Type SRD-**<**#**>]: Stock exterior doors complying with WDMA I.S.6, "Industry Standard for Wood Stile and Rail Doors," and with other requirements specified.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:
2. Basis-of-Design Product: Subject to compliance with requirements, provide [**product indicated on Drawings**] <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

a. Belentry Doors LLC.
b. International Door and Latch.
c. Jeld-Wen, Inc.
d. Karona, Inc.
e. McPhillips Manufacturing Company.
f. QSM Doors, Inc.
g. Simpson Door Company.

h. <**Insert manufacturer's name**>.

3. Finish and Grade: [**Transparent and Premium or Select**] [**Opaque and Standard**].
4. Wood Species: [**Idaho white, lodgepole, ponderosa, or sugar pine**] [**Manufacturer's standard softwood species and cut**] <**Insert species**>.
5. Stile and Rail Construction: [**Edge-glued solid lumber**] [**or**] [**veneered, structural composite lumber**] [**or**] [**veneered edge- and end-glued lumber**].
6. Panel Construction: [**Edge-glued solid lumber**] [**or**] [**veneered panel product**].
7. Raised-Panel Thickness: [**Manufacturer's standard, but not less than that required by WDMA I.S.6 for design group indicated**] [**As indicated**].
8. Molding Profile (Sticking): [**Manufacturer's standard**] [**As selected by Architect from manufacturer's full range**].
9. Glass: Uncoated, clear, [**fully tempered float glass, 5.0 mm thick**] [**laminated glass made from two lites of 3.0-mm-thick annealed glass**] [**insulating-glass units made from two lites of 3.0-mm-thick, fully tempered glass with 1/4-inch (6.4-mm) interspace**] complying with Division 08 Section "Glazing."
10. WDMA Design Group: [**1-3/4 Front Entrance Doors (Exterior)**] [**1-3/4 Thermal (Insulated-Glass) Doors (Exterior)**] [**8'-0" High Doors**] [**Side Lights**] [**1-3/4 and 1-3/8 Entrance Doors (Exterior)**] [**Combination Doors**] [**Screen Doors**].

    a. Panel Design: <**Insert WDMA designation**>.

11. Mark, label, or otherwise identify stile and rail wood doors as complying with WDMA I.S.6 and grade specified. Include panel design number if applicable.

B. Exterior Stile and Rail Wood Doors[**Type SRD-**<**#**>]: [**Stock**] [**Custom**] exterior doors complying with [**AWI's "Architectural Woodwork Quality Standards,"**] [**WI's "Manual of Millwork,"**] [**WDMA I.S.6A, "Industry Standard for Architectural Stile and Rail Doors,"**] and with other requirements specified.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:
2. Basis-of-Design Product: Subject to compliance with requirements, provide [**product indicated on Drawings**] <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

    a. Algoma Hardwoods, Inc.
    b. Artistic Doors and Windows, Inc.
    c. Belentry Doors LLC.
    d. Buell Door Company.
    e. Dimension Millworks.
    f. Eggers Industries.
    g. Enjo Architectural Millwork.
    h. Harring Doors.
    i. Ideal Architectural Doors & Plywood.
    j. Maiman Company (The).
    k. Marshfield DoorSystems, Inc.
    l. McPhillips Manufacturing Company.
    m. Pinecrest, Inc.

n. Select Interior Door, Ltd.
o. Sun-Dor-Co.
p. Woodtech Trading Company.
q. <**Insert manufacturer's name**>.

3. Panel Designs: Indicated by Drawings. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
4. Grade: [**Premium**] [**Custom**].
5. Finish: [**Transparent**] [**Opaque**].
6. Wood Species and Cut for Transparent Finish: [**Idaho white, lodgepole, ponderosa, or sugar pine, plain sawed/sliced**] [**Douglas fir or western hemlock, quarter sawed/sliced (vertical grain)**] [**Red oak, quarter sawed/sliced stiles and rails, plain sawed/sliced panels**] [**Species indicated in schedule, plain sawed/sliced**] <**Insert species and cut**>.
7. Door Construction for Transparent Finish:

   a. Stile and Rail Construction: Clear lumber; may be edge glued for width. Select lumber for similarity of grain and color, and arrange for optimum match between adjacent pieces.
   b. Stile and Rail Construction: Veneered, structural composite lumber[**or veneered, edge- and end-glued clear lumber**]. Select veneers for similarity of grain and color, and arrange for optimum match between adjacent pieces.[**Use veneers not less than 1/16 inch (1.6 mm) thick.**]
   c. Raised-Panel Construction: Clear lumber; edge glued for width. Select lumber for similarity of grain and color, and arrange for optimum match between adjacent pieces.
   d. Raised-Panel Construction: Edge-glued, clear lumber; glued to both sides of a wood-based panel product. Select lumber for similarity of grain and color, and arrange for optimum match between adjacent pieces.
   e. Raised-Panel Construction: Veneered, wood-based panel product with mitered, raised rims made from matching clear lumber.
   f. Raised-Panel Construction: Veneered, shaped, wood-based panel product with veneer conforming to raised-panel shape.

8. Door Construction for Opaque Finish:

   a. Stile and Rail Construction: Clear softwood; may be edge glued for width and finger jointed.
   b. Stile and Rail Construction: Veneered, structural composite lumber[**or veneered edge- and end-glued lumber**].
   c. Raised-Panel Construction: Clear softwood lumber; edge glued for width.
   d. Raised-Panel Construction: Veneered, wood-based panel product.

9. Stile and Rail Widths: [**As indicated.**] [**Manufacturer's standard, but not less than the following:**]

   a. Stiles, Top and Intermediate Rails: 5-3/8 inches (137 mm).
   b. Bottom Rails: 11-3/8 inches (289 mm).

10. Raised-Panel Thickness: [**As indicated**] [**1-3/4 inches (44 mm)**] [**1-3/8 inches (35 mm)**] [**Manufacturer's standard, but not less than 1-1/8 inches (29 mm)**].
11. Molding Profile (Sticking): [**Bead and cove**] [**Ogee**] [**Ovalo**] [**Recessed bevel**] [**Recessed square**] [**Manufacturer's standard**] [**As selected by Architect from manufacturer's full range**].
12. Glass: Uncoated, clear, [**fully tempered float glass, 5.0 mm thick**] [**laminated glass made from two lites of 3.0-mm-thick annealed glass**] [**insulating-glass units made from two lites of 3.0-mm-thick, fully tempered glass with 1/4-inch (6.4-mm) interspace**], complying with Division 08 Section "Glazing."
13. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.
14. Provide WI-Certified Compliance Certificate indicating that doors comply with requirements of grades specified.
15. Mark, label, or otherwise identify stile and rail wood doors as complying with WDMA I.S.6A and grade specified.

2.3 INTERIOR STILE AND RAIL WOOD DOORS

A. Interior Stile and Rail Wood Doors[**Type SRD-**<#>]: Stock interior doors complying with WDMA I.S.6, "Industry Standard for Wood Stile and Rail Doors," and with other requirements specified.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:
2. Basis-of-Design Product: Subject to compliance with requirements, provide [**product indicated on Drawings**] <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

    a. Belentry Doors LLC.
    b. International Door and Latch.
    c. Jeld-Wen, Inc.
    d. Karona, Inc.
    e. McPhillips Manufacturing Company.
    f. QSM Doors, Inc.
    g. Simpson Door Company.
    h. <**Insert manufacturer's name**>.

3. Finish and Grade: [**Transparent and Premium or Select**] [**Opaque and Standard**].
4. Wood Species: [**Idaho white, lodgepole, ponderosa, or sugar pine**] [**Douglas fir or western hemlock, vertical sawed/sliced**] [**Red oak, quarter sawed/sliced**] [**Manufacturer's standard softwood species and cut**] <**Insert species**>.
5. Stile and Rail Construction: [**Edge-glued solid lumber**] [**or**] [**veneered, structural composite lumber**] [**or**] [**veneered edge- and end-glued lumber**].
6. Raised-Panel Construction: [**Edge-glued solid lumber**] [**Veneered panel product**] [**or**] [**shaped, medium-density fiberboard**].
7. Flat-Panel Construction: [**Veneered panel product**] [**or**] [**hardboard or medium-density fiberboard**].

8. Raised-Panel Thickness: [**Manufacturer's standard, but not less than that required by WDMA I.S.6 for design group indicated**] [**As indicated**].
9. Flat-Panel Thickness: [**Manufacturer's standard, but not less than that required by WDMA I.S.6 for design group indicated**] [**As indicated**].
10. Molding Profile (Sticking): [**Manufacturer's standard**] [**As selected by Architect from manufacturer's full range**].
11. Glass: Uncoated, clear, [**fully tempered float glass, 5.0 mm thick**] [**laminated glass made from two lites of 3.0-mm-thick annealed glass**] complying with Division 08 Section "Glazing."
12. WDMA Design Group: [**1-3/8 Interior Panel Doors**] [**French Doors**] [**8'-0" High Doors**] [**Bifold Doors**].

    a. Panel Design: <**Insert WDMA designation**>.

13. Mark, label, or otherwise identify stile and rail wood doors as complying with WDMA I.S.6 and grade specified. Include panel design number if applicable.

B. Interior Stile and Rail Wood Doors[**Type SRD-**<**#**>]: [**Stock**] [**Custom**] interior doors complying with [**AWI's "Architectural Woodwork Quality Standards,"**] [**WI's "Manual of Millwork,"**] [**WDMA I.S.6A, "Industry Standard for Architectural Stile and Rail Doors,"**] and with other requirements specified.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:
2. Basis-of-Design Product: Subject to compliance with requirements, provide [**product indicated on Drawings**] <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

    a. Algoma Hardwoods, Inc.
    b. Artistic Doors and Windows, Inc.
    c. Belentry Doors LLC.
    d. Buell Door Company.
    e. Dimension Millworks.
    f. Eggers Industries.
    g. Enjo Architectural Millwork.
    h. Harring Doors.
    i. Ideal Architectural Doors & Plywood.
    j. Maiman Company (The).
    k. Marshfield DoorSystems, Inc.
    l. McPhillips Manufacturing Company.
    m. Pinecrest, Inc.
    n. Select Interior Door, Ltd.
    o. Sun-Dor-Co.
    p. Woodtech Trading Company.
    q. <**Insert manufacturer's name**>.

3. Panel Designs: Indicated by Drawings. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

4. Grade: [**Premium**] [**Custom**].
5. Finish: [**Transparent**] [**Opaque**].
6. Wood Species and Cut for Transparent Finish: [**Idaho white, lodgepole, ponderosa, or sugar pine, plain sawed/sliced**] [**Douglas fir or western hemlock, quarter sawed/sliced (vertical grain)**] [**Red oak, quarter sawed/sliced stiles and rails, plain sawed/sliced panels**] [**Species indicated in schedule, plain sawed/sliced**] <**Insert species and cut**>.
7. Door Construction for Transparent Finish:

    a. Stile and Rail Construction: Clear lumber; may be edge glued for width. Select lumber for similarity of grain and color, and arrange for optimum match between adjacent pieces.
    b. Stile and Rail Construction: Veneered, structural composite lumber[**or veneered, edge- and end-glued clear lumber**]. Select veneers for similarity of grain and color, and arrange for optimum match between adjacent pieces.[**Use veneers not less than 1/16 inch (1.6 mm) thick.**]
    c. Raised-Panel Construction: Clear lumber; edge glued for width. Select lumber for similarity of grain and color, and arrange for optimum match between adjacent pieces.
    d. Raised-Panel Construction: Edge-glued, clear lumber; glued to both sides of a wood-based panel product. Select lumber for similarity of grain and color, and arrange for optimum match between adjacent pieces.
    e. Raised-Panel Construction: Veneered, wood-based panel product with mitered, raised rims made from matching clear lumber.
    f. Raised-Panel Construction: Veneered, shaped, wood-based panel product with veneer conforming to raised-panel shape.
    g. Flat-Panel Construction: Veneered, wood-based panel product.

8. Door Construction for Opaque Finish:

    a. Stile and Rail Construction: Clear softwood; may be edge glued for width and finger jointed.
    b. Stile and Rail Construction: Veneered, structural composite lumber[**or veneered edge- and end-glued lumber**].
    c. Raised-Panel Construction: Clear softwood lumber; edge glued for width.
    d. Raised-Panel Construction: Shaped, medium-density fiberboard.
    e. Flat-Panel Construction: [**Veneered, wood-based panel product**] [**Medium-density fiberboard**].

9. Stile and Rail Widths: [**As indicated.**] [**Manufacturer's standard, but not less than the following:**]

    a. Stiles, Top and Intermediate Rails: 4-1/2 inches (114 mm).
    b. Bottom Rails: 9 inches (229 mm).

10. Raised-Panel Thickness: [**As indicated**] [**1-3/4 inches (44 mm)**] [**1-3/8 inches (35 mm)**] [**Manufacturer's standard, but not less than 1-1/8 inches (29 mm)**] [**Manufacturer's standard, but not less than 3/4 inch (19 mm)**].
11. Flat-Panel Thickness: [**As indicated**] [**1/2 inch (13 mm)**] [**3/8 inch (10 mm)**] [**1/4 inch (6.4 mm)**].

12. Molding Profile (Sticking): [**Bead and cove**] [**Ogee**] [**Ovalo**] [**Recessed bevel**] [**Recessed square**] [**Manufacturer's standard**] [**As selected by Architect from manufacturer's full range**].
13. Glass: Uncoated, clear, [**fully tempered float glass, 5.0 mm thick**] [**laminated glass made from two lites of 3.0-mm-thick annealed glass**], complying with Division 08 Section "Glazing."
14. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.
15. Provide WI-Certified Compliance Certificate indicating that doors comply with requirements of grades specified.
16. Mark, label, or otherwise identify stile and rail wood doors as complying with WDMA I.S.6A and grade specified.

C. Interior Stile and Rail Wood Doors[**Type SRD-**<**#**>]: Fire-rated (20-minute rating) doors complying with [**AWI's "Architectural Woodwork Quality Standards,"**] [**WI's "Manual of Millwork,"**] [**WDMA I.S.6A, "Industry Standard for Architectural Stile and Rail Doors,"**] and with other requirements specified.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:
2. Basis-of-Design Product: Subject to compliance with requirements, provide [**product indicated on Drawings**] <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

    a. Algoma Hardwoods, Inc.
    b. Artistic Doors and Windows, Inc.
    c. Buell Door Company.
    d. Dimension Millworks.
    e. Eggers Industries.
    f. Enjo Architectural Millwork.
    g. Harring Doors.
    h. Maiman Company (The).
    i. Marshfield DoorSystems, Inc.
    j. Pinecrest, Inc.
    k. Select Interior Door, Ltd.
    l. Sun-Dor-Co.
    m. Woodtech Trading Company.
    n. <**Insert manufacturer's name**>.

3. Panel Designs: Indicated by Drawings. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
4. Grade: [**Premium**] [**Custom**].
5. Finish: [**Transparent**] [**Opaque**].
6. Wood Species and Cut for Transparent Finish: [**Idaho white, lodgepole, ponderosa, or sugar pine, plain sawed/sliced**] [**Douglas fir or western hemlock, quarter sawed/sliced (vertical grain)**] [**Red oak, quarter sawed/sliced stiles and rails, plain sawed/sliced panels**] [**Species indicated in schedule, plain sawed/sliced**] <**Insert species and cut**>.

7. Door Construction for Transparent Finish: 1-3/4-inch- (44-mm-) thick stiles and rails and veneered [**flat panels not less than 5/8 inch (16 mm) thick**] [**raised panels not less than 1-1/8 inches (29 mm) thick**].

    a. Stile and Rail Construction: Veneered, structural composite lumber[**or veneered, edge- and end-glued clear lumber**]. Select veneers for similarity of grain and color, and arrange for optimum match between adjacent pieces.[**Use veneers not less than 1/16 inch (1.6 mm) thick.**]
    b. Raised-Panel Construction: Veneered, shaped, wood-based panel product with veneer conforming to raised-panel shape.
    c. Flat-Panel Construction: Veneered, wood-based panel product.

8. Door Construction for Opaque Finish: 1-3/4-inch- (44-mm-) thick stiles and rails and veneered [**flat panels not less than 5/8 inch (16 mm) thick**] [**raised panels not less than 1-1/8 inches (29 mm) thick**].

    a. Stile and Rail Construction: Veneered, structural composite lumber[**or veneered edge- and end-glued lumber**].
    b. Raised-Panel Construction: Shaped, medium-density fiberboard.
    c. Flat-Panel Construction: [**Veneered, wood-based panel product**] [**Medium-density fiberboard**].

9. Stile and Rail Widths: [**As indicated.**] [**Manufacturer's standard, but not less than the following:**]

    a. Stiles, Top and Intermediate Rails: 4-1/2 inches (114 mm).
    b. Bottom Rails: 9 inches (229 mm).

10. Molding Profile (Sticking): [**Bead and cove**] [**Ogee**] [**Ovalo**] [**Recessed bevel**] [**Recessed square**] [**Manufacturer's standard**] [**As selected by Architect from manufacturer's full range**].
11. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.
12. Provide WI-Certified Compliance Certificate indicating that doors comply with requirements of grades specified.
13. Mark, label, or otherwise identify stile and rail wood doors as complying with WDMA I.S.6A and grade specified.

D. Interior Stile and Rail Wood Doors[**Type SRD-**<#>]: Fire-rated (45-minute rating) doors complying with [**AWI's "Architectural Woodwork Quality Standards,"**] [**WI's "Manual of Millwork,"**] and with other requirements specified.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:
2. Basis-of-Design Product: Subject to compliance with requirements, provide [**product indicated on Drawings**] <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

    a. Algoma Hardwoods, Inc.

b. Artistic Doors and Windows, Inc.
c. Buell Door Company.
d. Dimension Millworks.
e. Eggers Industries.
f. Enjo Architectural Millwork.
g. Harring Doors.
h. Maiman Company (The).
i. Marshfield DoorSystems, Inc.
j. Pinecrest, Inc.
k. Select Interior Door, Ltd.
l. Sun-Dor-Co.
m. Woodtech Trading Company.
n. <**Insert manufacturer's name**>.

3. Panel Designs: Indicate by Drawings. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
4. Grade: [**Premium**] [**Custom**].
5. Finish: [**Transparent**] [**Opaque**].
6. Wood Species and Cut for Transparent Finish: [**Idaho white, lodgepole, ponderosa, or sugar pine, plain sawed/sliced**] [**Douglas fir or western hemlock, quarter sawed/sliced (vertical grain)**] [**Red oak, quarter sawed/sliced stiles and rails, plain sawed/sliced panels**] [**Species indicated in schedule, plain sawed/sliced**] <**Insert species and cut**>.
7. Interior Fire-Rated Door Construction: 1-3/4-inch- (44-mm-) thick, edged and veneered mineral-core stiles and rails and 1-1/8-inch- (29-mm-) thick, veneered mineral-core raised panels.
8. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

    a. Screw-Holding Capability: [**550 lbf (2440 N)**] [**475 lbf (2110 N)**] [**400 lbf (1780 N)**] per NWWDA T.M.-10.

9. Stile and Rail Widths: [**As indicated.**] [**Manufacturer's standard, but not less than the following:**]

    a. Stiles, Top and Intermediate Rails: 4-1/2 inches (114 mm).
    b. Bottom Rails: 9 inches (229 mm).

10. Molding Profile (Sticking): [**Bead and cove**] [**Ogee**] [**Ovalo**] [**Recessed bevel**] [**Recessed square**] [**Manufacturer's standard**] [**As selected by Architect from manufacturer's full range**].
11. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.
12. Provide WI-Certified Compliance Certificate indicating that doors comply with requirements of grades specified.

2.4 INTERIOR FIRE-RATED WOOD DOOR FRAMES

A. Interior Fire-Rated Wood Door Frames: Frames, complete with[**sidelite frames and**] casings, fabricated from solid fire-retardant-treated wood or from veneered fire-retardant particleboard, fire-retardant medium-density fiberboard, or mineral board.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:
2. Basis-of-Design Product: Subject to compliance with requirements, provide [**product indicated on Drawings**] <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

a. Algoma Hardwoods, Inc.
b. Eggers Industries.
c. Maiman Company (The).
d. Marshfield DoorSystems, Inc.
e. <**Insert manufacturer's name**>.

B. Species: [**Red oak**] [**White oak**] [**White maple**] [**Cherry**] <**Insert species**>.

2.5 STILE AND RAIL WOOD DOOR FABRICATION

A. Fabricate stile and rail wood doors in sizes indicated for field fitting.

B. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels unless otherwise indicated:

1. Clearances: Provide 1/8 inch (3 mm) at heads, jambs, and between pairs of doors. Provide 1/2 inch (13 mm) from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide not more than 3/8 inch (10 mm) from bottom of door to top of threshold.

a. Comply with NFPA 80 for fire-rated doors.

2. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.
3. Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) on lock edge; trim stiles and rails only to extent permitted by labeling agency.

C. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W Series standards, and hardware templates.

1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.

D. Glazed Openings: Trim openings indicated for glazing with solid wood moldings, with one side removable. Miter wood moldings at corner joints.

E. Glazed Openings: Glaze doors at factory with glass of type and thickness indicated, complying with Division 08 Section "Glazing." Install glass using manufacturer's standard elastomeric glazing sealant complying with ASTM C 920. Secure glass in place with removable wood moldings. Miter wood moldings at corner joints.

F. Transom and Side Panels: Fabricate panels to match adjoining doors in materials, finish, and quality of construction.

G. Exterior Doors: Factory treat exterior doors after fabrication with water-repellent preservative to comply with WDMA I.S.4. Flash top of outswinging doors with manufacturer's standard metal flashing.

H. Prehung Doors: Provide stile and rail doors as prehung units including doors, frames, [**weather stripping,**]and hardware.

1. Provide wood door frames[**, other than fire-rated wood door frames,**] that comply with Division 06 Section "[**Interior Finish Carpentry**] [**Interior Architectural Woodwork**]."
2. Provide hardware[**, including weather stripping and thresholds,**] that complies with Division 08 Section "Door Hardware."

2.6 SHOP PRIMING

A. Doors for Opaque Finish: Shop prime doors with one coat of wood primer specified in Division 09 Section "[**Exterior Painting**] [**Interior Painting**]." Seal all four edges, edges of cutouts, and mortises with primer.

B. Doors for Transparent Finish: Shop prime doors with stain (if required), other required pretreatments, and first coat of finish as specified in Division 09 Section "Staining and Transparent Finishing." Seal all four edges, edges of cutouts, and mortises with first coat of finish.

2.7 FINISHING

A. Finish wood doors at [**factory**] [**woodworking shop**].

B. Finish wood doors at [**factory**] [**woodworking shop**] that are indicated to receive transparent finish. Wood doors that are indicated to receive opaque finish may be field finished.

C. Finish wood doors at [**factory**] [**woodworking shop**] where indicated in schedules or on Drawings. Wood doors that are not indicated to be [**factory**] [**shop**] finished may be field finished.

D. For doors indicated to be [**factory**] [**shop**] finished, comply with [**AWI's "Architectural Woodwork Quality Standards,"**] [**WI's "Manual of Millwork,"**] [**WDMA I.S.6A, "Industry Standard for Architectural Stile and Rail Doors,"**] and with other requirements specified.

1. Finish faces and all four edges of doors, including mortises and cutouts. Stains and fillers may be omitted on[**top and**] bottom edges, edges of cutouts, and mortises.

E. Transparent Finish:

1. Grade: [**Premium**] [**Custom**].
2. Finish: [**AWI conversion varnish**] [**or**] [**AWI catalyzed polyurethane**] <**Insert finish designation**> system.
3. Finish: [**WDMA TR-4 conversion varnish**] [**or**] [**WDMA TR-6 catalyzed polyurethane**] <**Insert finish designation**>.
4. Finish: [**WI System 4 clear conversion varnish**] [**WI System 5 catalyzed polyurethane**] [**or**] [**WI System 8 UV-curable coating**] <**Insert finish designation**>.
5. Staining: [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] [**None required**].
6. Effect: [**Open-grain finish**] [**Filled finish**] [**Semifilled finish, produced by applying an additional finish coat to partially fill the wood pores**].
7. Sheen: [**Satin**] [**Semigloss**].

F. Opaque Finish:

1. Grade: [**Premium**] [**Custom**].
2. Finish: [**AWI conversion varnish**] [**or**] [**AWI catalyzed polyurethane**] <**Insert finish designation**> system.
3. Finish: [**WDMA OP-4 conversion varnish**] [**or**] [**WDMA OP-6 catalyzed polyurethane**] <**Insert finish designation**>.
4. Finish: [**WI System 4 conversion varnish**] [**WI System 5 catalyzed polyurethane**] [**or**] [**WI System 8 UV-curable coating**] <**Insert finish designation**>.
5. Color: [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**].
6. Sheen: [**Satin**] [**Semigloss**] [**Gloss**].

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and substrates, with Installer present, for suitable conditions where wood stile and rail doors[**and fire-rated wood door frames**] will be installed.

1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install fire-rated wood door frames level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.

1. Countersink fasteners, fill surface flush, and sand smooth.

B. Hardware: For installation, see Division 08 Section "Door Hardware."

C. Install wood doors to comply with manufacturer's written instructions, [**WDMA I.S.6, "Industry Standard for Wood Stile and Rail Doors,"**] [**AWI's "Architectural Woodwork Quality Standards,"**] [**WI's "Manual of Millwork,"**] [**WDMA I.S.6A, "Industry Standard for Architectural Stile and Rail Doors,"**] and other requirements specified.

1. Provide WI-Certified Compliance Certificate for Installation.
2. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.

D. Field-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.

1. Clearances: Provide 1/8 inch (3 mm) at heads, jambs, and between pairs of doors. Provide [**1/8 inch (3 mm)**] [**1/4 inch (6 mm)**] [**3/8 inch (10 mm)**] [**1/2 inch (13 mm)**] from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide [**1/4 inch (6 mm)**] [**3/8 inch (10 mm)**] from bottom of door to top of threshold.

   a. Comply with NFPA 80 for fire-rated doors.

2. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.
3. Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) on lock edge; trim stiles and rails only to extent permitted by labeling agency.

E. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

F. [**Factory**] [**Shop**]-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or 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 081433

SECTION 083113 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Access doors and frames for walls and ceilings.
2. Floor access doors and frames.

B. Related Requirements:

1. Division 07 Section "Roof Accessories" for roof hatches.
2. Division 08 Section "Security Access Doors and Frames" for access doors and frames for security applications.
3. Division 23 Section "Air Duct Accessories" for heating and air-conditioning duct access doors.

1.3 ALLOWANCES

A. Access doors and frames are part of an access door and frame allowance.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details[**, fire ratings,**] materials, individual components and profiles, and finishes.

B. Shop Drawings:

1. Include plans, elevations, sections, details, and attachments to other work.
2. Detail fabrication and installation of access doors and frames for each type of substrate.

C. Samples: For each door face material, at least 3 by 5 inches (75 by 125 mm) in size, in specified finish.

D. Product Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics according to the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. NFPA 252 or UL 10B for fire-rated access door assemblies installed vertically.
2. NFPA 288 for fire-rated access door assemblies installed horizontally.

2.2 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

A. Manufacturers: Subject to compliance with requirements, [**provide products by the following**] [**provide products by one of the following**] [**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 product indicated or comparable product by one of the following:

1. Access Panel Solutions.
2. Acudor Products, Inc.
3. Alfab, Inc.
4. Babcock-Davis.
5. Cendrex Inc.
6. Elmdor/Stoneman Manufacturing Co.; Div. of Acorn Engineering Co.
7. Jensen Industries; Div. of Broan-Nutone, LLC.
8. J. L. Industries, Inc.; Div. of Activar Construction Products Group.
9. Karp Associates, Inc.
10. Larsen's Manufacturing Company.
11. Maxam Metal Products Limited.
12. Metropolitan Door Industries Corp.
13. MIFAB, Inc.
14. Milcor Inc.
15. Nystrom, Inc.
16. Williams Bros. Corporation of America (The).
17. <**Insert manufacturer's name**>.

C. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.

D. Flush Access Doors with Exposed Flanges <**Insert drawing designation**>:

1. Basis-of-Design Product: [**Indicated on Drawings**] <**Insert manufacturer's name; product name or designation**>.
2. Assembly Description: Fabricate door to fit flush to frame. Provide manufacturer's standard-width exposed flange, proportional to door size.

3. Locations: [**Wall**] [**Ceiling**] [**Wall and ceiling**] <**Insert location or substrate**>.
4. Door Size: <**Insert door size**>.
5. Uncoated Steel Sheet for Door: [**Nominal 0.060 inch (1.52 mm), 16 gage**] <**Insert thickness**>.

    a. Finish: [**Factory prime**] [**Factory finish**].

6. Metallic-Coated Steel Sheet for Door: [**Nominal 0.064 inch (1.63 mm), 16 gage**] <**Insert thickness**>.

    a. Finish: [**Factory prime**] [**Factory finish**].

7. Stainless-Steel Sheet for Door: [**Nominal 0.062 inch (1.59 mm), 16 gage**] <**Insert thickness**>.

    a. Finish: [**No. 4**] [**No. 2b**].

8. Frame Material: [**Same material, thickness, and finish as door**] <**Insert material, thickness, finish**>.
9. Hinges: [**Manufacturer's standard**] <**Insert hinge type**>.
10. Hardware: [**Latch**] [**Lock**].

E. Flush Access Doors with Concealed Flanges <**Insert drawing designation**>:

1. Basis-of-Design Product: [**Indicated on Drawings**] <**Insert manufacturer's name; product name or designation**>.
2. Assembly Description: Fabricate door to fit flush to frame. Provide frame with [**gypsum board**] [**plaster**] beads for concealed flange installation.
3. Locations: [**Wall**] [**Ceiling**] [**Wall and ceiling**] <**Insert location or substrate**>.
4. Door Size: <**Insert door size**>.
5. Uncoated Steel Sheet for Door: [**Nominal 0.060 inch (1.52 mm), 16 gage**] <**Insert thickness**>.

    a. Finish: [**Factory prime**] [**Factory finish**].

6. Metallic-Coated Steel Sheet for Door: [**Nominal 0.064 inch (1.63 mm), 16 gage**] <**Insert thickness**>.

    a. Finish: [**Factory prime**] [**Factory finish**].

7. Stainless-Steel Sheet for Door: [**Nominal 0.062 inch (1.59 mm), 16 gage**] <**Insert thickness**>.

    a. Finish: [**No. 4**] [**No. 2b**].

8. Frame Material: [**Same material and thickness as door**] <**Insert material, thickness, finish**>.
9. Hinges: [**Manufacturer's standard**] <**Insert hinge type**>.
10. Hardware: [**Latch**] [**Lock**].

F. Recessed Access Doors <**Insert drawing designation**>:

1. Basis-of-Design Product: [**Indicated on Drawings**] <**Insert manufacturer's name; product name or designation**>.
2. Assembly Description: Fabricate door in the form of a pan recessed [**1/2 inch (13 mm)**] [**5/8 inch (16 mm)**] [**1 inch (25 mm)**] for [**gypsum board**] [**plaster**] [**acoustical tile**] <**Insert material**> infill. Provide frame with [**gypsum board bead for concealed flange**] [**plaster bead for concealed flange**] [**no bead for acoustical tile**] installation.
3. Locations: [**Wall**] [**Ceiling**] [**Wall and ceiling**] <**Insert location or substrate**>.
4. Door Size: <**Insert door size**>.
5. Uncoated Steel Sheet for Door: [**Nominal 0.060 inch (1.52 mm), 16 gage**] <**Insert thickness**>.

    a. Finish: [**Factory prime**] [**Factory finish**].

6. Metallic-Coated Steel Sheet for Door: [**Nominal 0.064 inch (1.63 mm), 16 gage**] <**Insert thickness**>.

    a. Finish: [**Factory prime**] [**Factory finish**].

7. Stainless-Steel Sheet for Door: [**Nominal 0.062 inch (1.59 mm), 16 gage**] <**Insert thickness**>.

    a. Finish: [**No. 4**] [**No. 2b**].

8. Frame Material: [**Same material and thickness as door**] <**Insert material, thickness, finish**>.
9. Hinges: [**Manufacturer's standard**] <**Insert hinge type**>.
10. Hardware: [**Latch**] [**Lock**].

G. Aluminum Flush Access Doors <**Insert drawing designation**>:

1. Basis-of-Design Product: [**Indicated on Drawings**] <**Insert manufacturer's name; product name or designation**>.
2. Assembly Description: Fabricate door to fit flush to frame. Provide manufacturer's standard-width exposed flange, proportional to door size.
3. Locations: [**Wall**] [**Ceiling**] [**Wall and ceiling**] <**Insert location or substrate**>.
4. Door Size: <**Insert door size**>.
5. Aluminum Sheet for Door: [**Nominal 0.045 inch (1.15 mm)**] <**Insert thickness**>.

    a. Finish: [**Mill**] [**Clear anodic**].

6. Frame Material: [**Same material, thickness, and finish as door**] <**Insert material, thickness, finish**>.
7. Hinges: [**Manufacturer's standard**] <**Insert hinge type**>.
8. Hardware: [**Lock**] [**Latch**].

H. Lightweight Flush Access Doors <**Insert drawing designation**>:

1. Basis-of-Design Product: [**Indicated on Drawings**] <**Insert manufacturer's name; product name or designation**>.

2. Assembly Description: Fabricate door to fit flush to frame. Provide manufacturer's standard-width frame for surface mounting, proportional to door size.
3. Locations: [**Wall**] [**Ceiling**] [**Wall and ceiling**] <**Insert location or substrate**>.
4. Door Size: <**Insert door size**>.
5. Uncoated Steel Sheet for Door: [**Nominal 0.018 inch (0.46 mm), 26 gage**] <**Insert thickness**>.

    a. Finish: [**Factory prime**] [**Factory finish**].

6. Metallic-Coated Steel Sheet for Door: [**Nominal 0.022 inch (0.56 mm), 26 gage**] <**Insert thickness**>.

    a. Finish: [**Factory prime**] [**Factory finish**].

7. Frame Material: [**Aluminum, nominal 0.045 inch (1.15 mm), mill finish**] <**Insert material, thickness, finish**>.
8. Hinges: Manufacturer's standard.
9. Hardware: [**Lock**] [**Latch**].

I. Plastic Flush Access Doors <**Insert drawing designation**>:

1. Basis-of-Design Product: [**Indicated on Drawings**] <**Insert manufacturer's name; product name or designation**>.
2. Assembly Description: Fabricate door to fit flush to frame. Fabricate frame from single piece, 3/4 inch (19 mm) wide, with [**gypsum board**] [**plaster**] bead for concealed installation.
3. Locations: [**Wall**] [**Ceiling**] [**Wall and ceiling**] <**Insert location or substrate**>.
4. Door Size: <**Insert door size**>.
5. Door and Frame Materials: 1/8-inch- (3.2-mm-) thick, high-impact plastic with UV stabilizer. White finish with textured exposed surfaces.
6. Hinges: Manufacturer's standard.
7. Hardware: Snap latch.

J. Exterior Flush Access Doors <**Insert drawing designation**>:

1. Basis-of-Design Product: [**Indicated on Drawings**] <**Insert manufacturer's name; product name or designation**>.
2. Assembly Description: Fabricate door to be weatherproof and fit flush to frame. Provide manufacturer's standard 2-inch- (50-mm-) thick fiberglass insulation and extruded door gaskets. Provide manufacturer's standard-width frame for surface mounting, proportional to door size.
3. Locations: [**Wall**] <**Insert location or substrate**>.
4. Door Size: <**Insert door size**>.
5. Metallic-Coated Steel Sheet for Door: [**Nominal 0.064 inch (1.63 mm), 16 gage**] <**Insert thickness**>.

    a. Finish: [**Factory prime**] [**Factory finish**].

6. Stainless-Steel Sheet for Door: [**Nominal 0.062 inch (1.59 mm), 16 gage**] <**Insert thickness**>.

a. Finish: [**No. 4**] [**No. 2b**].

7. Frame Material: [**Same material, thickness, and finish as door**] <**Insert material, thickness, finish**>.
8. Hinges: [**Manufacturer's standard**] <**Insert hinge type**>.
9. Hardware: [**Latch**] [**Lock**].

K. Medium-Security Flush Access Doors <**Insert drawing designation**>:

1. Basis-of-Design Product: [**Indicated on Drawings**] <**Insert manufacturer's name; product name or designation**>.
2. Assembly Description: Fabricate door to fit flush to frame. Provide manufacturer's standard-width exposed flange, proportional to door size.
3. Locations: [**Wall**] [**Ceiling**] [**Wall and ceiling**] <**Insert location or substrate**>.
4. Door Size: <**Insert door size**>.
5. Uncoated Steel Sheet for Door: [**Nominal 0.105 inch (2.66 mm), 12 gage**] [**Nominal 0.075 inch (1.90 mm), 14 gage**].

   a. Finish: Factory prime.

6. Metallic-Coated Steel Sheet for Door: [**Nominal 0.108 inch (2.74 mm), 12 gage**] [**Nominal 0.079 inch (2.01 mm), 14 gage**].

   a. Finish: Factory prime.

7. Stainless-Steel Sheet for Door: [**Nominal 0.109 inch (2.78 mm), 12 gage**] [**Nominal 0.078 inch (1.98 mm), 14 gage**].

   a. Finish: No. 4.

8. Frame Material: [**Same material, thickness, and finish as door**] [**Minimum 3/16-by-1-1/2-by-1-1/2-inch (4.7-by-38-by-38-mm) angle welded with joints ground smooth; factory prime**] <**Insert material, thickness, finish**>.
9. Hinges: [**Manufacturer's standard security hinge**] <**Insert hinge type**>.
10. Hardware: Tamper-resistant [**latch**] [**lock**].

L. Fire-Rated, Flush Access Doors with Exposed Flanges <**Insert drawing designation**>:

1. Basis-of-Design Product: [**Indicated on Drawings**] <**Insert manufacturer's name; product name or designation**>.
2. Assembly Description: Fabricate door to fit flush to frame, [**with a core of mineral-fiber insulation enclosed in sheet metal**] [**uninsulated**]. Provide self-latching door with automatic closer and interior latch release. Provide manufacturer's standard-width exposed flange, proportional to door size.
3. Locations: [**Wall**] [**Ceiling**] [**Wall and ceiling**] <**Insert location or substrate**>.
4. Fire-Resistance Rating: Not less than [**that indicated**] [**that of adjacent construction**] [**45 minutes**] [**1 hour**] [**1-1/2 hours**] [**2 hours**] [**3 hours**] <**Insert requirement**>.
5. Temperature-Rise Rating: [**450 deg F (250 deg C) at the end of 30 minutes**] [**250 deg F (139 deg C) at the end of 30 minutes**].

6. Uncoated Steel Sheet for Door: [**Nominal 0.036 inch (0.91 mm), 20 gage**] <**Insert thickness**>.

    a. Finish: [**Factory prime**] [**Factory finish**].

7. Metallic-Coated Steel Sheet for Door: [**Nominal 0.040 inch (1.02 mm), 20 gage**] <**Insert thickness**>.

    a. Finish: [**Factory prime**] [**Factory finish**].

8. Stainless-Steel Sheet for Door: [**Nominal 0.038 inch (0.95 mm), 20 gage**] <**Insert thickness**>.

    a. Finish: [**No. 4**] [**No. 2b**].

9. Frame Material: [**Same material, thickness, and finish as door**] <**Insert material, thickness, finish**>.
10. Hinges: [**Manufacturer's standard**] <**Insert hinge type**>.
11. Hardware: [**Latch**] [**Lock**].

M. Fire-Rated, Flush Access Doors with Concealed Flanges <**Insert drawing designation**>:

1. Basis-of-Design Product: [**Indicated on Drawings**] <**Insert manufacturer's name; product name or designation**>.
2. Assembly Description: Fabricate door to fit flush to frame, [**with a core of mineral-fiber insulation enclosed in sheet metal**] [**uninsulated**]. Provide self-latching door with automatic closer and interior latch release. Provide frame with [**gypsum board**] [**plaster**] beads for concealed flange installation.
3. Locations: [**Wall**] [**Ceiling**] [**Wall and ceiling**] <**Insert location or substrate**>.
4. Fire-Resistance Rating: Not less than [**that indicated**] [**that of adjacent construction**] [**45 minutes**] [**1 hour**] [**1-1/2 hours**] [**2 hours**] [**3 hours**] <**Insert requirement**>.
5. Temperature-Rise Rating: [**450 deg F (250 deg C) at the end of 30 minutes**] [**250 deg F (139 deg C) at the end of 30 minutes**].
6. Uncoated Steel Sheet for Door: [**Nominal 0.036 inch (0.91 mm), 20 gage**] <**Insert thickness**>.

    a. Finish: [**Factory prime**] [**Factory finish**].

7. Metallic-Coated Steel Sheet for Door: [**Nominal 0.040 inch (1.02 mm), 20 gage**] <**Insert thickness**>.

    a. Finish: [**Factory prime**] [**Factory finish**].

8. Stainless-Steel Sheet for Door: [**Nominal 0.038 inch (0.95 mm), 20 gage**] <**Insert thickness**>.

    a. Finish: [**No. 4**] [**No. 2b**].

9. Frame Material: [**Same material, thickness, and finish as door**] <**Insert material, thickness, finish**>.
10. Hinges: [**Manufacturer's standard**] <**Insert hinge type**>.

11. Hardware: [**Latch**] [**Lock**].

N. Hardware:

1. Latch: [**Cam latch**] [**Slam latch**] [**Self-latching bolt**] <**Insert latch**> operated [**by screwdriver**] [**by knurled knob**] [**by hex-head wrench**] [**by pinned-hex-head wrench**] [**by spanner-head wrench**] [**by flush key**] [**by ring turn**] [**as shown on Drawings**] [**as indicated in schedule**] <**Insert operator**> [**with interior release**].
2. Lock: [**Cylinder**] [**Mortise cylinder**] [**As shown on Drawings**] [**As indicated in schedule**] <**Insert lock**>.

a. Lock Preparation: Prepare door panel to accept cylinder specified in Division 08 Section "[**Door Hardware**] [**Door Hardware (Descriptive Specification)**]."

2.3 FLOOR ACCESS DOORS AND FRAMES

A. Manufacturers: Subject to compliance with requirements, [**provide products by the following**] [**provide products by one of the following**] [**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 product indicated or comparable product by one of the following:

1. Acudor Products, Inc.
2. Babcock-Davis.
3. Bilco Company (The).
4. Cendrex Inc.
5. Dur-Red Products.
6. Halliday Products.
7. Jensen Industries; Div. of Broan-Nutone, LLC.
8. Karp Associates, Inc.
9. Maxam Metal Products Limited.
10. Metropolitan Door Industries Corp.
11. MIFAB, Inc.
12. Milcor Inc.
13. Nystrom, Inc.
14. U.S.F. Fabrication.
15. Williams Bros. Corporation of America (The).
16. <**Insert manufacturer's name**>.

C. Floor Doors, General: Equip each door with adjustable counterbalancing springs, heavy-duty hold-open arm that automatically locks door open at 90 degrees, release handle with red vinyl grip that allows for one-handed closure, and recessed lift handle.

D. Aluminum Floor Door: [**Single**] [**Double**]-leaf opening. Extruded-aluminum angle frame with 1/4-inch- (6.4-mm-) thick, diamond-pattern, aluminum tread plate door; nonwatertight; loading capacity to support [**150-lbf/sq. ft. (7.2-kN/sq. m) pedestrian live load**] [**300-lbf/sq. ft. (14.4-kN/sq. m) pedestrian live load**] [**AASHTO H20 concentrated wheel load, without impact**].

E. Watertight Aluminum Floor Door: [**Single**] [**Double**]-leaf opening. Extruded-aluminum gutter frame with NPS 1-1/2 (DN 40) drainage coupling and 1/4-inch- (6.4-mm-) thick, diamond-pattern, aluminum tread plate door; watertight; loading capacity to support [**150-lbf/sq. ft. (7.2-kN/sq. m) pedestrian live load**] [**300-lbf/sq. ft. (14.4-kN/sq. m) pedestrian live load**] [**AASHTO H20 concentrated wheel load, without impact**].

F. Steel Angle-Frame Floor Door: [**Single**] [**Double**]-leaf opening. [**Prime-painted structural**] [**Galvanized structural**] [**Stainless**]-steel frame with [**3/16- or 1/4-inch- (4.8- or 6.4-mm-)**] [**3/16-inch- (4.8-mm-)**] [**1/4-inch- (6.4-mm-)**] thick, diamond-pattern, [**prime-painted structural**] [**galvanized structural**] [**stainless**]-steel tread plate door; nonwatertight; loading capacity to support [**150-lbf/sq. ft. (7.2-kN/sq. m) pedestrian live**] [**300-lbf/sq. ft. (14.4-kN/sq. m) pedestrian live**] [**AASHTO H20 concentrated wheel**] load.

1. Fire-Resistance Rating: Not less than [**that indicated**] [**that of adjacent construction**] [**45 minutes**] [**1 hour**] [**1-1/2 hours**] [**2 hours**] [**3 hours**] <**Insert requirement**>.

    a. Finish: Yellow with wording "FIRE DOOR - DO NOT STORE MATERIALS ON SURFACE."

G. Watertight Steel Gutter-Frame Floor Door: [**Single**] [**Double**]-leaf opening. [**Prime-painted structural**] [**Galvanized structural**] [**Stainless**]-steel channel frame forming gutter with NPS 1-1/2 (DN 40) drainage coupling and [**3/16- or 1/4-inch- (4.8- or 6.4-mm-)**] [**3/16-inch- (4.8-mm-)**] [**1/4-inch- (6.4-mm-)**] thick, diamond-pattern, [**prime-painted structural**] [**galvanized structural**] [**stainless**]-steel tread plate door; watertight; loading capacity to support [**150-lbf/sq. ft. (7.2-kN/sq. m) pedestrian live**] [**300-lbf/sq. ft. (14.4-kN/sq. m) pedestrian live**] [**AASHTO H20 concentrated wheel**] load.

1. Fire-Resistance Rating: Not less than [**that indicated**] [**that of adjacent construction**] [**45 minutes**] [**1 hour**] [**1-1/2 hours**] [**2 hours**] [**3 hours**] <**Insert requirement**>.

    a. Finish: Yellow with wording "FIRE DOOR - DO NOT STORE MATERIALS ON SURFACE."

H. Hardware: Provide the following:

1. Hinges: Heavy-duty, [**zinc-coated steel**] [**aluminum**] [**stainless-steel**] [**brass**] butt hinges with stainless-steel pins.
2. Latch: Stainless-steel slam latch.
3. Lock: [**Staple for a padlock**] [**Recessed hasp**] [**Keyed deadbolt lock**] [**Hasp and staple**].
4. Hardware Material: [**Manufacturer's standard**] [**Stainless steel, including latch and lifting mechanism assemblies, hold-open arms, and all brackets, hinges, pins, and fasteners**].

I. Insulation: [**Fiberglass**] [**Urethane**] with liner pan.

J. Safety Accessories: Safety [**chains**] [**net**] [**railing**].

2.4 MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

C. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.

D. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

E. Rolled-Stainless-Steel Floor Plate: ASTM A 793, manufacturer's standard finish.

F. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, [**Type 304**] [**Type 316**]. Remove tool and die marks and stretch lines or blend into finish.

G. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T6.

H. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.

I. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than strength and durability properties of Alloy 5005-H15; with minimum sheet thickness according to ANSI H35.2 (ANSI H35.2M).

J. Frame Anchors: Same type as door face.

K. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.5 FABRICATION

A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.

1. For concealed flanges with drywall bead, provide edge trim for [**gypsum board**] [**and**] [**gypsum base**] securely attached to perimeter of frames.
2. For concealed flanges with plaster bead for full-bed plaster applications, provide zinc-coated expanded metal lath and exposed casing bead welded to perimeter of frames.
3. Provide mounting holes in frames for attachment of units to metal or wood framing.

4. Provide mounting holes in frame for attachment of masonry anchors.

D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling.

1. For recessed doors with plaster infill, provide self-furring expanded metal lath attached to door panel.

E. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

1. For cylinder locks, furnish two keys per lock and key all locks alike.
2. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.

F. Extruded Aluminum: After fabrication, apply manufacturer's standard protective coating on aluminum that will come in contact with concrete.

2.6 FINISHES

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.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Steel and Metallic-Coated-Steel Finishes:

1. Factory Prime: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
2. Factory Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry-film thickness of 1 mil (0.025 mm) for topcoat.

E. Stainless-Steel Finishes:

1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

a. Run grain of directional finishes with long dimension of each piece.
b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
c. Directional Satin Finish: No. 4.

3. Bright, Cold-Rolled, Unpolished Finish: No. 2B.

F. Aluminum Finishes:

1. Mill finish.
2. Clear Anodic Finish: AAMA 611, [**AA-M12C22A41, Class I, 0.018 mm**] [**AA-M12C22A31, Class II, 0.010 mm**] or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.3 ADJUSTING

A. Adjust doors and hardware, after installation, for proper operation.

B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 083113

SECTION 085113 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes operable aluminum-framed windows for exterior locations.

1.2 PERFORMANCE REQUIREMENTS

A. General Performance: Aluminum-framed systems shall withstand the effects of performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction.

B. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

1.3 SUBMITTALS

A. Door & window schedule.

B. Product Data: For each type of product part of the complete system(s).

C. Shop Drawings or Manufacturer’s Standard Details: For aluminum-framed systems. Include plans, elevations, sections, details, hardware, and attachments to other work.

D. Maintenance data.

E. Calculations: Prepare calculations in compliance with current design rules of AA, AISC, AISI, and ACI. Include analysis for wind and dead load on framing members, anchors, and concrete inserts. Show section property computations for framing members. Show vertical and horizontal loads on curbs and other supports. Existing test reports will be acceptable substitute for calculations. Calculations shall be signed and sealed by a California-licensed professional engineer.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Preinstallation Conference: Conduct conference at Project site.

C. Warranty:
   1. Special assembly warranty: Manufacturer standard form in which manufacturer agrees to repair or replace components of glazed aluminum assemblies that do not comply with requirements or that deteriorate as defined in this Section within specified warranty period. Repair or replace, when repairs are acceptable to the Owner, defective materials and workmanship during the warranty period at no cost to the Owner. Failures include, but are not limited to, the following:
      a. Penetration of water into the building thru glazed aluminum assemblies.
      b. Air infiltration exceeding specified limits.
      c. Structural failure of components resulting from forces within specified limits.
      d. Discoloration or fading, excessive non-uniformity, pitting, cracking, peeling, or crazing of finish or corrosion.
      e. Failure to fulfill other specified performance requirements.
      f. Failure of operating parts to function normally.
   2. other trades.

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify aluminum window openings by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

C. Basis-of-Design Product: Subject to compliance with requirements, provide [**the product indicated on Drawings**] <**Insert manufacturer's name; product name or designation**> or a comparable product by one of the following:

   1. All Seasons Windows & Doors; All Seasons Commercial Division, Inc.
   2. Boyd Aluminum Manufacturing.
   3. Custom Window Company.
   4. DeSCo Windows.
   5. EFCO Corporation.
   6. EXTECH Exterior Technologies, Inc.
   7. Fleetwood Aluminum Products, Inc.
   8. Gerkin Windows and Doors.
   9. Graham Architectural Products Corp.
   10. Kawneer; an Alcoa Company.
   11. Mannix; a division of Interstate Window Corp.
   12. Peerless Products Inc.

13. Thermal Windows, Inc.
14. TRACO.
15. Wausau Window and Wall Systems.
16. Winco Window Company.
17. Window Technologies, Inc.; Century Manufacturing, Inc.
18. YKK AP America Inc.
19. <**Insert manufacturer's name.**>

2.2 MATERIALS

A. Aluminum Extrusions: Alloy and temper recommended by aluminum window manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi (150-MPa) ultimate tensile strength, not less than 16,000-psi (110-MPa) minimum yield strength, and not less than 0.062-inch (1.6-mm) thickness at any location for the main frame and sash members.

B. Fasteners: Aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum window members, trim, hardware, anchors, and other components.

1. Reinforcement: Where fasteners screw anchor into aluminum less than 0.125 inch (3.2 mm) thick, reinforce interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard, noncorrosive, pressed-in, splined grommet nuts.
2. Exposed Fasteners: Unless unavoidable for applying hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.

C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.

D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.

E. Compression-Type Weather Stripping: Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action and for complete concealment when aluminum window is closed.

1. Weather-Stripping Material: Elastomeric cellular preformed gaskets complying with ASTM C 509.
2. Weather-Stripping Material: Dense elastomeric gaskets complying with ASTM C 864.
3. Weather-Stripping Material: Manufacturer's standard system and materials complying with AAMA/WDMA 101/I.S.2/NAFS.

F. Sliding-Type Weather Stripping: Provide woven-pile weather stripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric. Comply with AAMA 701/702.

1. Weather Seals: Provide weather stripping with integral barrier fin or fins of semirigid, polypropylene sheet or polypropylene-coated material. Comply with AAMA 701/702.

G. Replaceable Weather Seals: Comply with AAMA 701/702.

H. Sealant: For sealants required within fabricated windows, provide window manufacturer's standard, permanently elastic, nonshrinking, and nonmigrating type recommended by sealant manufacturer for joint size and movement.

2.3 WINDOW <**Insert drawing designation**>

A. Window Type: [**Casement**] [**Double hung**] [**Dual action**] [**Fixed**] [**Horizontal sliding**] [**Projected**] [**Projected awning**] [**Single hung**] [**Top-hinged inswinging**] [**Vertically pivoted**] [**As indicated on Drawings**] [**As indicated in a schedule**] <**Insert window type**>.

B. AAMA/WDMA Performance Requirements: Provide aluminum windows of performance indicated that comply with AAMA/WDMA 101/I.S.2/NAFS[**unless more stringent performance requirements are indicated**].

1. Performance Class and Grade: R[**15**] [**20**] [**25**] <**Insert grade**>.
2. Performance Class and Grade: LC[**25**] [**30**] [**35**] <**Insert grade**>.
3. Performance Class and Grade: C[**30**] [**35**] [**40**] <**Insert grade**>.
4. Performance Class and Grade: HC[**40**] [**45**] [**50**] <**Insert grade**>.
5. Performance Class and Grade: AW[**40**] [**45**] [**50**] <**Insert grade**>.
6. Performance Class and Grade: As indicated.
7. Performance Class: [**R**] [**LC**] [**C**] [**HC**] [**AW**].

C. Condensation-Resistance Factor (CRF): Provide aluminum windows tested for thermal performance according to AAMA 1503, showing a CRF of [**45**] [**52**] <**Insert value**>.

D. Thermal Transmittance: Provide aluminum windows with a whole-window, U-factor maximum indicated at 15-mph (24-km/h) exterior wind velocity and winter condition temperatures when tested according to [**AAMA 1503**] [**ASTM E 1423**] [**NFRC 100**].

1. U-Factor: [**0.35 Btu/sq. ft. x h x deg F (2.0 W/sq. m x K)**] [**0.40 Btu/sq. ft. x h x deg F (2.3 W/sq. m x K)**] [**0.43 Btu/sq. ft. x h x deg F (2.5 W/sq. m x K)**] [**0.60 Btu/sq. ft. x h x deg F (3.4 W/sq. m x K)**] <**Insert value appropriate to system of measure**> or less.

E. Solar Heat-Gain Coefficient (SHGC): Provide aluminum windows with a whole-window SHGC maximum of [**0.40**] [**0.50**] [**0.55**] <**Insert value**>, determined according to NFRC 200 procedures.

F. Sound Transmission Class (STC): Provide glazed windows rated for not less than [**26**] [**30**] [**35**] <**Insert rating**> STC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 413.

G. Air Infiltration: Maximum rate not more than indicated when tested according to AAMA/WDMA 101/I.S.2/NAFS, Air Infiltration Test.

1. Maximum Rate: 0.3 cfm/sq. ft. (5 cu. m/h x sq. m) of area at an inward test pressure of 1.57 lbf/sq. ft. (75 Pa).
2. Maximum Rate: 0.3 cfm/sq. ft. (5 cu. m/h x sq. m) of area at an inward test pressure of 6.24 lbf/sq. ft. (300 Pa).
3. Maximum Rate: 0.1 cfm/sq. ft. (2 cu. m/h x sq. m) of area at an inward test pressure of 6.24 lbf/sq. ft. (300 Pa).
4. Maximum Rate: <**Insert rate and test pressure.**>

H. Water Resistance: No water leakage as defined in AAMA/WDMA referenced test methods at a water test pressure equaling that indicated, when tested according to AAMA/WDMA 101/I.S.2/NAFS, Water Resistance Test.

1. Test Pressure: 15 percent of positive design pressure, but not less than 2.86 lbf/sq. ft. (140 Pa) or more than 15 lbf/sq. ft. (720 Pa).
2. Test Pressure: 20 percent of positive design pressure, but not more than 15 lbf/sq. ft. (720 Pa).
3. Test Pressure: <**Insert percent and pressure.**>

I. Forced-Entry Resistance: Comply with Performance Grade [**10**] [**20**] [**30**] [**40**] requirements when tested according to ASTM F 588.

J. Life-Cycle Testing: Test according to AAMA 910 and comply with AAMA/WDMA 101/I.S.2/NAFS.

K. Operating Force and Auxiliary (Durability) Tests: Comply with AAMA/WDMA 101/I.S.2/NAFS for operating window types indicated.

2.4 GLAZING

A. Glass and Glazing Materials: Refer to Division 08 Section "Glazing" for glass units and glazing requirements applicable to glazed aluminum window units.

B. Glass <**Insert drawing designation**>: [**Clear, insulating-glass units**] [**Clear, insulating-glass units, with low-E coating pyrolytic on second surface or sputtered on second or third surface,**] [**Clear, insulating-glass units, argon gas filled, with low-E coating pyrolytic on second surface or sputtered on second or third surface,**] <**Insert glass type, description, and performance requirements**> complying with Division 08 Section "Glazing."

C. Glazing System: [**Manufacturer's standard factory-glazing system that produces weathertight seal.**] [**Manufacturer's standard factory-glazing system that produces weathertight seal and complies with requirements for windborne-debris resistance.**] [**Manufacturer's standard factory-glazing system as indicated in Division 08 Section "Glazing."**] <**Insert glazing requirements.**>

D. Dual-Action Windows: Provide pivoting unit for double glazing, constructed of one sheet of glass in a removable sash for access to interior of unit, installed with airtight gaskets.

2.5 HARDWARE

A. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely lock aluminum windows, and sized to accommodate sash or ventilator weight and dimensions. Do not use aluminum in frictional contact with other metals. Where exposed, provide [**solid bronze**] [**extruded, cast, or wrought aluminum**] [**die-cast zinc with special coating finish**] [**or**] [**nonmagnetic stainless steel**].

B. Counterbalancing Mechanism: Comply with AAMA 902.

1. Sash Balance: Concealed, [**tape-spring type**] [**spiral-tube type**] [**spring-loaded, block-and-tackle type**] [**ultralift spring type capable of lifting 70 percent of sash weight**], of size and capacity to hold sash stationary at any open position.

C. Sill Cap/Track: [**Extruded-aluminum track with natural anodized finish**] [**Rigid PVC or other weather-resistant plastic track with manufacturer's standard integral color**], of thickness, dimensions, and profile indicated; designed to comply with performance requirements indicated and to drain to the exterior.

D. Locks and Latches: Designed to allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only.

E. Roller Assemblies: Low-friction design.

F. Push-Bar Operators: Provide telescoping-type, push-bar operator designed to open and close ventilators with fixed screens.

G. Gear-Type Rotary Operators: Comply with AAMA 901 when tested according to ASTM E 405, Method A.

1. Operation Function: All ventilators move simultaneously and securely close at both jambs without using additional manually controlled locking devices.

H. Four- or Six-Bar Friction Hinges: Comply with AAMA 904.

1. Locking mechanism and handles for manual operation.
2. Friction Shoes: Provide friction shoes of nylon or other nonabrasive, nonstaining, noncorrosive, durable material.

I. Limit Devices: Provide limit devices designed to restrict sash or ventilator opening.

1. Safety Devices: Limit clear opening to [**4 inches (100 mm)**] [**6 inches (150 mm)**] <**Insert dimension**> for ventilation; with custodial key release.

J. Pole Operators: Tubular-shaped anodized aluminum; with rubber-capped lower end and standard push-pull hook at top to match hardware design; of sufficient length to operate window without reaching more than 60 inches (1500 mm) above floor; 1 pole operator and pole hanger per room that has operable windows more than 72 inches (1800 mm) above floor.

K. Casement Windows: Provide the following operating hardware:

1. Operator: [**Gear-type rotary single-arm operator located on jamb at sill**] [**Gear-type rotary dual-arm operator located on jamb at sill**] <**Insert requirements**>.

   a. Rating: Provide rotary operator rated [**C-R15**] [**C-C20**] [**C-HC40**] according to AAMA 901.
   b. Handle: [**Standard crank**] [**Folding crank**] [**Removable crank**] [**Knob**] [**T-handle**] <**Insert type**>.

2. Hinge: Extension hinge or pivot, nonfriction type.
3. Hinge: Heavy-duty, [**three**] [**five**]-knuckle butt hinge with nylon bushings.
4. Hinge: [**Standard**] [**Heavy**]-duty, concealed, four- or six-bar friction hinge with adjustable-slide friction shoe; designed to permit ventilator operation for inside cleaning of outside glass face; two per ventilator.
5. Hinge: [**Standard**] [**Heavy**]-duty, concealed, four- or six-bar friction egress hinge with adjustable-slide friction shoe; designed to achieve 90-degree ventilator opening[**and to permit ventilator operation for inside cleaning of outside glass face**]; two per ventilator.
6. Lock: Lift-type throw, cam-action lock with keeper; [**one**] [**two**] <**Insert number**> per ventilator.
7. Lock: Combination lever handle and cam-action lock with keeper; [**one**] [**two**] <**Insert number**> per ventilator.
8. Lock: Combination dual lever handles, tie rod, and cam-action lock with keepers.
9. Lock: Key-operated custodial lock and keeper with removable handle; [**one**] [**two**] <**Insert number**> per ventilator.
10. Lock: Concealed multipoint lock operated by single lever handle or lift-type throw; [**three**] <**Insert number**> per ventilator.
11. Lock: <**Insert requirements.**>
12. Limit Device: Concealed [**friction adjustor, adjustable stay bar**] [**or**] [**support arms with adjustable, limited, hold-open**] limit device.

L. [**Double**] [**Single**]-Hung Windows: Provide the following operating hardware:

1. Sash Balances: Two per sash.
2. Handles: Applied sash [**lift bar**] [**pull-downs**] on bottom rail of forward-placed operating sash; two per sash.
3. Handle: Continuous, integral, sash [**lift bar**] [**pull-down**] on bottom rail of forward-placed operating sash.
4. Sash Lock: Cam-action sweep lock and keeper on meeting rail; [**one**] [**two**] <**Insert number**> per sash.
5. Sash Lock: Spring-loaded, snap-type lock on bottom rail of lower sash; two per sash.
6. Sash Lock: Spring-loaded plunger lock with keeper on meeting rail of lower sash; two per sash.
7. Sash Lock: Pole-operated, cam-action lock on meeting rail of windows with meeting rail more than 72 inches (1800 mm) above floor; with keeper.
8. Sash Lock: <**Insert requirements.**>
9. Pole Socket: Provide a pole socket or groove on inside face of top rail of [**upper**] [**lower**] sash on windows with meeting rails more than 72 inches (1800 mm) above floor.

10. Limit Device: [**Sash stop**] [**Keyed sash**] limit device; for [**top**] [**bottom**] [**each operable**] sash located at jamb; [**one**] [**two**] per sash.
11. Removable Lift-Out Sash: Design windows and provide with[**tamperproof, key-operated**] hardware to permit removal of sash from inside for cleaning.
12. Tilt Lock: Design windows and provide with[**tamperproof, key-operated**] tilt latch and pivot bar hardware to permit tilting of sash inward for cleaning both sides of sash from interior.

M. Dual-Action Windows: Provide the following operating hardware:

1. Operator: Two-position, combination lever handle and cam-type latch.
2. Operator: Concealed, internal, multipoint locking bar and combination locking handle mechanism.
3. Hinge: Combination [**three-knuckle**] [**five-knuckle butt**] hinge and stay bar.
4. Lock: Key-operated, [**concealed**] [**exposed**] custodial lock.
5. Stabilizing Arm: Aluminum.

N. Horizontal-Sliding Windows: Provide the following operating hardware:

1. Sash Rollers: [**Nylon rollers**] [**Steel, lubricated ball-bearing rollers with nylon tires**] [**Stainless-steel, lubricated ball-bearing rollers with nylon tires**].
2. Sash Lock: Cam-action sweep sash lock and keeper at meeting rails.
3. Sash Lock: Spring-loaded, snap-type lock at jambs; two per sash.
4. Sash Lock: Spring-loaded plunger lock with keeper on meeting rail; two per sash.
5. Sash Lock: <**Insert requirements.**>
6. Limit Device: Sash stop limit device; mounted in bottom of pull stile.
7. Removable Lift-Out Sash: Design windows and provide with[**tamperproof, key-operated**] hardware to permit removal of sash from inside for cleaning.

O. Projected Windows: Provide the following operating hardware:

1. Operator: [**Underscreen push-bar**] [**Underscreen pivot-shoe-type, gear-type rotary operator**] <**Insert requirements**>.
2. Hinge: Five-knuckle butt hinge.
3. Hinge: Concealed four- or six-bar friction hinge with adjustable-slide friction shoe; two per ventilator.
4. Lock: Cam-action, sweep lock handle with strike; [**one**] [**two**] <**Insert number**> per ventilator.
5. Lock: Combination lever handle and cam-action lock with concealed pawl and keeper.
6. Lock: Key-operated security lock and keeper.
7. Lock: Key-operated custodial lock and keeper with removable handle.
8. Lock: Pole-operated, [**spring-catch lock and keeper**] [**cam-action, sweep lock handle and strike**].
9. Lock: <**Insert requirements.**>
10. Limit Device: Concealed [**friction adjustor, adjustable stay bar**] [**or**] [**support arms with adjustable, limited, hold-open**] limit device; located on jamb of each ventilator.

P. Projected Awning Windows: Provide the following operating hardware:

1. Operator: [**Push-bar**] [**Lever**] [**Gear-type rotary**] operator located on jamb at sill.

a. Handle: [**Standard crank**] [**Folding crank**] [**Removable crank**] [**Knob**] [**T-handle**] <**Insert type**>.

2. Window-Operating System: Wall-mounted, group or gang-type window operating system with [**chain-wheel**] [**rotary crank-type**] [**electric**] operator.
3. Hinge: Concealed four- or six-bar friction hinge located on each jamb near top rail; two per ventilator.
4. Lock: Lift-type throw, cam-action lock with keeper; [**one**] [**two**] <**Insert number**> per ventilator.
5. Lock: Combination lever handle and cam-action lock with concealed pawl and keeper; [**one**] [**two**] per ventilator.
6. Lock: Pole-operated, [**combination handle and cam-action lock**] [**face-mounted transom latch**] and keeper.
7. Lock: Key-operated custodial lock with removable handle.
8. Lock: <**Insert requirements.**>
9. Limit Device: Concealed [**friction adjustor, adjustable stay bar**] [**or**] [**support arms with adjustable, limited, hold-open**] limit device; located on jamb of each ventilator.

Q. Top-Hinged Inswinging Windows: Provide the following operating hardware:

1. Hinge: Exposed, applied butt hinge located at corners; [**two**] [**three**] <**Insert number**> per ventilator.
2. Hinge: Exposed, applied continuous hinge.
3. Hinge: Concealed, applied pivot hinge located at corners; [**two**] [**three**] <**Insert number**> per ventilator.
4. Hinge: Continuous, integrally extruded hinge.
5. Hinge: Four- or six-bar friction hinge with adjustable-slide friction shoe; two per ventilator.
6. Lock: Internal, key-operated, limited-access locks located not more than 48 inches (1220 mm) o.c. at jambs and sill.
7. Lock: <**Insert requirements.**>
8. Hold-Open Device: Automatic-locking [**hold-open arms**] [**or**] [**stay bars**]; designed to permit sash operation for inside cleaning of outside glass face; two per ventilator.

R. Vertically Pivoted Windows: Provide the following operating hardware:

1. Pivot Assembly: [**Aluminum-alloy**] [**Manganese-bronze**] [**Stainless-steel**] pivot assembly designed for [**center**] [**off-center**] axis pivoting.
2. Lock: Internal, key-operated, limited-access lock; [**one**] [**two**] <**Insert number**> per jamb.
3. Lock: <**Insert requirements.**>
4. Limit device.

2.6 GROUP OR GANG-TYPE WINDOW OPERATING SYSTEMS

A. Provide window operating system of the type and in groups as indicated. Coordinate operating system design with window fabrication and hardware selection to ensure smooth, durable operation of ventilators.

B. Operation Function: All ventilators move simultaneously and securely close at sash frames without using additional manually controlled locking devices.

C. [**Rack-and-Pinion**] [**or**] [**Screw**]-Type Operating System: Complete with shafts, brackets, levers, rods, oil-encased gear boxes, and standard fittings and accessories for operation indicated.

D. Horizontal-Movement Operating System: Tension type; complete with mounting brackets, oil-encased gear boxes, steel rod or cable operating in conduit between sash operator units, and standard fittings and accessories for operation indicated.

E. Operation: Manual, with chain-wheel operator on each gear box shaft; with chain loops terminated 24 inches (600 mm) above floor.

F. Operation: Manual, with crank-type operator on each gear box shaft, with removable crank. Where necessary, extend crankshaft with universal joints and support brackets to a suitable crank-mounting location not more than 44 inches (1115 mm) above floor, with an oil-encased miter gear box.

G. Operation: Electric, with factory-assembled electric operator designed for operating windows of type, size, weight, construction, use, and operating frequency indicated.

1. Electric Operator: Provide operating system complying with NFPA 70; of size and capacity and with features, characteristics, and accessories suitable for Project conditions, recommended in writing by window manufacturer; complete with operating system indicated, electric motor and factory-prewired motor controls with limit switches,remote-remote-control stations, power disconnect switches, enclosures protecting controls and all operating parts, and accessories required for reliable operation. Include wiring from motor controls to motor. Coordinate operator wiring requirements and electrical characteristics with building electrical system.

a. Control Equipment: Comply with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6.
b. Electric Motor: Comply with NEMA MG 1; with thermal-overload protection; sized to start and operate size and weight of window sash ventilators under any conditions; one per each gear box shaft.

1) Motor Characteristics: Single phase, [**sized by electric operator manufacturer**] <**Insert horsepower**>, <**Insert voltage rating**>, 60 Hz.

c. Remote Controls: Electric controls with NEMA ICS 6, Type 1 enclosure and [**momentary-contact, single push-button-operated control**] [**three-position, push-button-operated control with open, close, and stop functions**] <**Insert control type and function**>.
d. Limit Switches: Adjustable switches, interlocked with motor controls and set to automatically stop sash ventilators at fully opened and fully closed positions.

2.7 INSECT SCREENS

A. General: Design windows and hardware to accommodate screens in a tight-fitting, removable arrangement, with a minimum of exposed fasteners and latches. Fabricate insect screens to fully integrate with window frame. Locate screens on [**inside**] [**outside**] of window and provide for each operable exterior sash or ventilator.

1. Aluminum Tubular Frame Screens: Comply with SMA 1004, "Specifications for Aluminum Tubular Frame Screens for Windows," [**Residential R-20**] [**Architectural C-24**] [**Monumental M-32**] class.
2. Comply with SMA 1004, "Specifications for Aluminum Tubular Frame Screens for Windows," for minimum standards of appearance, fabrication, attachment of screen fabric, hardware, and accessories unless more stringent requirements are indicated.

B. Stainless-Steel Insect Screen Frames: Fabricate frames of nonmagnetic stainless-steel members of 0.020-inch (0.5-mm) minimum wall thickness, with mitered or coped joints or corner extrusions, concealed fasteners, adjustable rollers, and removable PVC spline/anchor concealing edge of frame. Finish frames with No. 2B, bright mill finish.

C. Aluminum Insect Screen Frames: Manufacturer's standard aluminum alloy complying with SMA 1004. Fabricate frames with mitered or coped joints or corner extrusions, concealed fasteners,[**adjustable rollers,**] and removable PVC spline/anchor concealing edge of frame.

1. Aluminum Tubular Framing Sections and Cross Braces: Roll formed from aluminum sheet with minimum wall thickness as required for class indicated.
2. Extruded-Aluminum or Aluminum Tubular Framing Sections and Cross Braces: Not less than [**0.040-inch (1.0-mm)**] [**0.050-inch (1.3-mm)**] <**Insert thickness**> wall thickness.
3. Finish: Match aluminum window members.
4. Finish: [**Anodized aluminum**] [**Baked-on organic coating**] <**Insert finish**> in manufacturer's standard color.
5. Finish: [**Anodized aluminum**] [**Baked-on organic coating**] <**Insert finish**> in color selected by Architect from manufacturer's full range.
6. Finish: Manufacturer's standard.

D. Glass-Fiber Mesh Fabric: [**18-by-14 (1.1-by-1.4-mm) or 18-by-16 (1.0-by-1.1-mm)**] [**20-by-20 (0.85-by-0.85-mm) or 20-by-30 (0.85-by-0.42-mm)**] <**Insert type**> mesh of PVC-coated, glass-fiber threads; woven and fused to form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration; in the following color. Comply with ASTM D 3656.

1. Mesh Color: [**Charcoal gray**] [**Silver gray**] [**Aquamarine**] <**Insert color**>.

E. Aluminum Wire Fabric: 18-by-16 (1.1-by-1.3-mm) mesh of 0.011-inch- (0.28-mm-) diameter, coated aluminum wire.

1. Wire-Fabric Finish: [**Natural bright**] [**Charcoal gray**] [**Black**] <**Insert finish**>.

F. Copper Wire Fabric: 16-by-16 (1.3-by-1.3-mm) mesh of 0.011-inch- (0.28-mm-) diameter copper wire.

G. Bronze Wire Fabric: [**18-by-14 (1.2-by-1.6-mm) mesh of 0.009-inch- (0.23-mm-)**] [**18-by-14 (1.13-by-1.5-mm) mesh of 0.011-inch- (0.28-mm-)**] diameter bronze wire with a clear varnish finish.

H. Stainless-Steel Wire Fabric: [**18-by-14 (1.2-by-1.6-mm) mesh of 0.009-inch- (0.23-mm-)**] [**18-by-16 (1.2-by-1.4-mm) mesh of 0.009-inch- (0.23-mm-)**] [**18-by-16 (1.13-by-1.3-mm) mesh of 0.011-inch- (0.28-mm-)**] diameter, nonmagnetic stainless-steel wire, Type 304 or 316, complying with FS RR-W-365, Type VI.

I. Solar-Screening Mesh Fabric: [**17-by-15 (0.86-by-1.1-mm)**] [**40-by-40 (0.3-by-0.3-mm)**] <**Insert mesh designation (opening dimension)**> mesh of PVC-coated, glass-fiber threads; woven and fused to form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration. Comply with ASTM D 3656.

1. Solar-Optical Properties: <**Insert requirements.**>
2. Openness Factor: <**Insert percent openness.**>
3. Mesh Color: <**Insert color.**>

J. Wickets: Provide [**sliding**] [**or**] [**hinged**] wickets, framed and trimmed for a tight fit and for durability during handling.

2.8 ACCESSORIES

A. Integral Ventilating System/Device: Where indicated, provide weather-stripped, adjustable, horizontal fresh-air vent, with a free airflow slot, full width of window sash by approximately [**1 inch (25 mm)**] [**3 inches (75 mm)**] when open, complying with AAMA/WDMA 101/I.S.2/NAFS. Equip vent bar with an integral insect screen, removable for cleaning.

B. Window Cleaner Anchor Bolts: Provide window cleaner anchor bolts of standard design, complying with requirements of authorities having jurisdiction. Fabricate bolts of nonmagnetic stainless steel.

1. Reinforce window units or mullions to receive bolts and provide additional anchorage of units at bolt locations.

C. Integral Louver Blinds: Provide remotely operated horizontal louver blinds in the space between two panes of glass. Construct blinds of aluminum slats, approximately 1 inch (25 mm) wide, with polyester fiber cords, equipped for tilting, raising, and lowering by standard operating hardware located on inside face of sash.

D. Exterior Louver Units: Manually adjustable, extruded-aluminum, solar-shade louver units; of type recommended by manufacturer for application over operable or fixed windows. Provide main extrusion members of 0.062-inch (1.6-mm) minimum wall thickness.

1. Operator: Crank-type gang operator, operable from inside building, designed to rotate louver blades simultaneously at least 80 degrees and to lock units in closed position; one operator per each louver unit. Form unit framing or mounting without interfering with insect screens.

2.9 FABRICATION

A. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.

B. Fabricate aluminum windows that are reglazable without dismantling sash or ventilator framing.

C. Thermally Improved Construction: Fabricate aluminum windows with an integral, concealed, low-conductance thermal barrier; located between exterior materials and window members exposed on interior side; in a manner that eliminates direct metal-to-metal contact.

1. Provide thermal-break construction that has been in use for not less than three years and has been tested to demonstrate resistance to thermal conductance and condensation and to show adequate strength and security of glass retention.
2. Provide thermal barriers tested according to AAMA 505; determine the allowable design shear flow per the appendix in AAMA 505.
3. Provide hardware with low conductivity or nonmetallic material for hardware bridging thermal breaks at frame or vent sash.

D. Weather Stripping: Provide full-perimeter weather stripping for each operable sash and ventilator.

1. Horizontal-Sliding Windows: Provide operable sash with a double row of sliding weather stripping in horizontal rails and single- or double-row weather stripping in meeting or jamb stiles, as required to meet specified performance requirements. Provide compression-type weather stripping at perimeter of each movable panel where sliding-type weather stripping is not appropriate.
2. Vertically Pivoted Windows: Provide double-row weather stripping.

E. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.

F. Provide water-shed members above side-hinged ventilators and similar lines of natural water penetration.

G. Mullions: Provide mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of window units.

H. Subframes: Provide subframes with anchors for window units as shown, of profile and dimensions indicated but not less than 0.062-inch- (1.6-mm-) thick extruded aluminum. Miter or cope corners, and weld and dress smooth with concealed mechanical joint fasteners. Finish to match window units. Provide subframes capable of withstanding design loads of window units.

I. Factory-Glazed Fabrication: Glaze aluminum windows in the factory where practical and possible for applications indicated. Comply with requirements in Division 08 Section "Glazing" and with AAMA/WDMA 101/I.S.2/NAFS.

J. Glazing Stops: Provide snap-on glazing stops coordinated with Division 08 Section "Glazing" and glazing system indicated. Provide glazing stops to match sash and ventilator frames.

2.10 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

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.

2.11 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.

C. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

D. Class II, Color Anodic Finish: AA-M12C22A32/A34 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, integrally colored or electrolytically deposited color coating 0.010 mm or thicker) complying with AAMA 611.

E. Class I, Color Anodic Finish: AA-M12C22A42/A44 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.

1. Color: [**Light bronze**] [**Medium bronze**] [**Dark bronze**] [**Black**].
2. Color: [**Match Architect's sample**] [**As selected by Architect from full range of industry colors and color densities**].

F. Baked-Enamel Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Apply baked enamel complying with paint manufacturer's written instructions for cleaning, conversion coating, and painting.

1. Organic Coating: Thermosetting, modified-acrylic or polyester enamel primer/topcoat system complying with AAMA 2603[**, except with a minimum dry film thickness of 1.5 mils (0.04 mm),**] medium gloss.
2. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**].

G. High-Performance Organic Finish (2-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than [**50**] [**70**] percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with [**AAMA 2604**] [**AAMA 2605**] and with coating and resin manufacturers' written instructions.

H. High-Performance Organic Finish (3-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coatings; Organic Coating: manufacturer's standard 3-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2605 and with coating and resin manufacturers' written instructions.

1. Color and Gloss: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**].

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate, [**accurate locations of connections to building electrical system;**] and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weathertight window installation.

1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
2. Wood Frame Walls: Dry, clean, sound, well nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within 3 inches (76 mm) of opening.
3. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.

B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

C. Set sill members in bed of sealant or with gaskets, as indicated, for weathertight construction.

D. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.

E. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

F. Connect automatic operators to building electrical system.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: [**Owner will engage**] [**Engage**] a qualified testing agency to perform tests and inspections and prepare test reports.

1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.

B. Testing Services: Testing and inspecting of installed windows shall take place as follows:

1. Testing Methodology: Testing of windows for air infiltration and water resistance shall be performed according to AAMA 502, Test Method [**A**] [**B**], by applying same test pressures required to determine compliance with AAMA/WDMA 101/I.S.2/NAFS in Part 1 "Performance Requirements" Article.
2. Testing Extent: [**Three**] [**Three mockup**] <**Insert number or description**> windows as selected by Architect and a qualified independent testing and inspecting agency. Windows shall be tested immediately after installation.
3. Test Reports: Shall be prepared according to AAMA 502.

C. Remove and replace noncomplying aluminum window and retest as specified above.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.4 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust operating sashes and ventilators, screens, hardware, [**operators,**]and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.

B. Clean aluminum surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

C. Clean factory-glazed glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.

D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

E. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain window operating system. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION 085113

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes general requirements for door hardware.

1.2 SUBMITTALS

A. Product Data cut sheets and Warranty: For each type of product.

B. Door Hardware Schedule: Identified by door number, location, and type. Include, at the minimum, the following information as applicable: manufacturer, product name, hinges, levers, hand, plates, locks and cylinder types, strikes, finishes, accessories, and keying.

C. Shop Drawings: Details of electrified door hardware.

1.3 QUALITY ASSURANCE

A. Comply with ADA California Title 24 Chapters 11B. Where different requirements are presented, comply with the most restrictive requirement. Notify architect immediately of any potential conflict.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.

1.5 COORDINATION

A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete. Retain first paragraph below for factory-prepared doors and frames.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

E. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Three years from date of Substantial Completion, unless otherwise indicated.

PART 2 - PRODUCTS

2.1 FINISH OF HARDWARE

A. The finish of all hardware shall be as specified in the hardware groups. BHMA designation indicates base metal as well as finish.

B. Special care shall be taken to coordinate the finish of the various manufacturers to insure a uniform acceptable finish.

2.2 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, or brushed nickel finished
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.

2.3 LOCKS AND LATCHES, & LOCK CYLINDERS

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.

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. Backset: 2-3/4 inches, unless otherwise indicated.
D. Strikes: Manufacturer's standard strike with strike box for each latchbolt or lock bolt, with curved lip extended to protect frame, finished to match door hardware set.
E. Levers: At passage-type doorways, levers shall comply with California accessibility requirements.
F. Lock Functions: Comply with the following:
   1. Bored Locks: BHMA A156.2.
   2. Mortise Locks: BHMA A156.13.
G. All latchsets and locksets not specified as electronic locksets shall be Schlage commercial grade L-Series locksets (with Sparta levers), or approved equal.

2.4 LOCK CYLINDERS

A. Basis of Design:
   1. Schlage, ND Series, Omega 626 level, stainless steel accessories and trim or approved equal.
B. Function Type: ANSI # as indicated on Drawings on Door Schedule.
C. Manufacturer: Same manufacturer as for locks and latches.
D. Construction Keying: Comply with the following:
   1. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.

2.5 CLOSERS

A. Accessibility Requirements: Comply with the following maximum opening-force requirements:
   1. Interior, Hinged Doors: 5 lbf applied perpendicular to door.
   2. Sliding or Folding Doors: 5 lbf applied parallel to door at latch.
B. 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.
C. Type: Surface Closers, BHMA A156.4, Grade 1. Provide type of arm required for closer to be located on interior side of door.

2.6 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.
   2. Provide stops of proper height to engage doors
   3. Where specified floor stops present an obstruction hazard, furnish Glynn Johnson #410, #100 or #900 series overhead stop as conditions require.
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.

2.7 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.

2.8 EXIT DEVICES

A. Exit devices shall be constructed of architectural metals with a total projection of not more than 3-1/2” and without concealed vertical rods. Where required, surface vertical rods shall have smooth covers over bottom 11” for accessibility.

B. Where "Security Exit Devices" are specified they shall incorporate a solid bolt throw of 3/4” minimum. Security Exit Device's shall meet ANSI/BHMA A156.3 grade 1, types 1 & 28, and 4 & 28 inclusive (800 pound pull force at the bolt).

C. Outside trim, shall match that of the lockset trim as specified in this section and be "freewheeling" with “Night Latch Function”.

D. Products: Von Duprin’s “XP98/99 Exit Device” (Note “XP98/99-F at all fire rated openings); or approved equal.

2.9 PROTECTION PLATES

A. Unless otherwise specified in the Hardware Schedule, kick plates shall be .050 thick stainless steel, 10” high and 2” less than door width (LDW) for single doors and 1” less than door width for each leaf of a pair. Sizes of other types of plates shall be as specified in the Hardware Schedule.

2.10 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.

2.11 Kick Plates: 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.

2.12 ELECTRIFIED PANIC DEVICES

A. Electrified panic devices are to be low voltage with conduit and cabling to the hinge side of each door assembly. All cabling is to be concealed in doorframe (and/or window/wall) members typically.

2.13 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 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.

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.

C. Finishes: BHMA A156.18, as indicated in door hardware sets.

2.14 FINISHES

A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

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.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. 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.

B. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

C. 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.

3.3 ADJUSTING

A. Initial 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.

3.4 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

END OF SECTION 087100

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 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. Sloped glazing.
4. Skylights.

1.2 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**] [**ICC's 2003 International Building Code**] 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.

3. Design Snow Loads: <**Insert design snow load**> [**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.
5. Sloped Glazing: For glass surfaces sloped more than 15 degrees from vertical, design glass to resist each of the following combinations of loads:

    a. Outward design wind pressure minus the weight of the glass. Base design on glass type factors for short-duration load.
    b. Inward design wind pressure plus the weight of the glass plus half of the design snow load. Base design on glass type factors for short-duration load.
    c. Half of the inward design wind pressure plus the weight of the glass plus the design snow load. Base design on glass type factors for long-duration load.

6. Glass Type Factors for Wired, Patterned, and Sandblasted Glass:

    a. Short-Duration Glass Type Factor for Wired Glass: 0.5.
    b. Long-Duration Glass Type Factor for Wired Glass: 0.3.
    c. Short-Duration Glass Type Factor for Patterned Glass: 1.0.
    d. Long-Duration Glass Type Factor for Patterned Glass: 0.6.

e. Short-Duration Glass Type Factor for Sandblasted Glass: 0.5.

7. Thickness of Patterned Glass: Base design of patterned glass on thickness at thinnest part of the glass.
8. Probability of Breakage for Sloped Glazing: For glass surfaces sloped more than 15 degrees from vertical, design glass for a probability of breakage not greater than 0.001.
9. 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.
10. 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.

1.3 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.

1. Testing will not be required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
2. Use ASTM C 1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
3. Test no fewer than [**eight**] <**Insert number**> Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
4. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including the use of specially formulated primers.

1.4 SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. LEED Submittals:

1. Product Data for Credit EQ 4.1: For glazing sealants used inside of the weatherproofing system, including printed statement of VOC content.

C. Glass Samples: For each type of [**glass product other than clear monolithic vision glass**] [**the following products**]; 12 inches (300 mm) square.

1. Tinted glass.
2. Patterned glass.
3. Coated glass.
4. Wired glass.
5. Fire-resistive glazing products.

6. Laminated glass with colored interlayer.
7. Insulating glass.

D. Glazing Accessory Samples: For [**gaskets**] [**sealants**] [**and**] [**colored spacers**], in 12-inch (300-mm) lengths.[**Install sealant Samples between two strips of material representative in color of the adjoining framing system.**]

E. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

F. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

G. Qualification Data: For [**installers**] [**manufacturers of insulating-glass units with sputter-coated, low-e coatings**] [**glass testing agency**] [**and**] [**sealant testing agency**].

H. Product Certificates: For glass and glazing products, from manufacturer.

I. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for [**tinted glass**] [**coated glass**] [**insulating glass**] [**glazing sealants**] [**and**] [**glazing gaskets**].

1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.

J. Preconstruction adhesion and compatibility test report.

K. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved[**and certified**] 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. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

E. Source Limitations for Glass: Obtain [**ultraclear float glass**] [**tinted float glass**] [**coated float glass**] [**laminated glass**] [**and**] [**insulating glass**] from single source from single manufacturer for each glass type.

F. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

G. 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 "Laminated Glazing Reference Manual" and**]GANA's "Glazing Manual."
2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped Glazing Guidelines."
3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

H. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of [**the SGCC**] [**the SGCC or another certification agency acceptable to authorities having jurisdiction**] [**or**] [**the manufacturer**]. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

I. 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 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.

J. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

K. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Install glazing in mockups specified in Division 08 Section "[**Aluminum-Framed Entrances and Storefronts**] [**Aluminum Windows**] [**Glazed Aluminum Curtain Walls**] <**Insert Section title**>" to match glazing systems required for Project, including glazing methods.
2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

L. Preinstallation Conference: Conduct conference at [**Project site**] <**Insert location**>.

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review temporary protection requirements for glazing during and after installation.

1.6 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.

1.7 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).

1.8 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**] <**Insert number**> 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**] [**10**] <**Insert number**> 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.

1. Warranty Period: [**10**] <**Insert number**> years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 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.

1. Minimum Glass Thickness for Exterior Lites: Not less than [**6.0**] <**Insert thickness designation**> mm.
2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.

B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass[**as needed to comply with "Performance Requirements" Article**]. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass[**as needed to comply with "Performance Requirements" Article**]. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

C. Windborne-Debris-Impact Resistance: Provide exterior glazing that passes [**basic**] [**enhanced**]-protection testing requirements in ASTM E 1996 for [**Wind Zone 1**] [**Wind Zone 2**] [**Wind Zone 3**] [**Wind Zone 4**] when tested according to ASTM E 1886. Test specimens shall be no smaller in width and length than glazing indicated for use on the Project and shall be installed in same manner as glazing indicated for use on the Project.

1. Large-Missile Test: For glazing located within 30 feet (9.1 m) of grade.
2. Small-Missile Test: For glazing located more than 30 feet (9.1 m) above grade.
3. Large-Missile Test: For all glazing, regardless of height above grade.

D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites [**6.0 mm thick**] [**of thickness indicated**].
2. For laminated-glass lites, properties are based on products of construction indicated.
3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
4. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
5. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
6. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.2 GLASS PRODUCTS

A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.

B. Ultraclear Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I, complying with other requirements specified and with visible light transmission not less than 91 percent[**and solar heat gain coefficient not less than 0.87**].

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

   a. AFG Industries, Inc.; Krystal Klear.
   b. Guardian Industries Corp.; Ultrawhite.
   c. Pilkington North America; Optiwhite.
   d. PPG Industries, Inc.; Starphire.
   e. <**Insert manufacturer's name; product name or designation**>.

C. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
2. For uncoated glass, comply with requirements for Condition A.
3. For coated vision glass, comply with requirements for Condition C (other coated glass).

D. Pyrolytic-Coated, Self-Cleaning, Low-Maintenance Glass: Clear float glass with a coating on first surface having both photocatalytic and hydrophilic properties that act to loosen dirt and to cause water to sheet evenly over the glass instead of beading.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. AFG Industries, Inc.; Spotless Ti.
    b. Cardinal Glass Industries; LoE2 Plus.
    c. Pilkington North America; Activ.
    d. PPG Industries, Inc.; SunClean.
    e. <**Insert manufacturer's name; product name or designation**>.

E. Uncoated Tinted Float Glass: Class 2, complying with other requirements specified.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2. Basis-of-Design Product: Subject to compliance with requirements, provide <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

    a. <**Insert, in separate subparagraphs, manufacturer's name**>.

3. Tint Color: [**Blue**] [**Blue-green**] [**Bronze**] [**Green**] [**Gray**] <**Insert color**>.
4. Visible Light Transmittance: <**Insert value**> percent minimum.

F. Polished Wired Glass: ASTM C 1036, Type II, Class 1 (clear), Form 1, Quality-Q6, complying with ANSI Z97.1, Class C.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2. Mesh: [**M1 (diamond)**] [**M2 (square)**].

G. Film-Faced Polished Wired Glass: ASTM C 1036, Type II, Class 1 (clear), Form 1, Quality-Q6 and complying with testing requirements in 16 CFR 1201 for Category II materials.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2. Mesh: [**M1 (diamond)**] [**M2 (square)**].

H. Patterned Glass: ASTM C 1036, Type II, Class 1 (clear), Form 3; Quality-Q6, [**Finish F1 (patterned one side)**] [**Finish F2 (patterned both sides)**], [**Pattern P1 (linear)**] [**Pattern P2 (geometric)**] [**Pattern P3 (random)**] [**Pattern P4 (special)**].

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

I. Tempered Patterned Glass: ASTM C 1048, Kind FT (fully tempered), Type II, Class 1 (clear), Form 3; Quality-Q6, [**Finish F1 (patterned one side)**] [**Finish F2 (patterned both sides)**], [**Pattern P1 (linear)**] [**Pattern P2 (geometric)**] [**Pattern P3 (random)**] [**Pattern P4 (special)**].

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

J. Patterned Wired Glass: ASTM C 1036, Type II, Class 1 (clear), Form 2, Quality-Q6, [**Finish F1 (patterned one side)**] [**Finish F2 (patterned both sides)**], Mesh M1 (diamond), [**Pattern P1 (linear)**] [**Pattern P2 (geometric)**] [**Pattern P3 (random)**] [**Pattern P4 (special)**].

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

K. Ceramic-Coated Vision Glass: Heat-treated float glass, Condition C; with ceramic enamel applied by silk-screened process; complying with Specification No. 95-1-31 in GANA's Tempering Division's "Engineering Standards Manual" and with other requirements specified.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2. Basis-of-Design Product: Subject to compliance with requirements, provide <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

    a. <**Insert, in separate subparagraphs, manufacturer's name**>.

3. Glass: [**Clear float**] [**Ultraclear float**] [**Tinted float**].
4. Tint Color: [**Blue**] [**Blue-green**] [**Bronze**] [**Green**] [**Gray**] <**Insert color**>.
5. Ceramic Coating Color and Pattern: [**As selected by Architect from manufacturer's full range**] [**Match**] [**Provide**] <**Insert one manufacturer's color and pattern designation if matching is required; otherwise, insert color and pattern designation for each product named above**>.

L. Reflective-Coated Vision Glass: ASTM C 1376, coated by [**pyrolytic process**] [**vacuum deposition (sputter-coating) process**], and complying with other requirements specified.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2. Basis-of-Design Product: Subject to compliance with requirements, provide <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

    a. <**Insert, in separate subparagraphs, manufacturer's name**>.

3. Kind: Kind CV (coated vision glass)[**, except that Kind CO (coated overhead glass) may be used where the lower edge of the glass is more than 6 feet (1.8 m) above the adjacent floor level or cannot be approached closer than 10 feet (3.0 m)**].
4. Coating Color: [**Gold**] [**Pewter**] [**Silver**] <**Insert color**>.
5. Glass: [**Clear float**] [**Tinted float**].
6. Tint Color: [**Blue**] [**Blue-green**] [**Bronze**] [**Green**] [**Gray**] <**Insert color**>.
7. Visible Light Transmittance: <**Insert value**> percent minimum.
8. Outdoor Visible Reflectance: <**Insert value**> percent maximum.
9. Self-Cleaning, Low-Maintenance Coating: Pyrolytic coating on first surface.

M. Ceramic-Coated Spandrel Glass: ASTM C 1048, Condition B, Type I, Quality-Q3, and complying with other requirements specified.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2. Basis-of-Design Product: Subject to compliance with requirements, provide <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

    a. <**Insert, in separate subparagraphs, manufacturer's name**>.

3. Glass: [**Clear float**] [**Ultraclear float**] [**Tinted float**].
4. Tint Color: [**Blue**] [**Blue-green**] [**Bronze**] [**Green**] [**Gray**] <**Insert color**>.
5. Ceramic Coating Color: [**As selected by Architect from manufacturer's full range**] [**Match**] [**Provide**] <**Insert one manufacturer's color designation if matching is required; otherwise, insert color designation for each product named above**>.

N. Silicone-Coated Spandrel Glass: ASTM C 1048, Condition C, Type I, Quality-Q3, and complying with other requirements specified.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

   a. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2. Basis-of-Design Product: Subject to compliance with requirements, provide <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

   a. <**Insert, in separate subparagraphs, manufacturer's name**>.

3. Glass: [**Clear float**] [**Ultraclear float**] [**Tinted float**].
4. Tint Color: [**Blue**] [**Blue-green**] [**Bronze**] [**Green**] [**Gray**] <**Insert color**>.
5. Silicone Coating Color: [**As selected by Architect from manufacturer's full range**] [**Match**] [**Provide**] <**Insert one manufacturer's color designation if matching is required; otherwise, insert color designation for each product named above**>.

O. Reflective-Coated Spandrel Glass: ASTM C 1376, Kind CS; coated by [**pyrolytic process**] [**vacuum deposition (sputter-coating) process**], and complying with other requirements specified.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

   a. <**Insert, in separate subparagraphs, manufacturer's name; product name or designation**>.

2. Basis-of-Design Product: Subject to compliance with requirements, provide <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

   a. <**Insert, in separate subparagraphs, manufacturer's name**>.

3. Coating Color: [**Gold**] [**Pewter**] [**Silver**] <**Insert color**>.
4. Glass: [**Clear float**] [**Ultraclear float**] [**Tinted float**].
5. Tint Color: [**Blue**] [**Blue-green**] [**Bronze**] [**Green**] [**Gray**] <**Insert color**>.
6. Visible Light Transmittance: <**Insert value**> percent minimum.
7. Outdoor Visible Reflectance: <**Insert value**> percent maximum.

2.3 LAMINATED GLASS

A. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

1. <**Insert, in separate subparagraphs, manufacturer's name**>.

B. Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

1. Construction: Laminate glass with [**polyvinyl butyral interlayer**] [**or**] [**cast-in-place and cured-transparent-resin interlayer**] to comply with interlayer manufacturer's written recommendations.
2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
3. Interlayer Color: Clear unless otherwise indicated.

C. Windborne-Debris-Impact-Resistant Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, with "Windborne-Debris-Impact Resistance" Paragraph in "Glass Products, General" Article, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

1. Construction: Laminate glass with[**one of**] the following to comply with interlayer manufacturer's written recommendations:

    a. Polyvinyl butyral interlayer.
    b. Polyvinyl butyral interlayers reinforced with polyethylene terephthalate film.
    c. Ionoplast interlayer.
    d. Cast-in-place and cured-transparent-resin interlayer.
    e. Cast-in-place and cured-transparent-resin interlayer reinforced with polyethylene terephthalate film.

2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
3. Interlayer Color: Clear unless otherwise indicated.

D. Glass: Comply with applicable requirements in "Glass Products" Article as indicated by designations in "Laminated-Glass Types" Article.

2.4 INSULATING GLASS

A. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

1. <**Insert, in separate subparagraphs, manufacturer's name**>.

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.

1. Sealing System: Dual seal, with [**manufacturer's standard**] [**polyisobutylene and polysulfide**] [**polyisobutylene and silicone**] [**polyisobutylene and hot-melt butyl**] [**polyisobutylene and polyurethane**] primary and secondary.
2. Spacer: [**Manufacturer's standard spacer material and construction**] [**Aluminum with mill or clear anodic finish**] [**Aluminum with black, color anodic finish**] [**Aluminum with bronze, color anodic finish**] [**Aluminum with powdered metal paint finish in color selected by Architect**] [**Galvanized steel**] [**Stainless steel**] [**Polypropylene covered stainless steel in color selected by Architect**] [**Thermally broken aluminum**] [**Nonmetallic laminate**] [**Nonmetallic tube**] <**Insert material**>.
3. Desiccant: Molecular sieve or silica gel, or blend of both.

C. Glass: Comply with applicable requirements in "Glass Products" Article[**and in "Laminated Glass" Article**] as indicated by designations in "Insulating-Glass Types" Article[**and in "Insulating-Laminated-Glass Types" Article**].

2.5 FIRE-PROTECTION-RATED GLAZING

A. Fire-Protection-Rated Glazing, General: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to [**NFPA 252 for door assemblies**] [**and**] [**NFPA 257 for window assemblies**].

B. Monolithic Ceramic Glazing: Clear, ceramic flat glass; 3/16-inch (5-mm) nominal thickness.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Nippon Electric Glass Co., Ltd. (distributed by Technical Glass Products); [**Obscure FireLite**] [**Premium FireLite**] [**Standard FireLite**].
b. Safti First; SuperLite C/P.
c. Schott North America, Inc.; [**Pyran Star**] [**Pyran Crystal**].
d. Vetrotech Saint-Gobain; SGG Keralite FR-R.
e. <**Insert manufacturer's name; product name or designation**>.

C. Film-Faced Ceramic Glazing: Clear, ceramic flat glass; 3/16-inch (5-mm) nominal thickness; faced on one surface with a clear glazing film; complying with testing requirements in 16 CFR 1201 for Category II materials.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Nippon Electric Glass Co., Ltd. (distributed by Technical Glass Products); FireLite NT.
b. Safti First; SuperLite C/SP.
c. Schott North America, Inc.; [**Filmed Pyran Star**] [**Filmed Pyran Crystal**].
d. Vetrotech Saint-Gobain; SGG Keralite FR-F.
e. <**Insert manufacturer's name; product name or designation**>.

D. Laminated Ceramic Glazing: Laminated glass made from 2 plies of clear, ceramic flat glass; 5/16-inch (8-mm) total nominal thickness; complying with testing requirements in 16 CFR 1201 for Category II materials.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Nippon Electric Glass Co., Ltd. (distributed by Technical Glass Products); FireLite Plus.
b. Schott North America, Inc.; Laminated Pyran Crystal.
c. Vetrotech Saint-Gobain; SGG Keralite FR-L.
d. <**Insert manufacturer's name; product name or designation**>.

E. Fire-Protection-Rated Tempered Glass: [**1/4-inch- (6.4-mm-)**] [**3/8-inch- (9.5-mm-)**] [**1/2-inch- (12.7-mm-)**] thick, fire-protection-rated tempered glass, complying with testing requirements in 16 CFR 1201 for Category II materials.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. InterEdge, Inc., a subsidiary of AFG Industries, Inc.; PyroEdge-20.
b. Safti First; SuperLite20.
c. Vetrotech Saint-Gobain; SSG Pyroswiss.
d. <**Insert manufacturer's name; product name or designation**>.

F. Fire-Protection-Rated Laminated Glass: 5/16-inch- (8-mm-) thick, fire-protection-rated laminated glass, complying with testing requirements in 16 CFR 1201 for Category II materials.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Oldcastle Glass, Inc.; Pyroguard.
b. <**Insert manufacturer's name; product name or designation**>.

G. Laminated Glass with Intumescent Interlayers: Laminated glass made from multiple plies of uncoated, clear float glass; with intumescent interlayers; complying with testing requirements in 16 CFR 1201 for Category II materials.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. InterEdge, Inc., a subsidiary of AFG Industries, Inc.; Pyrobel.
b. Pilkington Group Limited (distributed by Technical Glass Products); PyroStop.
c. Vetrotech Saint-Gobain; [**SGG Contraflam N2**] [**SGG Swissflam N2**].
d. <**Insert manufacturer's name; product name or designation**>.

H. Gel-Filled, Double Glazing Units: Double glazing units made from two lites of uncoated, clear, fully tempered float glass; with a perimeter metal spacer separating lites and dual-edge seal enclosing a cavity filled with clear, fully transparent, heat-absorbing gel; complying with testing requirements in 16 CFR 1201 for Category II materials.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. Safti First; SuperLite II.
    b. <**Insert manufacturer's name; product name or designation**>.

2.6 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 [**neoprene**] [**EPDM**] [**silicone**] [**or**] [**thermoplastic polyolefin rubber**] gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.

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.

2.7 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 indicated by manufacturer's designations**] [**Match Architect's samples**] [**As selected by Architect from manufacturer's full range**].

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Dow Corning Corporation; 790.
b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
c. May National Associates, Inc.; Bondaflex Sil 290.
d. Pecora Corporation; 890.
e. Sika Corporation, Construction Products Division; SikaSil-C990.
f. Tremco Incorporated; Spectrem 1.
g. <**Insert manufacturer's name; product name or designation**>.

2. Applications: <**Describe types of glazing applications where this sealant is required**>.

C. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. BASF Building Systems; Omniseal 50.
b. Dow Corning Corporation; [**756 SMS**] [**791**] [**795**] [**995**].
c. GE Advanced Materials - Silicones; [**SilGlaze II SCS2800**] [**SilPruf NB SCS9000**] [**SilPruf SCS2000**] [**UltraPruf II SCS2900**].
d. May National Associates, Inc.; Bondaflex Sil 295.
e. Pecora Corporation; [**864**] [**895**] [**898**].
f. Polymeric Systems, Inc.; PSI-641.
g. Sika Corporation, Construction Products Division; SikaSil-C995.
h. Tremco Incorporated; [**Spectrem 2**] [**Spectrem 3**].
i. <**Insert manufacturer's name; product name or designation**>.

2. Applications: <**Describe types of glazing applications where this sealant is required**>.

D. Glazing Sealant: 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, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Dow Corning Corporation; 799.
b. GE Advanced Materials - Silicones; [**UltraGlaze SSG4000**] [**UltraGlaze SSG4000AC**].
c. May National Associates, Inc.; [**Bondaflex Sil 200 GPN**] [**Bondaflex Sil 201 FC**].
d. Polymeric Systems, Inc.; PSI-631.
e. Schnee-Morehead, Inc., an ITW company; SM5731 Poly-Glaze Plus.
f. Tremco Incorporated; [**Proglaze SSG**] [**Tremsil 600**].
g. <**Insert manufacturer's name; product name or designation**>.

2. Applications: <**Describe types of glazing applications where this sealant is required**>.

E. Glazing Sealant: Acid-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. BASF Building Systems; OmniPlus.
    b. Bostik, Inc.; Chem-Calk 1200.
    c. Dow Corning Corporation; 999-A.
    d. GE Advanced Materials - Silicones; [**Contractors SCS1000**] [**Construction SCS1200**].
    e. May National Associates, Inc.; [**Sil 100 GC**] [**Sil 100 GP**] [**Sil 100 WF**].
    f. Pecora Corporation; 860.
    g. Polymeric Systems, Inc.; PSI-601.
    h. Schnee-Morehead, Inc., an ITW company; SM5732 Polyglaze.
    i. Tremco Incorporated; [**Proglaze**] [**Tremsil 200**].
    j. <**Insert manufacturer's name; product name or designation**>.

2. Applications: <**Describe types of glazing applications where this sealant is required**>.

F. 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.

2.8 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.9 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.

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.

2.10 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.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

C. Grind smooth and polish exposed glass edges and corners.

2.11 MONOLITHIC-GLASS TYPES

A. Glass Type [**GL-**<#>]: Clear [**float glass**] [**heat-strengthened float glass**] [**fully tempered float glass**].

1. Thickness: [**6.0 mm**] <**Insert thickness designation**>.
2. Provide safety glazing labeling.

B. Glass Type [**GL-**<#>]: Ultraclear [**float glass**] [**heat-strengthened float glass**] [**fully tempered float glass**].

1. Thickness: [**6.0 mm**] <**Insert thickness designation**>.
2. Provide safety glazing labeling.

C. Glass Type [**GL-**<#>]: Pyrolytic-coated, self-cleaning, low-maintenance, clear [**float glass**] [**heat-strengthened float glass**] [**fully tempered float glass**].

1. Thickness: [**6.0 mm**] <**Insert thickness designation**>.
2. Provide safety glazing labeling.

D. Glass Type [**GL-**<#>]: Tinted [**float glass**] [**heat-strengthened float glass**] [**fully tempered float glass**].

1. Thickness: [**6.0 mm**] <**Insert thickness designation**>.
2. Winter Nighttime U-Factor: <**Insert value**> maximum.
3. Summer Daytime U-Factor: <**Insert value**> maximum.
4. Solar Heat Gain Coefficient: <**Insert value**> maximum.
5. Provide safety glazing labeling.

E. Glass Type [**GL-**<#>]: Polished wired glass.

1. Thickness: 6.0 mm.

F. Glass Type [**GL-**<#>]: Patterned glass.

1. Thickness: [**4.0**] [**5.0**] [**6.0**] mm.

G. Glass Type [**GL-**<#>]: Tempered patterned glass.

1. Thickness: [**4.0**] [**5.0**] [**6.0**] mm.
2. Provide safety glazing labeling.

H. Glass Type [**GL-**<#>]: Patterned wired glass.

1. Thickness: 6.0 mm.

I. Glass Type [**GL-**<#>]: Ceramic-coated vision glass, [**heat-strengthened float glass**] [**fully tempered float glass**].

1. Thickness: [**6.0 mm**] <**Insert thickness designation**>.
2. Coating Location: Second surface.
3. Winter Nighttime U-Factor: <**Insert value**> maximum.
4. Summer Daytime U-Factor: <**Insert value**> maximum.
5. Solar Heat Gain Coefficient: <**Insert value**> maximum.
6. Provide safety glazing labeling.

J. Glass Type [**GL-**<#>]: Reflective-coated vision glass, [**float glass**] [**heat-strengthened float glass**] [**fully tempered float glass**].

1. Thickness: [**6.0 mm**] <**Insert thickness designation**>.
2. Coating Location: [**First**] [**Second**] surface.
3. Winter Nighttime U-Factor: <**Insert value**> maximum.
4. Summer Daytime U-Factor: <**Insert value**> maximum.
5. Solar Heat Gain Coefficient: <**Insert value**> maximum.
6. Provide safety glazing labeling.

K. Glass Type [**GL-**<#>]: Ceramic-coated spandrel glass, [**heat-strengthened float glass**] [**fully tempered float glass**].

1. Thickness: [**6.0 mm**] <**Insert thickness designation**>.
2. Coating Location: Second surface.
3. Winter Nighttime U-Factor: <**Insert value**> maximum.
4. Summer Daytime U-Factor: <**Insert value**> maximum.
5. Fallout Resistance: Passes fallout-resistance test in ASTM C 1048 for an assembly of glass and adhered reinforcing material.

L. Glass Type [**GL-**<#>]: Silicone-coated spandrel glass, [**heat-strengthened float glass**] [**fully tempered float glass**].

1. Thickness: [**6.0 mm**] <**Insert thickness designation**>.
2. Coating Location: Second surface.
3. Winter Nighttime U-Factor: <**Insert value**> maximum.
4. Summer Daytime U-Factor: <**Insert value**> maximum.
5. Fallout Resistance: Passes fallout-resistance test in ASTM C 1048 for an assembly of glass and adhered reinforcing material.

M. Glass Type [**GL-**<#>]: Reflective-coated spandrel glass, [**heat-strengthened float glass**] [**fully tempered float glass**].

1. Thickness: [**6.0 mm**] <**Insert thickness designation**>.
2. Coating Location: [**First**] [**Second**] surface.
3. Winter Nighttime U-Factor: <**Insert value**> maximum.
4. Summer Daytime U-Factor: <**Insert value**> maximum.
5. Fallout Resistance: Passes fallout-resistance test in ASTM C 1048 for an assembly of glass and adhered reinforcing material.
6. Factory apply manufacturer's standard opacifier of the following material to coated second surface of lites, with resulting products complying with Specification No. 89-1-6 in GANA's Tempering Division's "Engineering Standards Manual":

    a. Manufacturer's standard opacifier material.
    b. Polyester film laminated to glass with solvent-based adhesive.

2.12 LAMINATED-GLASS TYPES

A. Glass Type [**GL-**<#>]: Clear laminated glass with two plies of [**float glass**] [**heat-strengthened float glass**] [**fully tempered float glass**] [**ultraclear float glass**] [**ultraclear heat-strengthened float glass**] [**ultraclear fully tempered float glass**].

1. Thickness of Each Glass Ply: [**3.0 mm**] [**4.0 mm**] [**5.0 mm**] [**6.0 mm**] [**As indicated**] <**Insert thickness designation**>.
2. Interlayer Thickness: [**0.030 inch (0.76 mm)**] [**0.060 inch (1.52 mm)**] [**0.090 inch (2.29 mm)**].
3. Provide safety glazing labeling.

B. Glass Type [**GL-**<#>]: Antireflective-coated clear laminated glass with two plies of [**float glass**] [**heat-strengthened float glass**] [**fully tempered float glass**] [**ultraclear float glass**] [**ultraclear heat-strengthened float glass**] [**ultraclear fully tempered float glass**].

1. Thickness of Each Glass Ply: [**3.0 mm**] [**4.0 mm**] [**5.0 mm**] [**6.0 mm**].
2. Interlayer Thickness: [**0.030 inch (0.76 mm)**] [**0.060 inch (1.52 mm)**] [**0.090 inch (2.29 mm)**].
3. Visible Reflectance: Less than 2 percent.
4. Winter Nighttime U-Factor: <**Insert value**> maximum.
5. Summer Daytime U-Factor: <**Insert value**> maximum.
6. Solar Heat Gain Coefficient: <**Insert value**> maximum.
7. Provide safety glazing labeling.

C. Glass Type [**GL-**<#>]: Tinted laminated glass with two plies of [**float glass**] [**heat-strengthened float glass**] [**fully tempered float glass**] with outer ply Class 2 (tinted) and inner ply Class 1 (clear).

1. Thickness of Each Glass Ply: [**3.0 mm**] [**4.0 mm**] [**5.0 mm**] [**6.0 mm**] [**As indicated**] <**Insert thickness designation**>.
2. Interlayer Thickness: [**0.030 inch (0.76 mm)**] [**0.060 inch (1.52 mm)**] [**0.090 inch (2.29 mm)**].
3. Winter Nighttime U-Factor: <**Insert value**> maximum.
4. Summer Daytime U-Factor: <**Insert value**> maximum.
5. Solar Heat Gain Coefficient: <**Insert value**> maximum.
6. Provide safety glazing labeling.

D. Glass Type [**GL-**<#>]: Tinted laminated glass with two plies of clear [**float glass**] [**heat-strengthened float glass**] [**fully tempered float glass**] and tinted interlayer.

1. Thickness of Each Glass Ply: [**3.0 mm**] [**4.0 mm**] [**5.0 mm**] [**6.0 mm**] [**As indicated**] <**Insert thickness designation**>.
2. Interlayer Thickness: [**0.030 inch (0.76 mm)**] [**0.060 inch (1.52 mm)**] [**0.090 inch (2.29 mm)**].
3. Interlayer Color: [**Blue-green**] [**Bronze light**] [**Gray**] <**Insert color**>.
4. Winter Nighttime U-Factor: <**Insert value**> maximum.
5. Summer Daytime U-Factor: <**Insert value**> maximum.
6. Solar Heat Gain Coefficient: <**Insert value**> maximum.
7. Provide safety glazing labeling.

E. Glass Type [**GL-**<#>]: Ceramic-coated, laminated vision glass with two plies of [**heat-strengthened float glass**] [**fully tempered float glass**].

1. Thickness of Each Glass Ply: [**3.0 mm**] [**4.0 mm**] [**5.0 mm**] [**6.0 mm**] [**As indicated**] <**Insert thickness designation**>.
2. Interlayer Thickness: [**0.030 inch (0.76 mm)**] [**0.060 inch (1.52 mm)**] [**0.090 inch (2.29 mm)**].
3. Coating Location: [**Second**] [**Third**] [**Fourth**] surface.
4. Winter Nighttime U-Factor: <**Insert value**> maximum.
5. Summer Daytime U-Factor: <**Insert value**> maximum.
6. Solar Heat Gain Coefficient: <**Insert value**> maximum.
7. Provide safety glazing labeling.

F. Glass Type [**GL-**<#>]: Reflective-coated, laminated vision glass with two plies of [**heat-strengthened float glass**] [**fully tempered float glass**] with inner ply Class 1 (clear).

1. Thickness of Each Glass Ply: [**3.0 mm**] [**4.0 mm**] [**5.0 mm**] [**6.0 mm**] [**As indicated**] <**Insert thickness designation**>.
2. Interlayer Thickness: [**0.030 inch (0.76 mm)**] [**0.060 inch (1.52 mm)**] [**0.090 inch (2.29 mm)**].
3. Coating Location: [**First**] [**Second**] [**Third**] surface.
4. Winter Nighttime U-Factor: <**Insert value**> maximum.
5. Summer Daytime U-Factor: <**Insert value**> maximum.
6. Solar Heat Gain Coefficient: <**Insert value**> maximum.
7. Provide safety glazing labeling.

G. Glass Type [**GL-**<#>]: Low-e-coated, laminated vision glass with two plies of clear [**float glass**] [**heat-strengthened float glass**] [**fully tempered float glass**].

1. Thickness of Each Glass Ply: [**3.0 mm**] [**4.0 mm**] [**5.0 mm**] [**6.0 mm**] [**As indicated**] <**Insert thickness designation**>.
2. Interlayer Thickness: [**0.030 inch (0.76 mm)**] [**0.060 inch (1.52 mm)**] [**0.090 inch (2.29 mm)**].
3. Low-E Coating: [**Pyrolytic on second**] [**Pyrolytic on third**] [**Sputtered on second**] [**Sputtered on third**] [**Pyrolytic or sputtered on second or third**] surface.
4. Visible Light Transmittance: <**Insert value**> percent minimum.
5. Winter Nighttime U-Factor: <**Insert value**> maximum.
6. Summer Daytime U-Factor: <**Insert value**> maximum.
7. Solar Heat Gain Coefficient: <**Insert value**> maximum.
8. Provide safety glazing labeling.

H. Glass Type [**GL-**<#>]: Reflective-coated, laminated spandrel glass with two plies of [**heat-strengthened float glass**] [**fully tempered float glass**] with inner ply Class 1 (clear).

1. Thickness of Each Glass Ply: [**3.0 mm**] [**4.0 mm**] [**5.0 mm**] [**6.0 mm**] [**As indicated**] <**Insert thickness designation**>.
2. Interlayer Thickness: [**0.030 inch (0.76 mm)**] [**0.060 inch (1.52 mm)**] [**0.090 inch (2.29 mm)**].
3. Coating Location: [**First**] [**Second**] [**Third**] surface.
4. Winter Nighttime U-Factor: <**Insert value**> maximum.
5. Summer Daytime U-Factor: <**Insert value**> maximum.

2.13 INSULATING-GLASS TYPES

A. Glass Type [**GL-**<#>]: Clear insulating glass.

1. Overall Unit Thickness: [**1 inch (25 mm)**] [**5/8 inch (16 mm)**] <**Insert dimension**>.
2. Thickness of Each Glass Lite: [**3.0 mm**] [**4.0 mm**] [**5.0 mm**] [**6.0 mm**] <**Insert thickness designation**>.
3. Outdoor Lite: [**Float glass**] [**Heat-strengthened float glass**] [**Fully tempered float glass**].
4. Interspace Content: [**Air**] [**Argon**].
5. Indoor Lite: [**Float glass**] [**Heat-strengthened float glass**] [**Fully tempered float glass**].
6. Winter Nighttime U-Factor: <**Insert value**> maximum.
7. Summer Daytime U-Factor: <**Insert value**> maximum.
8. Provide safety glazing labeling.

B. Glass Type [**GL-**<#>]: Ultraclear insulating glass.

1. Overall Unit Thickness: [**1 inch (25 mm)**] [**5/8 inch (16 mm)**] <**Insert dimension**>.
2. Thickness of Each Glass Lite: [**3.0 mm**] [**4.0 mm**] [**5.0 mm**] [**6.0 mm**] <**Insert thickness designation**>.
3. Outdoor Lite: Ultraclear [**float glass**] [**heat-strengthened float glass**] [**fully tempered float glass**].
4. Interspace Content: [**Air**] [**Argon**].
5. Indoor Lite: Ultraclear [**float glass**] [**heat-strengthened float glass**] [**fully tempered float glass**].
6. Winter Nighttime U-Factor: <**Insert value**> maximum.
7. Summer Daytime U-Factor: <**Insert value**> maximum.
8. Provide safety glazing labeling.

C. Glass Type [**GL-**<#>]: Pyrolytic-coated, self-cleaning, low-maintenance, clear insulating glass.

1. Overall Unit Thickness: [**1 inch (25 mm)**] [**5/8 inch (16 mm)**] <**Insert dimension**>.
2. Thickness of Each Glass Lite: [**3.0 mm**] [**4.0 mm**] [**5.0 mm**] [**6.0 mm**] <**Insert thickness designation**>.
3. Outdoor Lite: Pyrolytic-coated, self-cleaning, low-maintenance, clear [**float glass**] [**heat-strengthened float glass**] [**fully tempered float glass**].
4. Interspace Content: [**Air**] [**Argon**].
5. Indoor Lite: [**Float glass**] [**Heat-strengthened float glass**] [**Fully tempered float glass**].
6. Winter Nighttime U-Factor: <**Insert value**> maximum.
7. Summer Daytime U-Factor: <**Insert value**> maximum.
8. Provide safety glazing labeling.

D. Glass Type [**GL-**<#>]: Low-e-coated, clear insulating glass.

1. Overall Unit Thickness: [**1 inch (25 mm)**] [**5/8 inch (16 mm)**] <**Insert dimension**>.
2. Thickness of Each Glass Lite: [**3.0 mm**] [**4.0 mm**] [**5.0 mm**] [**6.0 mm**] <**Insert thickness designation**>.
3. Outdoor Lite: [**Float glass**] [**Heat-strengthened float glass**] [**Fully tempered float glass**] [**Ultraclear float glass**] [**Ultraclear heat-strengthened float glass**] [**Ultraclear fully tempered float glass**].
4. Interspace Content: [**Air**] [**Argon**].
5. Indoor Lite: [**Float glass**] [**Heat-strengthened float glass**] [**Fully tempered float glass**] [**Ultraclear float glass**] [**Ultraclear heat-strengthened float glass**] [**Ultraclear fully tempered float glass**].
6. Low-E Coating: [**Pyrolytic on second**] [**Pyrolytic on third**] [**Sputtered on second**] [**Sputtered on third**] [**Pyrolytic or sputtered on second or third**] surface.
7. Visible Light Transmittance: <**Insert value**> percent minimum.
8. Winter Nighttime U-Factor: <**Insert value**> maximum.
9. Summer Daytime U-Factor: <**Insert value**> maximum.
10. Solar Heat Gain Coefficient: <**Insert value**> maximum.
11. Provide safety glazing labeling.

E. Glass Type [**GL-**<#>]: Tinted insulating glass.

1. Overall Unit Thickness: [**1 inch (25 mm)**] [**5/8 inch (16 mm)**] <**Insert dimension**>.
2. Thickness of Each Glass Lite: [**3.0 mm**] [**4.0 mm**] [**5.0 mm**] [**6.0 mm**] <**Insert thickness designation**>.
3. Outdoor Lite: Tinted [**float glass**] [**heat-strengthened float glass**] [**fully tempered float glass**].
4. Interspace Content: [**Air**] [**Argon**].
5. Indoor Lite: Clear [**float glass**] [**heat-strengthened float glass**] [**fully tempered float glass**].
6. Winter Nighttime U-Factor: <**Insert value**> maximum.
7. Summer Daytime U-Factor: <**Insert value**> maximum.
8. Solar Heat Gain Coefficient: <**Insert value**> maximum.
9. Provide safety glazing labeling.

F. Glass Type [**GL-**<#>]: Low-e-coated, tinted insulating glass.

1. Overall Unit Thickness: [**1 inch (25 mm)**] [**5/8 inch (16 mm)**] <**Insert dimension**>.
2. Thickness of Each Glass Lite: [**3.0 mm**] [**4.0 mm**] [**5.0 mm**] [**6.0 mm**] <**Insert thickness designation**>.

3. Outdoor Lite: Tinted [**float glass**] [**heat-strengthened float glass**] [**fully tempered float glass**].
4. Interspace Content: [**Air**] [**Argon**].
5. Indoor Lite: Clear [**float glass**] [**heat-strengthened float glass**] [**fully tempered float glass**].
6. Low-E Coating: [**Pyrolytic on second**] [**Pyrolytic on third**] [**Sputtered on second**] [**Sputtered on third**] [**Pyrolytic or sputtered on second or third**] surface.
7. Visible Light Transmittance: <**Insert value**> percent minimum.
8. Winter Nighttime U-Factor: <**Insert value**> maximum.
9. Summer Daytime U-Factor: <**Insert value**> maximum.
10. Solar Heat Gain Coefficient: <**Insert value**> maximum.
11. Provide safety glazing labeling.

G. Glass Type [**GL-**<#>]: Ceramic-coated, insulating vision glass.

1. Overall Unit Thickness: [**1 inch (25 mm)**] [**5/8 inch (16 mm)**] <**Insert dimension**>.
2. Thickness of Each Glass Lite: [**3.0 mm**] [**4.0 mm**] [**5.0 mm**] [**6.0 mm**] <**Insert thickness designation**>.
3. Outdoor Lite: [**Heat-strengthened float glass**] [**Fully tempered float glass**] [**Ultraclear heat-strengthened float glass**] [**Ultraclear fully tempered float glass**].
4. Interspace Content: [**Air**] [**Argon**].
5. Indoor Lite: [**Float glass**] [**Heat-strengthened float glass**] [**Fully tempered float glass**] [**Ultraclear float glass**] [**Ultraclear heat-strengthened float glass**] [**Ultraclear fully tempered float glass**].
6. Coating Location: [**Second**] [**Third**] [**Fourth**] surface.
7. Winter Nighttime U-Factor: <**Insert value**> maximum.
8. Summer Daytime U-Factor: <**Insert value**> maximum.
9. Solar Heat Gain Coefficient: <**Insert value**> maximum.
10. Provide safety glazing labeling.

H. Glass Type [**GL-**<#>]: Reflective-coated, clear insulating glass.

1. Overall Unit Thickness: [**1 inch (25 mm)**] [**5/8 inch (16 mm)**] <**Insert dimension**>.
2. Thickness of Each Glass Lite: [**3.0 mm**] [**4.0 mm**] [**5.0 mm**] [**6.0 mm**] <**Insert thickness designation**>.
3. Outdoor Lite: Clear [**float glass**] [**heat-strengthened float glass**] [**fully tempered float glass**].
4. Interspace Content: [**Air**] [**Argon**].
5. Indoor Lite: Clear [**float glass**] [**heat-strengthened float glass**] [**fully tempered float glass**].
6. Coating Location: [**First**] [**Second**] [**Third**] surface.
7. Winter Nighttime U-Factor: <**Insert value**> maximum.
8. Summer Daytime U-Factor: <**Insert value**> maximum.
9. Solar Heat Gain Coefficient: <**Insert value**> maximum.
10. Provide safety glazing labeling.

I. Glass Type [**GL-**<#>]: Reflective-coated, tinted insulating glass.

1. Overall Unit Thickness: [**1 inch (25 mm)**] [**5/8 inch (16 mm)**] <**Insert dimension**>.
2. Thickness of Each Glass Lite: [**3.0 mm**] [**4.0 mm**] [**5.0 mm**] [**6.0 mm**] <**Insert thickness designation**>.
3. Outdoor Lite: Tinted [**float glass**] [**heat-strengthened float glass**] [**fully tempered float glass**].
4. Interspace Content: [**Air**] [**Argon**].

5. Indoor Lite: Clear [**float glass**] [**heat-strengthened float glass**] [**fully tempered float glass**].
6. Coating Location: [**First**] [**Second**] [**Third**] surface.
7. Winter Nighttime U-Factor: <**Insert value**> maximum.
8. Summer Daytime U-Factor: <**Insert value**> maximum.
9. Solar Heat Gain Coefficient: <**Insert value**> maximum.
10. Provide safety glazing labeling.

J. Glass Type [**GL-**<#>]: [**Ceramic-coated**] [**Silicone-coated**], insulating spandrel glass.

1. Overall Unit Thickness: [**1 inch (25 mm)**] <**Insert dimension**>.
2. Thickness of Each Glass Lite: [**5.0 mm**] [**6.0 mm**] <**Insert thickness designation**>.
3. Outdoor Lite: [**Float glass**] [**Heat-strengthened float glass**] [**Fully tempered float glass**] [**Ultraclear float glass**] [**Ultraclear heat-strengthened float glass**] [**Ultraclear fully tempered float glass**].
4. Interspace Content: [**Air**] [**Argon**].
5. Indoor Lite: [**Float glass**] [**Heat-strengthened float glass**] [**Fully tempered float glass**] [**Ultraclear float glass**] [**Ultraclear heat-strengthened float glass**] [**Ultraclear fully tempered float glass**].
6. Coating Location: Fourth surface.
7. Winter Nighttime U-Factor: <**Insert value**> maximum.
8. Summer Daytime U-Factor: <**Insert value**> maximum.

K. Glass Type [**GL-**<#>]: [**Ceramic-coated**] [**Silicone-coated**], low-e, insulating spandrel glass.

1. Overall Unit Thickness: [**1 inch (25 mm)**] <**Insert dimension**>.
2. Thickness of Each Glass Lite: [**5.0 mm**] [**6.0 mm**] <**Insert thickness designation**>.
3. Outdoor Lite: [**Float glass**] [**Heat-strengthened float glass**] [**Fully tempered float glass**] [**Ultraclear float glass**] [**Ultraclear heat-strengthened float glass**] [**Ultraclear fully tempered float glass**].
4. Interspace Content: [**Air**] [**Argon**].
5. Indoor Lite: [**Float glass**] [**Heat-strengthened float glass**] [**Fully tempered float glass**] [**Ultraclear float glass**] [**Ultraclear heat-strengthened float glass**] [**Ultraclear fully tempered float glass**].
6. Low-E Coating: [**Pyrolytic on second**] [**Pyrolytic on third**] [**Sputtered on second**] [**Sputtered on third**] [**Pyrolytic or sputtered on second or third**] surface.
7. Opaque Coating Location: Fourth surface.
8. Winter Nighttime U-Factor: <**Insert value**> maximum.
9. Summer Daytime U-Factor: <**Insert value**> maximum.

L. Glass Type [**GL-**<#>]: [**Ceramic-coated**] [**Silicone-coated**], tinted, insulating spandrel glass.

1. Overall Unit Thickness: [**1 inch (25 mm)**] <**Insert dimension**>.
2. Thickness of Each Glass Lite: [**5.0 mm**] [**6.0 mm**] <**Insert thickness designation**>.
3. Outdoor Lite: Tinted [**float glass**] [**heat-strengthened float glass**] [**fully tempered float glass**].
4. Interspace Content: [**Air**] [**Argon**].
5. Indoor Lite: Clear [**float glass**] [**heat-strengthened float glass**] [**fully tempered float glass**].
6. Coating Location: Fourth surface.
7. Winter Nighttime U-Factor: <**Insert value**> maximum.
8. Summer Daytime U-Factor: <**Insert value**> maximum.

2.14 INSULATING-LAMINATED-GLASS TYPES

A. Glass Type [**GL-**<#>]: Clear insulating laminated glass.

1. Overall Unit Thickness: [**1-3/16 inch (30 mm)**] [**1 inch (25 mm)**] [**3/4 inch (19 mm)**] <**insert dimension**>.
2. Thickness of Outdoor Lite: [**3.0 mm**] [**4.0 mm**] [**5.0 mm**] [**6.0 mm**] <**Insert thickness designation**>.
3. Outdoor Lite: [**Heat-strengthened float glass**] [**Fully tempered float glass**].
4. Interspace Content: [**Air**] [**Argon**].
5. Indoor Lite: Clear laminated glass with two plies of [**float glass**] [**heat-strengthened float glass**] [**fully tempered float glass**].

    a. Thickness of Each Glass Ply: [**3.0 mm**] [**4.0 mm**] [**5.0 mm**] [**6.0 mm**] [**As indicated**] <**Insert thickness designation**>.
    b. Interlayer Thickness: [**0.030 inch (0.76 mm)**] [**0.060 inch (1.52 mm)**] [**0.090 inch (2.29 mm)**].

6. Winter Nighttime U-Factor: <**Insert value**> maximum.
7. Summer Daytime U-Factor: <**Insert value**> maximum.
8. Solar Heat Gain Coefficient: <**Insert value**> maximum.
9. Provide safety glazing labeling.

B. Glass Type [**GL-**<#>]: Low-e-coated, clear insulating laminated glass.

1. Overall Unit Thickness: [**1-3/16 inch (30 mm)**] [**1 inch (25 mm)**] [**3/4 inch (19 mm)**] <**insert dimension**>.
2. Thickness of Outdoor Lite: [**3.0 mm**] [**4.0 mm**] [**5.0 mm**] [**6.0 mm**] <**Insert thickness designation**>.
3. Outdoor Lite: [**Heat-strengthened float glass**] [**Fully tempered float glass**].
4. Interspace Content: [**Air**] [**Argon**].
5. Indoor Lite: Clear laminated glass with two plies of [**float glass**] [**heat-strengthened float glass**] [**fully tempered float glass**].

    a. Thickness of Each Glass Ply: [**3.0 mm**] [**4.0 mm**] [**5.0 mm**] [**6.0 mm**] [**As indicated**] <**Insert thickness designation**>.
    b. Interlayer Thickness: [**0.030 inch (0.76 mm)**] [**0.060 inch (1.52 mm)**] [**0.090 inch (2.29 mm)**].

6. Low-E Coating: [**Pyrolytic on second**] [**Pyrolytic on third**] [**Sputtered on second**] [**Sputtered on third**] [**Pyrolytic or sputtered on second or third**] surface.
7. Visible Light Transmittance: <**Insert value**> percent minimum.
8. Winter Nighttime U-Factor: <**Insert value**> maximum.
9. Summer Daytime U-Factor: <**Insert value**> maximum.
10. Solar Heat Gain Coefficient: <**Insert value**> maximum.
11. Provide safety glazing labeling.

C. Glass Type [**GL-**<#>]: Tinted, insulating laminated glass.

1. Overall Unit Thickness: [**1-3/16 inch (30 mm)**] [**1 inch (25 mm)**] [**3/4 inch (19 mm)**] <**insert dimension**>.
2. Thickness of Outdoor Lite: [**3.0 mm**] [**4.0 mm**] [**5.0 mm**] [**6.0 mm**] <**Insert thickness designation**>.
3. Outdoor Lite: Tinted [**heat-strengthened float glass**] [**fully tempered float glass**].

4. Interspace Content: [**Air**] [**Argon**].
5. Indoor Lite: Clear laminated glass with two plies of [**float glass**] [**heat-strengthened float glass**] [**fully tempered float glass**].

    a. Thickness of Each Glass Ply: [**3.0 mm**] [**4.0 mm**] [**5.0 mm**] [**6.0 mm**] [**As indicated**] <**Insert thickness designation**>.
    b. Interlayer Thickness: [**0.030 inch (0.76 mm)**] [**0.060 inch (1.52 mm)**] [**0.090 inch (2.29 mm)**].

6. Winter Nighttime U-Factor: <**Insert value**> maximum.
7. Summer Daytime U-Factor: <**Insert value**> maximum.
8. Solar Heat Gain Coefficient: <**Insert value**> maximum.
9. Provide safety glazing labeling.

D. Glass Type [**GL-**<#>]: Low-e-coated, tinted, insulating laminated glass.

1. Overall Unit Thickness: [**1-3/16 inch (30 mm)**] [**1 inch (25 mm)**] [**3/4 inch (19 mm)**] <**insert dimension**>.
2. Thickness of Outdoor Lite: [**3.0 mm**] [**4.0 mm**] [**5.0 mm**] [**6.0 mm**] <**Insert thickness designation**>.
3. Outdoor Lite: Tinted [**heat-strengthened float glass**] [**fully tempered float glass**].
4. Interspace Content: [**Air**] [**Argon**].
5. Indoor Lite: Clear laminated glass with two plies of [**float glass**] [**heat-strengthened float glass**] [**fully tempered float glass**].

    a. Thickness of Each Glass Ply: [**3.0 mm**] [**4.0 mm**] [**5.0 mm**] [**6.0 mm**] [**As indicated**] <**Insert thickness designation**>.
    b. Interlayer Thickness: [**0.030 inch (0.76 mm)**] [**0.060 inch (1.52 mm)**] [**0.090 inch (2.29 mm)**].

6. Low-E Coating: [**Pyrolytic on second**] [**Pyrolytic on third**] [**Sputtered on second**] [**Sputtered on third**] [**Pyrolytic or sputtered on second or third**] surface.
7. Visible Light Transmittance: <**Insert value**> percent minimum.
8. Winter Nighttime U-Factor: <**Insert value**> maximum.
9. Summer Daytime U-Factor: <**Insert value**> maximum.
10. Solar Heat Gain Coefficient: <**Insert value**> maximum.
11. Provide safety glazing labeling.

E. Glass Type [**GL-**<#>]: Reflective-coated, clear, insulating laminated glass.

1. Overall Unit Thickness: [**1-3/16 inch (30 mm)**] [**1 inch (25 mm)**] <**Insert dimension**>.
2. Thickness of Outdoor Lite: [**6.0 mm**] <**Insert thickness designation**>.
3. Outdoor Lite: Clear [**heat-strengthened float glass**] [**fully tempered float glass**].
4. Interspace Content: [**Air**] [**Argon**].
5. Indoor Lite: Clear laminated glass with two plies of [**float glass**] [**heat-strengthened float glass**] [**fully tempered float glass**].

    a. Thickness of Each Glass Ply: [**3.0 mm**] [**4.0 mm**] [**5.0 mm**] [**6.0 mm**] [**As indicated**] <**Insert thickness designation**>.
    b. Interlayer Thickness: [**0.030 inch (0.76 mm)**] [**0.060 inch (1.52 mm)**] [**0.090 inch (2.29 mm)**].

6. Coating Location: [**First**] [**Second**] [**Third**] surface.
7. Winter Nighttime U-Factor: <**Insert value**> maximum.

8. Summer Daytime U-Factor: <**Insert value**> maximum.
9. Solar Heat Gain Coefficient: <**Insert value**> maximum.
10. Provide safety glazing labeling.

F. Glass Type [**GL-**<#>]: Reflective-coated, tinted, insulating laminated glass.

1. Overall Unit Thickness: [**1-3/16 inch (30 mm)**] [**1 inch (25 mm)**] <**Insert dimension**>.
2. Thickness of Outdoor Lite: [**6.0 mm**] <**Insert thickness designation**>.
3. Outdoor Lite: Tinted [**heat-strengthened float glass**] [**fully tempered float glass**].
4. Interspace Content: [**Air**] [**Argon**].
5. Indoor Lite: Clear laminated glass with two plies of [**float glass**] [**heat-strengthened float glass**] [**fully tempered float glass**].

    a. Thickness of Each Glass Ply: [**3.0 mm**] [**4.0 mm**] [**5.0 mm**] [**6.0 mm**] [**As indicated**] <**Insert thickness designation**>.
    b. Interlayer Thickness: [**0.030 inch (0.76 mm)**] [**0.060 inch (1.52 mm)**] [**0.090 inch (2.29 mm)**].

6. Coating Location: [**First**] [**Second**] [**Third**] surface.
7. Winter Nighttime U-Factor: <**Insert value**> maximum.
8. Summer Daytime U-Factor: <**Insert value**> maximum.
9. Solar Heat Gain Coefficient: <**Insert value**> maximum.
10. Provide safety glazing labeling.

2.15 FIRE-PROTECTION-RATED GLAZING TYPES

A. Glass Type [**GL-**<#>]: 20-minute fire-rated glazing without hose-stream test; [**monolithic ceramic glazing**] [**film-faced ceramic glazing**] [**laminated ceramic glazing**] [**fire-protection-rated tempered glass**] [**fire-protection-rated laminated glass**] [**or**] [**gel-filled, double glazing units**].

1. Provide safety glazing labeling.

B. Glass Type [**GL-**<#>]: 20-minute fire-rated glazing with hose-stream test; [**monolithic ceramic glazing**] [**film-faced ceramic glazing**] [**laminated ceramic glazing**] [**or**] [**gel-filled, double glazing units**].

1. Provide safety glazing labeling.

C. Glass Type [**GL-**<#>]: [**45-minute**] [**60-minute**] [**90-minute**] [**120-minute**] fire-rated glazing; [**monolithic ceramic glazing**] [**film-faced ceramic glazing**] [**laminated ceramic glazing**] [**laminated glass with intumescent interlayers**] [**or**] [**gel-filled, double glazing units**].

1. Provide safety glazing labeling.

D. Glass Type [**GL-**<#>]: [**45-minute**] [**60-minute**] [**90-minute**] [**120-minute**] fire-rated glazing with 450 deg F (250 deg C) temperature rise limitation; [**laminated glass with intumescent interlayers**] [**or**] [**gel-filled, double glazing units**].

1. Provide safety glazing labeling.

PART 3 - EXECUTION

3.1 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.

3.2 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.

3.3 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.

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.

3.4 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.

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.

3.5 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.

3.6 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.

3.7 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.

3.8 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

SECTION 09 21 16- GYPSUM BOARD SHAFT WALL ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes: Gypsum board shaft wall assemblies.

1.3 ACTION SUBMITTALS

A. Product Data: For each component of gypsum board shaft wall assembly.

1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For shaft wall assemblies, from ICC-ES.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or with gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install interior products until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, moisture damaged, or mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: Provide materials and construction identical to those of assemblies tested according to ASTM E 90 and classified according to ASTM E 413 by a testing and inspecting agency.

C. Low-Emitting Materials: Gypsum shaft wall assemblies shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 GYPSUM BOARD SHAFT WALL ASSEMBLIES <**Insert drawing designation**>

A. Fire-Resistance Rating: [**As indicated**] [**1 hour**] [**2 hours**] [**3 hours**] [**4 hours**] <**Insert rating**>.

B. STC Rating: [**As indicated**] [**51, minimum**] <**Insert rating**>.

C. Studs: Manufacturer's standard profile for repetitive members, corner and end members, and fire-resistance-rated assembly indicated.

1. Depth: [**As indicated**] [**2-1/2 inches (64 mm)**] [**4 inches (102 mm)**] [**6 inches (152 mm)**].
2. Minimum Base-Metal Thickness: [**As indicated**] [**0.018 inch (0.45 mm)**] [**0.033 inch (0.84 mm)**] <**Insert value**>.

D. Runner Tracks: Manufacturer's standard J-profile track with manufacturer's standard long-leg length, but at least [**2 inches (51 mm)**] <**Insert dimension**> long and matching studs in depth.

1. Minimum Base-Metal Thickness: [**As indicated**] [**Matching steel studs**] [**0.018 inch (0.45 mm)**] [**0.021 inch (0.53 mm)**] [**0.033 inch (0.84 mm)**] <**Insert value**>.

E. Firestop Tracks: Provide firestop track at head of shaft wall on each floor level.

F. Elevator Hoistway Entrances: Manufacturer's standard J-profile jamb strut with long-leg length of 3 inches (76 mm), matching studs in depth, and not less than [**0.033 inch (0.84 mm)**] <**Insert dimension**> thick.

G. Room-Side Finish: [**As indicated**] [**Gypsum board**] [**Gypsum veneer plaster**] [**Cementitious backer units**] <**Insert finish**>.

H. Shaft-Side Finish: [**As indicated**] [**Gypsum shaftliner board, Type X**] [**Gypsum shaftliner board, moisture- and mold-resistant Type X**] [**As indicated by fire-resistance-rated assembly design designation**] <**Insert finish**>.

I. Insulation: Sound attenuation blankets.

2.3 PANEL PRODUCTS

A. Recycled Content of Gypsum Panel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than <**Insert number**> percent by weight.

B. Regional Materials: Gypsum panel products shall be manufactured within 500 miles (800 km) of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.

C. Regional Materials: Gypsum panel products shall be manufactured within 500 miles (800 km) of Project site.

D. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

E. Gypsum Shaftliner Board, Type X: ASTM C 1396/C 1396M; manufacturer's proprietary fire-resistive liner panels with paper faces.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. American Gypsum; Shaft Liner.
    b. CertainTeed Corp.; ProRoc Shaftliner.
    c. Georgia-Pacific Gypsum LLC, Subsidiary of Georgia Pacific; ToughRock Fireguard Shaftliner.
    d. Lafarge North America, Inc.; Firecheck Type X Shaftliner.
    e. National Gypsum Company; Gold Bond Brand Fire-Shield Shaftliner.
    f. PABCO Gypsum; Pabcore Shaftliner Type X.
    g. Temple-Inland Inc.; Fire-Rated SilentGuard Gypsum Shaftliner System.
    h. USG Corporation; Sheetrock Brand Gypsum Liner Panel.
    i. <**Insert manufacturer's name; product name or designation**>.

2. Thickness: 1 inch (25.4 mm).
3. Long Edges: Double bevel.

F. Gypsum Shaftliner Board, Moisture- and Mold-Resistant Type X: ASTM C 1396/C 1396M; manufacturer's proprietary fire-resistive liner panels with moisture- and mold-resistant core and surfaces.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. CertainTeed Corp.; ProRoc Moisture and Mold Resistant Shaftliner.
    b. Georgia-Pacific Gypsum LLC, Subsidiary of Georgia Pacific; Dens-Glass Ultra Shaftliner.
    c. Lafarge North America, Inc.; Firecheck Moldcheck Type X Shaftliner.
    d. National Gypsum Company; Gold Bond Brand Fire-Shield Shaftliner XP.
    e. PABCO Gypsum; Pabcore Mold Curb Shaftliner Type X.
    f. Temple-Inland Inc.; Fire-Rated SilentGuard TS Mold-Resistant Gypsum Shaftliner System.
    g. USG Corporation; Sheetrock Brand Mold Tough Gypsum Liner Panel.
    h. <**Insert manufacturer's name; product name or designation**>.

2. Thickness: 1 inch (25.4 mm).
3. Long Edges: Double bevel.
4. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

G. Gypsum Board: As specified in Division 09 Section "Gypsum Board."

H. Gypsum Base for Gypsum Veneer Plaster: As specified in Division 09 Section "Gypsum Veneer Plastering."

I. Cementitious Backer Units: As specified in [**Division 09 Section "Gypsum Board."**] [**Division 09 Section "Tiling."**]

2.4 NON-LOAD-BEARING STEEL FRAMING

A. Recycled Content of Steel: Postconsumer recycled content plus one-half of preconsumer recycled content not less than [**25**] <**Insert number**> percent.

B. Steel Framing Members: Comply with ASTM C 645 requirements for metal unless otherwise indicated.

1. Protective Coating: [**Coating with equivalent corrosion resistance of ASTM A 653/A 653M, G40 (Z120)**] [**ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized**] [**ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized**] unless otherwise indicated.

C. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Fire Trak Corp.; Fire Trak System[**attached to studs with Fire Trak Posi Klip**].
b. Grace Construction Products; FlameSafe FlowTrak System.
c. Metal-Lite, Inc.; The System.
d. Steel Network Inc. (The); [**VertiClip SLD**] [**VertiTrack VTD**] Series.
e. <**Insert manufacturer's name; product name or designation**>.

2.5 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with manufacturer's written recommendations.

B. Trim Accessories: Cornerbead, edge trim, and control joints of material and shapes as specified in [**Division 09 Section "Gypsum Board"**] [**Division 09 Section "Gypsum Veneer Plastering"**] that comply with gypsum board shaft wall assembly manufacturer's written recommendations for application indicated.

C. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.

D. Track Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on shaft wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.

1. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing according to ASTM E 488 conducted by a qualified testing agency.
2. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing according to ASTM E 1190 conducted by a qualified testing agency.

E. Sound Attenuation Blankets: As specified in [**Division 09 Section "Gypsum Board."**] [**Division 09 Section "Gypsum Veneer Plastering."**]

F. Acoustical Sealant: As specified in [**Division 09 Section "Gypsum Board."**] [**Division 09 Section "Gypsum Veneer Plastering."**]

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to which gypsum board shaft wall assemblies attach or abut, with Installer present, including hollow-metal frames, elevator hoistway door frames, cast-in anchors, and structural framing. Examine for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Sprayed Fire-Resistive Materials: Coordinate with gypsum board shaft wall assemblies so both elements of Work remain complete and undamaged. Patch or replace sprayed fire-resistive materials removed or damaged during installation of shaft wall assemblies to comply with requirements specified in Division 07 Section "Applied Fireproofing."

B. After sprayed fire-resistive materials are applied, remove only to extent necessary for installation of gypsum board shaft wall assemblies and without reducing the fire-resistive material thickness below that which is required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

3.3 INSTALLATION

A. General: Install gypsum board shaft wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated, manufacturer's written installation instructions, and ASTM C 754 other than stud-spacing requirements.

B. Do not bridge building expansion joints with shaft wall assemblies; frame both sides of expansion joints with furring and other support.

C. Install supplementary framing in gypsum board shaft wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, wall-mounted door stops, and similar items that cannot be supported directly by shaft wall assembly framing.

1. Elevator Hoistway: At elevator hoistway-entrance door frames, provide jamb struts on each side of door frame.
2. Reinforcing: Where handrails directly attach to gypsum board shaft wall assemblies, provide galvanized steel reinforcing strip with [**0.033-inch (0.84-mm)**] <**Insert dimension**> minimum thickness of base metal (uncoated), accurately positioned and secured behind at least one layer of face panel.

D. Penetrations: At penetrations in shaft wall, maintain fire-resistance rating of shaft wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons, elevator floor indicators, and similar items.

E. Isolate perimeter of gypsum panels from building structure to prevent cracking of panels, while maintaining continuity of fire-rated construction.

F. Firestop Tracks: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

G. Control Joints: Install control joints [**at locations indicated on Drawings**] [**according to ASTM C 840 and in specific locations approved by Architect**] while maintaining fire-resistance rating of gypsum board shaft wall assemblies.

H. Sound-Rated Shaft Wall Assemblies: Seal gypsum board shaft walls with acoustical sealant at perimeter of each assembly where it abuts other work and at joints and penetrations within each assembly.

I. Cant Panels: At projections into shaft [**exceeding 4 inches (102 mm)**] [**where indicated**], install 1/2- or 5/8-inch- (13- or 16-mm-) thick gypsum board cants covering tops of projections.

1. Slope cant panels at least 75 degrees from horizontal. Set base edge of panels in adhesive and secure top edges to shaft walls at 24 inches (610 mm) o.c. with screws fastened to shaft wall framing.
2. Where steel framing is required to support gypsum board cants, install framing at 24 inches (610 mm) o.c. and extend studs from the projection to shaft wall framing.

J. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

3.4 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, or mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and 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 092116.23

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

B. STC-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 90 and classified per ASTM E 413 by a qualified independent testing and inspecting agency.

2.2 METAL FRAMING AND SUPPORTS

A. Steel Framing Members, General: ASTM C 754.

1. Steel Sheet Components: ASTM C 645. Thickness specified is minimum uncoated base-metal thickness.
2. Protective Coating: Coating with equivalent corrosion resistance of ASTM A 653/A 653M, G40 zinc coating.

B. Framing Systems:

1. Studs and Runners: In depth indicated and guage as required by span unless otherwise indicated.
2. Flat Strap and Backing: 0.033 inch thick.
3. Hat-Shaped, Rigid Furring Channels: In depth indicated 0.033 inch thick.
4. Resilient Furring Channels: 1/2 inch deep, with single- or double-leg configuration.
5. Cold-Rolled Furring Channels: 0.053 inch thick, 3/4 inch deep.
6. Z-Furring: In depth required by insulation, 1-1/4-inch face flange, 7/8-inch wall-attachment flange, and 0.018 inch thick.

2.3 ACCESSORIES

A. General: Comply with referenced installation standards.

1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Asphalt felt or foam gasket.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install steel framing to comply with ASTM C 754."

1. Gypsum Plaster Assemblies: Also comply with ASTM C 841.
2. Portland Cement Plaster Assemblies: Also comply with ASTM C 1063.
3. Gypsum Veneer Plaster Assemblies: Also comply with ASTM C 844.
4. Gypsum Board Assemblies: Also comply with ASTM C 840.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Isolate steel framing from building structure, except at floor, to prevent transfer of loading imposed by structural movement.

1. Where studs are installed directly against exterior walls, install isolation strip between studs and wall.

D. Fire-Resistance-Rated Assemblies: Comply with requirements of listed assemblies.

E. Install suspension systems level to within 1/8 inch in 12 feet.

END OF SECTION 092216

SECTION 092300 - GYPSUM PLASTERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Gypsum plasterwork on [**expanded-metal lath**] [**unit masonry**] [**and**] [**monolithic concrete**].
2. Solid-plaster partitions.

B. Related Sections:

1. Division 05 Section "Cold-Formed Metal Framing" for structural, load-bearing (transverse and axial) steel studs and joists that support lath and gypsum plaster.
2. Division 06 Section "Rough Carpentry" for wood framing and furring that support lath and gypsum plaster.
3. Division 07 Section "Thermal Insulation" for thermal insulations and vapor retarders included in gypsum plaster assemblies.
4. Division 09 Section "Non-Structural Metal Framing" for non-load-bearing steel framing and furring that support lath and gypsum plaster.
5. Division 09 Section "Portland Cement Plastering" for interior portland cement plaster and exterior portland cement plaster (stucco) and associated laths.
6. Division 09 Section "Gypsum Veneer Plastering" for gypsum-based veneer plaster applied on gypsum base for veneer plaster, unit masonry, and monolithic concrete.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show locations and installation of control and expansion joints including plans, elevations, sections, details of components, and attachments to other work.

1.4 QUALITY ASSURANCE

A. Fire-Resistance Ratings: Where indicated, provide gypsum plaster assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

B. Sound Transmission Characteristics: Where indicated, provide gypsum plaster assemblies identical to those of assemblies tested for STC ratings per ASTM E 90 and classified according to ASTM E 413 by a qualified testing agency.

C. Mockups: Before plastering, install mockups of at least 100 sq. ft in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Install mockups for the following applications:

a. Troweled Finishes: Surfaces indicated to receive nontextured paint finishes.
b. Surfaces with float finishes.

2. Simulate finished lighting conditions for review of mockups.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

1.6 PROJECT CONDITIONS

A. Comply with ASTM C 842 requirements or gypsum plaster manufacturer's written recommendations, whichever are more stringent.

B. Room Temperatures: Maintain temperatures at not less than 55 deg F or greater than 80 deg F for at least seven days before application of gypsum plaster, continuously during application, and for seven days after plaster has set or until plaster has dried.

C. Avoid conditions that result in gypsum plaster drying out too quickly.

1. Distribute heat evenly; prevent concentrated or uneven heat on plaster.
2. Maintain relative humidity levels for prevailing ambient temperature that produce normal drying conditions.
3. Ventilate building spaces in a manner that prevents drafts of air from contacting surfaces during plaster application and until plaster is dry.

PART 2 - PRODUCTS

2.1 STEEL FRAMING FOR SOLID-PLASTER PARTITIONS

A. Components, General: Comply with ASTM C 841. For steel sheet components not included in ASTM C 841, comply with ASTM C 645 requirements for metal unless otherwise indicated.

B. Channel Studs: As required to coordinate with existing conditions and support loads.

C. Runners: As required to coordinate with existing conditions and support loads.

2.2 EXPANDED-METAL LATH

A. Expanded-Metal Lath: ASTM C 847, cold-rolled carbon-steel sheet, ASTM A 653/A 653M, G60, hot-dip galvanized zinc coated.

1. Recycled Content: Provide steel products with average recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

2.3 ACCESSORIES

A. General: Comply with ASTM C 841 and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.

B. Metal Accessories:

1. Cornerite: Fabricated from expanded-metal lath with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating.
2. Striplath: Fabricated from expanded-metal lath with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating.
3. Cornerbeads: Fabricated from [**zinc**] [**or**] [**zinc-coated (galvanized) steel**].

    a. Small nose cornerbead with expanded flanges; use unless otherwise indicated.
    b. Small nose cornerbead with perforated flanges; use on curved corners.
    c. Small nose cornerbead with expanded flanges reinforced by perforated stiffening rib; use on columns and for finishing unit masonry corners.
    d. Bull nose cornerbead, radius 3/4 inch (19.1 mm) minimum, with expanded flanges; use at locations indicated on Drawings.

4. Casing Beads: Fabricated from [**zinc**] [**or**] [**zinc-coated (galvanized) steel**]; square-edged style; with expanded flanges.
5. Control Joints: Fabricated from [**zinc**] [**or**] [**zinc-coated (galvanized) steel**]; 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.
6. Expansion Joints: Fabricated from [**zinc**] [**or**] [**zinc-coated (galvanized) steel**]; folded pair of unperforated screeds in M-shaped configuration; with expanded flanges.
7. Two-Piece Expansion Joints: Fabricated from [**zinc**] [**or**] [**zinc-coated (galvanized) steel**]; formed to produce slip-joint and square-edged reveal that is adjustable from 1/4 to 5/8 inch (6 to 16 mm) wide; with perforated flanges.

C. Plastic Accessories: Fabricated from high-impact PVC.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. Alabama Metal Industries Corporation; a Gibraltar Industries company.
    b. Dietrich Metal Framing; a Worthington Industries company.
    c. Phillips Manufacturing Co.
    d. Plastic Components, Inc.
    e. Vinyl Corp.
    f. <**Insert manufacturer's name**>.

2. Cornerbeads: With perforated flanges.

    a. Small nose cornerbead; use unless otherwise indicated.
    b. Bull nose cornerbead, radius 3/4 inch (19.1 mm) minimum; use at locations indicated on Drawings.

3. Casing Beads: With perforated flanges in depth required to suit plaster bases indicated and flange length required to suit applications indicated.

    a. Square-edge style; use unless otherwise indicated.
    b. Bull-nose style, radius 3/4 inch (19.1 mm) minimum; use at locations indicated on Drawings.

4. 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.
5. Expansion Joints: Two-piece type, formed to produce slip-joint and square-edged [**1/2-inch- (13-mm-)**] [**1-inch- (25.4-mm-)**] [**1-1/2-inch- (38.1-mm-)**] <**Insert dimension**> wide reveal; with perforated concealed flanges.

D. Aluminum Trim: Extruded accessories of profiles and dimensions indicated on Drawings.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. Fry Reglet Corporation.
    b. Gordon, Inc.
    c. MM Systems Corporation.
    d. Pittcon Industries.
    e. <**Insert manufacturer's name**>.

2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221 (ASTM B 221M), Alloy 6063-T5.
3. Finish: [**Mill**] [**Chemical-conversion coating, ASTM D 1730, Type B, compatible with field-applied finish coatings specified**] <**Insert requirements for anodic or other factory-applied coatings**>.

2.4 MISCELLANEOUS MATERIALS

A. Water for Mixing and Finishing Plaster: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.

B. Bonding Compound: ASTM C 631.

C. Steel Drill Screws: For metal-to-metal fastening, ASTM C 1002 or ASTM C 954, as required by thickness of metal being fastened; with pan head that is suitable for application; in lengths required to achieve penetration through joined materials of no fewer than three exposed threads.

D. Fasteners for Attaching Metal Lath to Substrates: Complying with ASTM C 841.

E. Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, not less than 0.0475-inch (1.21-mm) diameter, unless otherwise indicated.

F. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of rated assembly.
2. Recycled Content: Provide blankets with recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of <**Insert number**> percent by weight.

G. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants."

1. Provide sealants that have a VOC content of [**250**] <**Insert limit**> g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.5 BASE-COAT PLASTER MATERIALS

A. Base-Coat Plasters, General: ASTM C 28/C 28M.

B. Lightweight Gypsum Ready-Mixed Plaster: With mill-mixed perlite aggregate.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. National Gypsum Company; Gold Bond Gypsolite.
b. USG Corporation; Structo-Lite.
c. <**Insert manufacturer's name; product name or designation**>.

C. Gypsum Neat Plaster: For use with job-mixed aggregates.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. National Gypsum Company; Gold Bond Two-Way Hardwall Plaster.
b. USG Corporation; Red Top Gypsum Plaster.
c. <**Insert manufacturer's name; product name or designation**>.

D. Gypsum Wood-Fibered Plaster:

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. USG Corporation; Red Top Wood Fiber Plaster.
b. <**Insert manufacturer's name; product name or designation**>.

E. High-Strength Gypsum Neat Plaster: With a minimum, average, dry compressive strength of 2800 psi (19 MPa) per ASTM C 472 for a mix of 100 lb (45 kg) of plaster and 2 cu. ft. (0.06 cu. m) of sand.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. USG Corporation; Structo-Base.
b. <**Insert manufacturer's name; product name or designation**>.

F. Aggregates for Base-Coat Plasters: ASTM C 35, [**sand**] [**and**] [**perlite**].

2.6 FINISH-COAT PLASTER MATERIALS

A. Gypsum Gaging Plaster: ASTM C 28/C 28M.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. National Gypsum Company; Gauging Plaster (Super-White).
b. USG Corporation; [**Champion Gauging**] [**Red Top Gauging Gypsum**] [**Star Gauging**] Plaster.
c. <**Insert manufacturer's name; product name or designation**>.

B. Gypsum Ready-Mixed Finish Plaster: Manufacturer's standard, mill-mixed, gaged, interior finish.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. National Gypsum Company; Gold Bond [**Kal-Kote Smooth**] [**Kal-Kote Texture**] [**Uni-Kal**] [**X-KALibur**].
b. USG Corporation; [**Diamond Brand Interior Finish Plaster**] [**Imperial Finish Plaster**] [**Red Top Finish Plaster**].
c. <**Insert manufacturer's name; product name or designation**>.

C. High-Strength Gypsum Gaging Plaster: ASTM C 28/C 28M, with a minimum, average, dry compressive strength of 5000 psi (34 MPa) per ASTM C 472 for a neat mix.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. USG Corporation; Structo-Gauge.
b. <**Insert manufacturer's name; product name or designation**>.

D. Gypsum Keene's Cement: ASTM C 61/C 61M.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. USG Corporation; Red Top Keene's Cement.
    b. <**Insert manufacturer's name; product name or designation**>.

E. Lime: ASTM C 206, Type S, special finishing hydrated lime.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. USG Corporation; [**Ivory**] [**Snowdrift**] Finish Lime.
    b. <**Insert manufacturer's name; product name or designation**>.

F. Lime: ASTM C 206, Type N, normal finishing hydrated lime.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. USG Corporation; Grand Prize Finish Lime.
    b. <**Insert manufacturer's name; product name or designation**>.

G. Aggregates for Float Finishes: ASTM C 35, [**sand**] [**perlite**]; graded per ASTM C 842.

2.7 PLASTER MIXES

A. Mixing: Comply with ASTM C 842 and manufacturer's written instructions for applications indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine nonstructural and structural metal framing, substrates, and hollow-metal frames, for compliance with requirements and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.

3.3 INSTALLATION, GENERAL

A. Fire-Resistance-Rated Assemblies: Install components according to requirements for design designations from listing organization and publication indicated on Drawings.

B. STC-Rated Assemblies: Install components according to requirements for design designations from listing organization and publication indicated on Drawings.

1. Seal construction at perimeters, behind control and expansion joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations.
2. Comply with ASTM C 919 and manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

C. Sound Attenuation Blankets: Where required, install blankets before installing lath unless blankets are readily installed after lath has been installed on one side.

D. Acoustical Sealant: Where required, seal joints between edges of plasterwork and abutting construction with acoustical sealant.

3.4 INSTALLING STEEL FRAMING FOR SOLID-PLASTER PARTITIONS

A. Install according to ASTM C 841.

B. Framing for Solid-Plaster Partitions: Provide channel stud to support expanded-metal lath construction.

1. Space channel studs at [**16 inches (406 mm)**] [**24 inches (610 mm)**] o.c. unless otherwise indicated.

C. Framing for Studless Solid-Plaster Partition: Provide top and bottom L-track runners to support expanded-metal lath.

3.5 INSTALLING EXPANDED-METAL LATH

A. Expanded-Metal Lath: Install according to ASTM C 841.

1. Partition Framing and Vertical Furring: Install [**flat diamond-mesh**] [**flat rib**] lath.
2. Flat-Ceiling and Horizontal Framing: Install [**flat diamond-mesh**] [**flat rib**] lath.
3. Curved-Ceiling Framing: Install flat diamond-mesh lath.
4. On Solid Surfaces, Not Otherwise Furred: Install self-furring, diamond-mesh lath.
5. Solid-Plaster Partitions: Where supported by channel studs, install [**flat rib**] [**flat diamond-mesh**] lath.
6. Studless Solid-Plaster Partitions: Install 3/8-inch (9.5-mm) rib lath.

3.6 INSTALLING ACCESSORIES

A. General: Install according to ASTM C 841.

B. Cornerbeads: Install at external corners.

C. Casing Beads: Install at terminations of plasterwork, except where plaster passes behind and is concealed by other work and where metal screeds, bases, or frames act as casing beads.

D. Control Joints: Install control joints [**at locations indicated on Drawings.**] [**with spacing between joints in either direction not exceeding the following and in specific locations approved by Architect for visual effect:**]

1. Partitions: 30 feet (9 m).
2. Ceilings: [**50 feet (15 m)**] [**30 feet (9 m)**].

3.7 PLASTER APPLICATION

A. General: Comply with ASTM C 842.

1. Do not deviate more than plus or minus 1/8 inch in 10 feet (3.1 mm in 3 m) from a true plane in finished plaster surfaces, as measured by a 10-foot (3-m) straightedge placed on surface.
2. Grout hollow-metal frames, bases, and similar work occurring in plastered areas, with base-coat plaster material, before lathing where necessary. Except where full grouting is indicated or required for fire-resistance rating, grout at least 6 inches (152 mm) at each jamb anchor.
3. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
4. Provide plaster surfaces that are ready to receive field-applied finishes indicated.

B. Bonding Compound: Apply on [**unit masonry**] [**and**] [**concrete**] plaster bases.

C. Base Coats:

1. Base Coats over Expanded-Metal Lath: [**High-strength gypsum**] [**Gypsum neat**] plaster with job-mixed sand for scratch and brown coats.
2. Base Coats over Expanded-Metal Lath:

    a. Scratch Coat: Gypsum wood-fibered plaster; neat or with job-mixed sand.
    b. Brown Coat: Gypsum [**wood-fibered plaster with job-mixed sand**] [**neat plaster with job-mixed sand**] [**lightweight ready-mixed plaster**] [**neat plaster with job-mixed perlite**].

3. Base Coats over Unit Masonry: Gypsum [**wood-fibered plaster with job-mixed sand**] [**neat plaster with job-mixed sand**] [**lightweight ready-mixed plaster**] <**Insert mix**>.
4. Base-Coat Mix over Monolithic Concrete: [**Gypsum neat plaster with job-mixed sand**] <**Insert mix**>.

D. Finish Coats:

1. Finish-Coat Mix for Smooth-Troweled Finishes: [**Gypsum gaging plaster**] [**Gypsum ready-mixed finish plaster**] [**High-strength gypsum gaging plaster**] [**Gypsum Keene's cement**] <**Insert finish-coat plaster**>.
2. Finish-Coat Mix for Float Finishes: [**Gypsum gaging plaster**] [**Gypsum Keene's cement**] <**Insert finish-coat plaster**>.

3. Finish-Coat Mix for Sprayed Finishes: [**Gypsum ready-mixed finish plaster**] <**Insert finish-coat plaster**>.
4. Finish-Coat Mix for Textured Finishes: [**Gypsum ready-mixed finish plaster**] <**Insert finish-coat plaster**>.

E. Plaster Finishes:

1. Provide troweled finish [**unless otherwise indicated**] [**where indicated**] <**Insert locations**>.
2. Provide float finish [**unless otherwise indicated**] [**where indicated**] <**Insert locations**>.
3. Provide sprayed finish [**unless otherwise indicated**] [**where indicated**] <**Insert locations**>.

    a. Sprayed Finish: [**Match Architect's sample**] <**Insert requirements**>.

4. Provide textured finish [**where indicated**] <**Insert locations**>.

    a. Textured Finish: [**Match Architect's sample**] <**Insert requirements**>.

F. Concealed Plaster:

1. Where plaster application will be concealed behind built-in cabinets, similar furnishings, and equipment, apply finish coat.
2. Where plaster application will be concealed above suspended ceilings and in similar locations, finish coat may be omitted.
3. Where plaster application will be used as a base for adhesive application of tile and similar finishes, finish coat may be omitted.

3.8 PLASTER REPAIRS

A. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

3.9 CLEANING AND PROTECTION

A. Remove temporary protection and enclosure of other work. Promptly remove plaster from door frames, windows, and other surfaces not indicated to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.

END OF SECTION 092300

SECTION 092400 - PORTLAND CEMENT PLASTERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Interior portland cement plasterwork on [**metal lath**] [**unit masonry**] [**and**] [**monolithic concrete**].
2. Exterior portland cement plasterwork (stucco) on [**metal lath**] [**unit masonry**] [**and**] [**monolithic concrete**].

B. Related Sections:

1. Division 05 Section "Cold-Formed Metal Framing" for structural, load-bearing (transverse and axial) steel studs and joists that support lath and portland cement plaster.
2. Division 06 Section "Rough Carpentry" for wood framing and furring included in portland cement plaster assemblies.
3. Division 06 Section "Sheathing" for sheathing and water-resistant barriers included in portland cement plaster assemblies.
4. Division 07 Section "Thermal Insulation" for thermal insulations and vapor retarders included in portland cement plaster assemblies.
5. Division 09 Section "Non-Structural Metal Framing" for non-structural framing and suspension systems that support lath and portland cement plaster.
6. Division 09 Section "Gypsum Plastering" for gypsum-based conventional plaster and associated lath.
7. Division 09 Section "Gypsum Veneer Plastering" for gypsum-based veneer plaster applied on gypsum base for veneer plaster, unit masonry, and monolithic concrete.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show locations and installation of control and expansion joints including plans, elevations, sections, details of components, and attachments to other work.

C. Samples for Initial Selection: For each type of factory-prepared finish coat indicated.

D. Samples for Verification: For each type of [**factory-prepared**] [**colored**] [**textured**] finish coat indicated; 12 by 12 inches (305 by 305 mm), and prepared on rigid backing.

1.4 QUALITY ASSURANCE

A. Fire-Resistance Ratings: Where indicated, provide portland cement plaster assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

B. Sound-Transmission Characteristics: Where indicated, provide portland cement plaster assemblies identical to those of assemblies tested for STC ratings per ASTM E 90 and classified according to ASTM E 413 by a qualified testing agency.

C. Mockups: Before plastering, install mockups of at least 100 sq. ft. (9.3 sq. m) in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Install mockups for each type of finish indicated.
2. For interior plasterwork, simulate finished lighting conditions for review of mockups.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

D. Preinstallation Conference: Conduct conference at [**Project site**] <**Insert location**>.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

1.6 PROJECT CONDITIONS

A. Comply with ASTM C 926 requirements.

B. Interior Plasterwork: Maintain room temperatures at greater than 40 deg F (4.4 deg C) for at least 48 hours before plaster application, and continuously during and after application.

1. Avoid conditions that result in plaster drying out during curing period. Distribute heat evenly; prevent concentrated or uneven heat on plaster.
2. Ventilate building spaces as required to remove water in excess of that required for hydrating plaster in a manner that prevents drafts of air from contacting surfaces during plaster application and until plaster is dry.

C. Exterior Plasterwork:

1. Apply and cure plaster to prevent plaster drying out during curing period. Use procedures required by climatic conditions, including moist curing, providing coverings, and providing barriers to deflect sunlight and wind.
2. Apply plaster when ambient temperature is greater than 40 deg F (4.4 deg C).
3. Protect plaster coats from freezing for not less than 48 hours after set of plaster coat has occurred.

D. Factory-Prepared Finishes: Comply with manufacturer's written recommendations for environmental conditions for applying finishes.

PART 2 - PRODUCTS

2.1 METAL LATH

A. Expanded-Metal Lath: ASTM C 847 with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating.

1. Recycled Content: Provide steel products with average recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than [**25**] <**Insert number**> percent.
2. Diamond-Mesh Lath: [**Flat**] [**Self-furring**], [**2.5 lb/sq. yd. (1.4 kg/sq. m)**] [**3.4 lb/sq. yd. (1.8 kg/sq. m)**].
3. Flat Rib Lath: Rib depth of not more than 1/8 inch (3.1 mm), [**2.75 lb/sq. yd. (1.5 kg/sq. m)**] [**3.4 lb/sq. yd. (1.8 kg/sq. m)**].
4. 3/8-Inch (9.5-mm) Rib Lath: [**3.4 lb/sq. yd. (1.8 kg/sq. m)**] [**4 lb/sq. yd. (2.2 kg/sq. m)**].

B. Wire-Fabric Lath:

1. Welded-Wire Lath: ASTM C 933; self-furring, [**1.4 lb/sq. yd. (0.8 kg/sq. m)**] [**1.95 lb/sq. yd. (1.1 kg/sq. m)**].
2. Woven-Wire Lath: ASTM C 1032; self-furring, with stiffener wire backing, [**1.1 lb/sq. yd. (0.6 kg/sq. m)**] [**1.4 lb/sq. yd. (0.8 kg/sq. m)**].

C. Paper Backing: FS UU-B-790, Type I, [**Grade D, Style 2 vapor-permeable paper**] [**Grade B, Style 1a vapor-retardant paper**] <**Insert requirements**>.

1. Provide paper-backed lath [**unless otherwise indicated**] [**at exterior locations**] [**in locations indicated on Drawings**] <**Insert locations**>.

2.2 ACCESSORIES

A. General: Comply with ASTM C 1063 and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.

B. Metal Accessories:

1. Foundation Weep Screed: Fabricated from hot-dip galvanized-steel sheet, ASTM A 653/A 653M, G60 (Z180) zinc coating.
2. Cornerite: Fabricated from metal lath with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating.
3. External-Corner Reinforcement: Fabricated from metal lath with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating.
4. Cornerbeads: Fabricated from [**zinc**] [**or**] [**zinc-coated (galvanized) steel**].

a. Small nose cornerbead with expanded flanges; use unless otherwise indicated.
b. Small nose cornerbead with perforated flanges; use on curved corners.
c. Small nose cornerbead with expanded flanges reinforced by perforated stiffening rib; use on columns and for finishing masonry corners.
d. Bull nose cornerbead, radius 3/4 inch (19.1 mm) minimum, with expanded flanges; use at locations indicated on Drawings.

5. Casing Beads: Fabricated from [**zinc**] [**or**] [**zinc-coated (galvanized) steel**]; square-edged style; with expanded flanges.
6. Control Joints: Fabricated from [**zinc**] [**or**] [**zinc-coated (galvanized) steel**]; 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.
7. Expansion Joints: Fabricated from [**zinc**] [**or**] [**zinc-coated (galvanized) steel**]; folded pair of unperforated screeds in M-shaped configuration; with expanded flanges.
8. Two-Piece Expansion Joints: Fabricated from [**zinc**] [**or**] [**zinc-coated (galvanized) steel**]; formed to produce slip-joint and square-edged reveal that is adjustable from 1/4 to 5/8 inch (6.34 to 16 mm) wide; with perforated flanges.

C. Plastic Accessories: Fabricated from high-impact PVC.

1. Cornerbeads: With perforated flanges.

   a. Small nose cornerbead; use unless otherwise indicated.
   b. Bull nose cornerbead, radius 3/4 inch (19.1 mm) minimum; use at locations indicated on Drawings.

2. Casing Beads: With perforated flanges in depth required to suit plaster bases indicated and flange length required to suit applications indicated.

   a. Square-edge style; use unless otherwise indicated.
   b. Bull-nose style, radius 3/4 inch (19.1 mm) minimum; use at locations indicated on Drawings.

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- (13-mm-)**] [**1-inch- (25-mm-)**] [**1-1/2-inch- (38-mm-)**] <**Insert dimension**> wide reveal; with perforated concealed flanges.

2.3 MISCELLANEOUS MATERIALS

A. Water for Mixing: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.

B. Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, 1/2 inch (13 mm) long, free of contaminants, manufactured for use in portland cement plaster.

C. Bonding Compound: ASTM C 932.

D. Steel Drill Screws: For metal-to-metal fastening, ASTM C 1002 or ASTM C 954, as required by thickness of metal being fastened; with pan head that is suitable for application; in lengths required to achieve penetration through joined materials of no fewer than three exposed threads.

E. Fasteners for Attaching Metal Lath to Substrates: Complying with ASTM C 1063.

F. Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, not less than 0.0475-inch (1.21-mm) diameter, unless otherwise indicated.

G. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
2. Recycled Content: Provide blankets with recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of <**Insert number**> percent by weight.

H. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants"

1. Provide sealants that have a VOC content of [**250**] <**Insert limit**> g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.4 PLASTER MATERIALS

A. Portland Cement: ASTM C 150, [**Type I**] [**Type II**].

1. Color for Finish Coats: [**White**] [**Gray**].

B. Masonry Cement: ASTM C 91, Type N.

1. Color for Finish Coats: [**White**] [**Gray**].

C. Plastic Cement: ASTM C 1328.

D. Colorants for Job-Mixed Finish Coats: Colorfast mineral pigments that produce finish plaster color [**to match Architect's sample**] <**Insert requirements**>.

E. Lime: ASTM C 206, Type S; or ASTM C 207, Type S.

F. Sand Aggregate: ASTM C 897.

1. Color for Job-Mixed Finish Coats: [**White**] [**In color matching Architect's sample**].

G. Perlite Aggregate: ASTM C 35.

H. Exposed Aggregates for Finish Coats: [**For marblecrete finish, clean, sound, crushed marble matching color and size gradation of Architect's sample**] <**Insert requirements**>.

I. Ready-Mixed Finish-Coat Plaster: Mill-mixed portland cement, aggregates, coloring agents, and proprietary ingredients.

1. Color: [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**].

J. Acrylic-Based Finish Coatings: Factory-mixed acrylic-emulsion coating systems, formulated with colorfast mineral pigments and fine aggregates; for use over portland cement plaster base coats. Include manufacturer's recommended primers and sealing topcoats for acrylic-based finishes.

1. Color: [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**].

2.5 PLASTER MIXES

A. General: Comply with ASTM C 926 for applications indicated.

1. Fiber Content: Add fiber to base-coat mixes after ingredients have mixed at least two minutes. Comply with fiber manufacturer's written instructions for fiber quantities in mixes, but do not exceed 1 lb of fiber/cu. yd. (0.6 kg of fiber/cu. m) of cementitious materials.

B. Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork as follows:

1. Portland Cement Mixes:

a. Scratch Coat: For cementitious material, mix 1 part portland cement and [**0 to 3/4**] [**3/4 to 1-1/2**] parts lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
b. Brown Coat: For cementitious material, mix 1 part portland cement and [**0 to 3/4**] [**3/4 to 1-1/2**] parts lime. Use 3 to 5 parts aggregate per part of cementitious material, but not less than volume of aggregate used in scratch coat.

2. Masonry Cement Mixes:

a. Scratch Coat: 1 part masonry cement and 2-1/2 to 4 parts aggregate.
b. Brown Coat: 1 part masonry cement and 3 to 5 parts aggregate, but not less than volume of aggregate used in scratch coat.

3. Portland and Masonry Cement Mixes:

a. Scratch Coat: For cementitious material, mix 1 part portland cement and 1 part masonry cement. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
b. Brown Coat: For cementitious material, mix 1 part portland cement and 1 part masonry cement. Use 3 to 5 parts aggregate per part of cementitious material, but not less than volume of aggregate used in scratch coat.

4. Plastic Cement Mixes:

a. Scratch Coat: 1 part plastic cement and 2-1/2 to 4 parts aggregate.
b. Brown Coat: 1 part plastic cement and 3 to 5 parts aggregate, but not less than volume of aggregate used in scratch coat.

5. Portland and Plastic Cement Mixes:

a. Scratch Coat: For cementitious material, mix 1 part plastic cement and 1 part portland cement. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
b. Brown Coat: For cementitious material, mix 1 part plastic cement and 1 part portland cement. Use 3 to 5 parts aggregate per part of cementitious material, but not less than volume of aggregate used in scratch coat.

C. Base-Coat Mixes: Single base coats for two-coat plasterwork as follows:

1. Portland Cement Mix: For cementitious material, mix 1 part portland cement and 0 to 3/4 part lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material.

2. Portland and Masonry Cement Mix: For cementitious material, mix 1 part portland cement and 1 part masonry cement. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
3. Plastic Cement Mix: Use 1 part plastic cement and 2-1/2 to 4 parts aggregate.

D. Base-Coat Mixes: Single base coats for two-coat plasterwork as follows:

1. Portland Cement Mix: For cementitious material, mix 1 part portland cement and 3/4 to 1-1/2 parts lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
2. Masonry Cement Mix: Use 1 part masonry cement and 2-1/2 to 4 parts aggregate.
3. Plastic Cement Mix: Use 1 part plastic cement and 2-1/2 to 4 parts aggregate.

E. Job-Mixed Finish-Coat Mixes:

1. Portland Cement Mix: For cementitious materials, mix 1 part portland cement and [**3/4 to 1-1/2**] [**1-1/2 to 2**] parts lime. Use 1-1/2 to 3 parts aggregate per part of cementitious material.
2. Masonry Cement Mix: 1 part masonry cement and 1-1/2 to 3 parts aggregate.
3. Portland and Masonry Cement Mix: For cementitious materials, mix 1 part portland cement and 1 part masonry cement. Use 1-1/2 to 3 parts aggregate per part of cementitious material.
4. Plastic Cement Mix: 1 part plastic cement and 1-1/2 to 3 parts aggregate.

F. Factory-Prepared Finish-Coat Mixes: For [**ready-mixed finish-coat plasters**] [**acrylic-based finish coatings**], comply with manufacturer's written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.

B. Prepare solid substrates for plaster that are smooth or that do not have the suction capability required to bond with plaster according to ASTM C 926.

3.3 INSTALLATION, GENERAL

A. Fire-Resistance-Rated Assemblies: Install components according to requirements for design designations from listing organization and publication indicated on Drawings.

B. Sound Attenuation Blankets: Where required, install blankets before installing lath unless blankets are readily installed after lath has been installed on one side.

C. Acoustical Sealant: Where required, seal joints between edges of plasterwork and abutting construction with acoustical sealant.

3.4 INSTALLING METAL LATH

A. Expanded-Metal Lath: Install according to ASTM C 1063.

1. Partition Framing and Vertical Furring: Install [**flat diamond-mesh**] [**flat rib**] [**welded-wire**] [**woven-wire**] lath.
2. Flat-Ceiling and Horizontal Framing: Install [**flat diamond-mesh**] [**flat rib**] [**3/8-inch (9.5-mm) rib lath**] [**welded-wire**] [**woven-wire**] lath.
3. Curved-Ceiling Framing: Install [**flat diamond-mesh**] [**welded-wire**] [**flat woven-wire**] lath.
4. On Solid Surfaces, Not Otherwise Furred: Install self-furring, [**diamond-mesh**] [**welded-wire**] [**woven-wire**] lath.

3.5 INSTALLING ACCESSORIES

A. Install according to ASTM C 1063 and at locations indicated on Drawings.

B. Reinforcement for External Corners:

1. Install lath-type, external-corner reinforcement at exterior locations.
2. Install cornerbead at interior[**and exterior**] locations.

C. Control Joints: Install control joints [**at locations indicated on Drawings.**] [**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.

3.6 PLASTER APPLICATION

A. General: Comply with ASTM C 926.

1. Do not deviate more than plus or minus 1/4 inch in 10 feet (6.4 mm in 3 m) from a true plane in finished plaster surfaces, as measured by a 10-foot (3-m) straightedge placed on surface.

2. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
3. Provide plaster surfaces that are ready to receive field-applied finishes indicated.

B. Bonding Compound: Apply on [**unit masonry**] [**and**] [**concrete**] plaster bases.

C. Walls; Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork[**, on masonry**] [**, on concrete**]; 3/4-inch (19-mm) thickness.

1. Portland cement mixes.
2. Masonry cement mixes.
3. Portland and masonry cement mixes.
4. Plastic cement mixes.
5. Portland and plastic cement mixes.

D. Ceilings; Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork; [**1/2 inch (13 mm) thick**] [**3/4 inch (19 mm) thick on concrete**].

1. Portland cement mixes.
2. Masonry cement mixes.
3. Portland and masonry cement mixes.
4. Plastic cement mixes.
5. Portland and plastic cement mixes.

E. Walls; Base-Coat Mix: Scratch coat for two-coat plasterwork[**, 3/8 inch (10 mm) thick on concrete masonry**] [**, 1/4 inch (6 mm) thick on concrete**].

1. Portland cement mixes.
2. Masonry cement mixes.
3. Portland and masonry cement mixes.
4. Plastic cement mixes.
5. Portland and plastic cement mixes.

F. Ceilings; Base-Coat Mix: Scratch coat for two-coat plasterwork, 1/4 inch (6 mm) thick on concrete.

1. Portland cement mixes.
2. Masonry cement mixes.
3. Portland and masonry cement mixes.
4. Plastic cement mixes.
5. Portland and plastic cement mixes.

G. Plaster Finish Coats: Apply to provide [**float**] [**dash**] [**scraped trowel-textured**] [**skip trowel-textured**] [**brocade (knock-down dash)**] [**trowel sweep**] [**combed**] [**sacked (California mission)**] [**English**] [**marblecrete**] <**Insert requirements**> finish to match Architect's sample.

H. Acrylic-Based Finish Coatings: Apply coating system, including primers, finish coats, and sealing topcoats, according to manufacturer's written instructions.

I. Concealed Exterior Plasterwork: Where plaster application will be used as a base for adhered finishes, omit finish coat.

J. Concealed Interior Plasterwork:

1. Where plaster application will be concealed behind built-in cabinets, similar furnishings, and equipment, apply finish coat.
2. Where plaster application will be concealed above suspended ceilings and in similar locations, finish coat may be omitted.
3. Where plaster application will be used as a base for adhesive application of tile and similar finishes, omit finish coat.

3.7 PLASTER REPAIRS

A. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

3.8 PROTECTION

A. Remove temporary protection and enclosure of other work. Promptly remove plaster from door frames, windows, and other surfaces not indicated to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.

END OF SECTION 092400

SECTION 092613 - GYPSUM VENEER PLASTERING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

B. STC-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 90 and classified per ASTM E 413 by a qualified independent testing and inspecting agency.

2.2 GYPSUM VENEER PLASTER

A. Gypsum Veneer Plaster: ASTM C 587, two-component veneer plaster system.

1. Two-Component Gypsum Veneer Plaster:

a. Products: One of the following or approved equal:

1) National Gypsum Company: Gold Bone Kal-Kote Basecoat Veneer Plaster and Kal-Kote Smooth Finish.
2) USG Corporation: Diamond Veneer Basecoat Plaster and Diamond Interior Finish Plaster.

2.3 PANEL PRODUCTS

A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

B. Gypsum Base for Veneer Plaster: ASTM C 1396/C 1396M, in thicknesses indicated. Regular type unless otherwise indicated.

1. Products: One of the following or approved equal:

a. CertainTeed Corp.; ProRoc Veneer Plaster Base.
b. Georgia-Pacific Gypsum LLC, Subsidiary of Georgia Pacific; Tough Rock Veneer Plaster Base.
c. Lafarge North America Inc.; Plasterbase.

d. National Gypsum Company; Kal-Core Regular.
e. USG Corporation; Imperial Regular Gypsum Base.

C. Backing Panels for Multilayer Application: ASTM C 1396/C 1396M, in thicknesses indicated. Same type as face layer unless otherwise indicated.

D. Cementitious Backer Units: ANSI A118.9 or ASTM C 1288, in thicknesses indicated.

2.4 ACCESSORIES

A. Trim Accessories: ASTM C 1047 and veneer plaster manufacturer's recommendations for application indicated.

1. Provide cornerbead at outside corners unless otherwise indicated.
2. Provide LC-bead (J-bead) at exposed panel edges.
3. Provide control joints where indicated.

B. Material: Formed metal or metal combined with paper; with metal complying with the requirement; sheet steel coated with zinc by hot-dip or electrolytic processes, or aluminum.

C. Joint-Reinforcing Materials: ASTM C 587.

1. Joint Tape: As recommended by gypsum veneer plaster manufacturer for applications indicated.
2. Embedding Material: As recommended by gypsum veneer plaster manufacturer.

D. Cementitious Backer Unit Joint-Treatment Materials: As recommended by cementitious backer unit manufacturer.

E. Bonding Agent: ASTM C 631, polyvinyl acetate.

F. Sound-Attenuation Blankets: ASTM C 665, Type I (unfaced).

G. Acoustical Sealant for Exposed and Concealed Joints: Nonsag, paintable, nonstaining latex sealant complying with ASTM C 834.

1. Sealants shall have a VOC content of 250 g/L or less.
2. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install panel products to comply with ASTM C 844 and as follows:

1. Isolate veneer plaster assemblies from abutting structural and masonry work. Provide edge trim and acoustical sealant.
2. Multilayer Fastening Methods: Fasten base layers as indicated in wall type.

B. STC-Rated Assemblies: Comply with ASTM C 919 for locating edge trim and closing off sound-flanking paths around or through assemblies.

C. Fire-Resistance-Rated Assemblies: Comply with requirements of listed assemblies.

D. Cementitious Backer Units: Comply with ANSI A108.11.

E. Apply bonding agent to dry concrete and cementitious backer units.

F. Apply gypsum veneer plaster to comply with ASTM C 843 and manufacturer's written recommendations.

1. Two-Component Gypsum Veneer Plaster: Trowel apply base coat over substrate to uniform thickness of 1/16 to 3/32 inch (1.6 to 2.4 mm). Fill all voids and imperfections. Trowel apply finish-coat plaster over base-coat plaster to uniform thickness of 1/16 to 3/32 inch (1.6 to 2.4 mm).
2. Where gypsum veneer plaster abuts only metal door frames, windows, and other units, groove finish coat to eliminate spalling.
3. Provide smooth-troweled finish.

END OF SECTION 092613

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SECTION 092713 - GLASS-FIBER REINFORCED PLASTER (GFRP) FABRICATIONS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:
1. Product Data
2. Shop Drawings
3. Samples

PART 2 - PRODUCTS

2.1 MATERIALS

A. Glass-Fiber Reinforced Plaster (GFRP) Fabrications: Molded, glass-fiber-reinforced gypsum units complying with ASTM C 1381/C 1381M.

1. Embedments: As standard with GFRP fabrication manufacturer and as required for reinforcement and for anchorage to substrates and framing.

B. Adhesives: As recommended by GFRP manufacturer.

1. Adhesive shall have a VOC content of 50 g/L or less.
2. Adhesive shall comply with Green Seal's GS-36 and with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Steel Drill Screws: Of sufficient length and size to securely fasten GFRP fabrications to framing members.

D. Joint-Treatment Materials: ASTM C 475/C 475M.

2.2 FABRICATION

A. Fabricate GFRP units to comply with ASTM C 1381/C 1381M, with smooth-finished surfaces; repair surface imperfections. Fabricate units in sizes that will minimize number of joints between abutting units.

B. Embedments: Incorporate embedments into units to develop the full strength of GFRP fabrications. Cover embedments with not less than 3/16-inch thickness of GFRP composite.

C. Connection Hardware: Designed and fabricated to support and connect GFRP fabrications.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with requirements in ASTM C 1467/C 1467M.

B. Acclimatize GFRP fabrications to ambient temperature and humidity of spaces in which they will be installed for not less than 48 hours before installing them.

C. Install GFRP fabrications level, plumb, true, and aligned with adjacent materials. Use concealed shims where required for alignment.

D. Predrill fastener holes. Fasten as required to comply with dimensional tolerances and not less than 5/16 inch from edges or ends of units.

E. Attach pieces at joints with adhesive, and band or brace together until adhesive is cured.

F. Use joint-treatment materials to finish GFRP fabrications to produce surfaces ready to receive primers and paint finishes.

1. Finish joints between units and countersunk fastener heads to comply with ASTM C 840 for Level 4 and to match surface texture of units.

END OF SECTION 092713

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

B. STC-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 90 and classified per ASTM E 413 by a qualified independent testing and inspecting agency.

2.2 PANEL PRODUCTS

A. Provide in maximum lengths available to minimize end-to-end butt joints.

B. Interior Gypsum Board: ASTM C 1396/C 1396M, in thickness indicated, with manufacturer's standard edges. Type as required for specific fire-resistance-rated assemblies, sag-resistant type for ceiling surfaces.

C. Water-Resistant Gypsum Backing Board: ASTM C 1396/C 1396M, in thickness indicated. Type X where required for fire-resistance-rated assemblies and where indicated.

D. Glass-Mat, Water-Resistant Gypsum Backing Board: ASTM C 1178/C 1178M, of thickness indicated. Type X where required for fire-resistance-rated assemblies and where indicated.

E. Cementitious Backer Units: ANSI A118.9, ASTM C 1288, or ASTM C 1325.

2.3 ACCESSORIES

A. Trim Accessories: ASTM C 1047, formed from galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet. For exterior trim, use accessories formed from hot-dip galvanized-steel sheet, plastic, or rolled zinc.

1. Provide cornerbead at outside corners unless otherwise indicated.
2. Provide LC-bead (J-bead) at exposed panel edges.
3. Provide control joints where indicated.

B. Aluminum Accessories: Extruded-aluminum accessories indicated with Class II, clear anodic finish.

C. Joint-Treatment Materials: ASTM C 475/C 475M.

1. Joint Tape: Paper unless otherwise recommended by panel manufacturer.
2. Joint Compounds: Setting-type compounds or drying-type, ready-mixed, all-purpose compounds as required to coordinate and match existing adjacent surfaces.
3. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound or drying-type, all-purpose compound or high-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish.
4. Cementitious Backer Unit Joint-Treatment Materials: Products recommended by cementitious backer unit manufacturer.

D. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

1. Adhesive shall have a VOC content of 50 g/L or less.

E. Acoustical Sealant for Exposed and Concealed Joints: Nonsag, paintable, nonstaining latex sealant complying with ASTM C 834.

1. Sealants shall have a VOC content of 250 g/L or less.

F. Sound-Attenuation Blankets: ASTM C 665, Type I (unfaced).

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install gypsum board to comply with ASTM C 840.

1. Isolate gypsum board assemblies from abutting structural and masonry work. Provide edge trim and acoustical sealant.
2. Single-Layer Fastening Methods: Fasten gypsum panels to supports with screws.
3. Multilayer Fastening Methods: Fasten base layers and face layer separately to supports with screws

B. Install cementitious backer units to comply with ANSI A108.11.

C. Fire-Resistance-Rated Assemblies: Comply with requirements of listed assemblies.

D. Finishing Gypsum Board: ASTM C 840.

1. At concealed areas, unless a higher level of finish is required for fire-resistance-rated assemblies, provide Level 1 finish: Embed tape at joints.
2. At substrates for tile, provide Level 2 finish: Embed tape and apply separate first coat of joint compound to tape, fasteners, and trim flanges.
3. Unless otherwise indicated, provide Level 5 finish: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges. Apply skim coat to entire surface.

E. Glass-Mat, Water-Resistant Backing Panels: Finish according to manufacturer's written instructions.

F. Cementitious Backer Units: Finish according to manufacturer's written instructions.

G. 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.

END OF SECTION 092900

SECTION 093000 - TILING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals
1. Product Data: For each type of product indicated
2. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
3. Samples for Initial Selection: For each type of tile and grout indicated. Include Samples of accessories involving color selection.
4. Samples for Verification:
   a. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required. Make samples at least 12 inches square, but not fewer than 4 tiles. Use grout of type and in color or colors approved for completed Work.
   b. Full-size units of each type of trim and accessory for each color and finish required.
   c. Metal edge strips in 12-inch lengths.

B. Obtain tile of each type and color or finish from same production run for each contiguous area

C. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use.

PART 2 - PRODUCTS

2.1 CERAMIC TILE

A. Ceramic tile that complies with Standard grade requirements in ANSI A137.1, "Specifications for Ceramic Tile."

B. Tile Type[**CT-**<#>]: Unglazed, square-edged quarry tile.

1. Face Size: 6 by 6 inches
2. Thickness: 3/8 inch.
3. Wearing Surface: Abrasive aggregate embedded in surface.
4. Color and Pattern: As selected.
5. Grout Color: As selected.
6. Trim Units: Coordinated with sizes and coursing of adjoining flat tile and matching characteristics of adjoining flat tile:

   a. Base: Coved with surface bullnose top edge.

C. Tile Type[**CT-**<#>]: Glazed natural clay or porcelain paver tile.

1. Face Size: As shown in drawings.
2. Thickness: 1/4 inch.
3. Face: Plain with square edges.
4. Finish: Mat, opaque glaze.
5. Color and Pattern: As selected.
6. Grout Color: As selected.
7. Trim Units: Coordinated with sizes and coursing of adjoining flat tile and matching characteristics of adjoining flat tile:

    a. Base: Coved.
    b. Base Cap for Thin-Set Mortar Installations: Surface bullnose.
    c. External Corners for Thin-Set Mortar Installations: Surface bullnose.
    d. Internal Corners: Field-butted square corners. For coved base and cap, use angle pieces designed to fit with stretcher shapes.

D. Tile Type[**CT-**<#>]: Glazed wall tile.

1. Module Size: As shown in drawings.
2. Thickness: 5/16 inch.
3. Face: Pattern of design indicated, with manufacturer's standard edges.
4. Finish: Bright, opaque glaze.
5. Color and Pattern: As selected.
6. Grout Color: As selected.
7. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
    a. Base for Thin-Set Mortar Installations: Coved.
    b. Wainscot Cap for Thin-Set Mortar Installations: Surface bullnose.
    c. External Corners for Thin-Set Mortar Installations: Surface bullnose.
    d. Internal Corners: Field-butted square corners. For coved base and cap use angle pieces designed to fit with stretcher shapes.

2.2 INSTALLATION MATERIALS

A. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325, 1/2 inch thick.

B. Fiber-Cement Underlayment: ASTM C 1288, 1/2 inch thick.

C. Low-Emitting Materials: Adhesives and fluid-applied waterproofing membranes shall have a VOC content of 65 g/L or less.

D. Waterproofing Membranes for Thin-Set Installations: ANSI A118.10, fabric-faced chlorinated polyethylene, PVC, or polyethylene sheet product or unreinforced liquid-latex or elastomeric polymer product.

E. Setting and Grouting Materials: Comply with material standards in ANSI's "Specifications for the Installation of Ceramic Tile" that apply to materials and methods indicated.

1. Thin-Set Mortar Type: As recommended by manufacturer for substrate and installation type.

2. Water-Cleanable, Tile-Setting Epoxy:

3. Organic Adhesive: ANSI A136.1, Type I.

4. Grout Type: Water-cleanable epoxy, unless otherwise indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of 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.

1. For installations indicated below, follow procedures in ANSI's "Specifications for the Installation of Ceramic Tile" for providing 95 percent mortar coverage.
   a. Tile floors in wet areas.
   b. Tile floors composed of tiles 8 by 8 inches or larger.

B. 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.

C. Lay tile in grid pattern unless otherwise indicated. Align joints where adjoining tiles on floor, base, walls, and trim are the same size.

D. Install cementitious backer units and fiber-cement underlayment and treat joints according to ANSI A108.11.

E. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped maximum 1:50 toward drains.

F. Install waterproofing to comply with ANSI A108.13.

G. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

H. Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in latex-portland cement mortar (thin set).

I. Apply sealer to cleaned stone tile flooring according to sealer manufacturer's written instructions.

J. Interior Floor Tile Installation Method(s):
   1. Verify existing subfloor conditions in field comply with planned installation method.
      a. Accessibility at floor finish changes such as at thresholds must be maintained.
   2. Over Waterproof Membranes on Concrete Subfloors: TCA F122 (thin-set mortar).
   3. Over Wood Subfloors: TCA F141 (cement mortar bed with cleavage membrane)
   4. Over Waterproof Membranes on Wood Subfloors: TCA F143 (epoxy mortar and grout).

K. Interior Wall Tile Installation Method(s):

1. Over Wood Studs or Furring: TCA W244 (thin-set mortar on cementitious backer units or fiber cement underlayment.
2. Over Metal Studs or Furring: TCA W244 (thin-set mortar on cementitious backer units or fiber cement underlayment).

END OF SECTION 093000

SECTION 096400 - WOOD FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Field-refinished and patched wood flooring.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. See Section 01 81 13 GREEN BUILDING REQUIREMENTS for related requirements.

   1. Product Data for Section 5.504: For wood coatings or adhesives, documentation including printed statement of VOC content.

1.3 QUALITY ASSURANCE

A. Hardwood and Softwood Flooring: Comply with NOFMA's "Official Flooring Grading Rules" for species, grade, and cut.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver wood flooring materials in unopened cartons or bundles.

B. Protect wood flooring from exposure to moisture. Do not deliver wood flooring until after concrete, masonry, plaster, ceramic tile, and similar wet work is complete and dry.

C. Store wood flooring materials in a dry, warm, ventilated, weathertight location.

1.5 PROJECT CONDITIONS

A. Existing Conditions: Determine that surfaced to which finishes are to be applied are even, smooth, sound, clean, dry and free from defects affecting proper application.

   1. Notify Architect of any defective surface

      a. Patch and repair defective area.

B. Conditioning period begins not less than seven days before wood flooring installation, is continuous through installation, and continues not less than seven days after wood flooring installation.

1. Environmental Conditioning: Maintain an ambient temperature between 65 and 75 deg F (18 and 24 deg C) and relative humidity planned for building occupants in spaces to receive wood flooring during the conditioning period.
2. Wood Flooring Conditioning: Move wood flooring into spaces where it will be installed, no later than the beginning of the conditioning period.

    a. Do not install flooring until it adjusts to relative humidity of, and is at same temperature as, space where it is to be installed.
    b. Open sealed packages to allow wood flooring to acclimatize immediately on moving flooring into spaces in which it will be installed.

C. After conditioning period, maintain relative humidity and ambient temperature planned for building occupants.

D. Install factory-finished wood flooring after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 FIELD-FINISHED WOOD FLOORING

A. Wood flooring repairs: Provide wood flooring in sizes, grades and configurations as similar as possible to the original flooring.

B. Nails, screws, other fasteners as per flooring manufacturer's specifications.
1. Ring-shank flooring nails must be long enough to securely attach the flooring to substrate.
2. Where possible, nails shall be hidden from view.
3. When nails cannot be hidden, countersink nails and fill holes with manufacturer's recommended filler.
4. Nails must not split flooring.

C. Urethane Finish System: Complete water-based system of compatible components that is recommended by finish manufacturer for application indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:

    a. Basic Coatings, Inc.
    b. BonaKemi USA Inc.
    c. Dura Seal, Sherwin-Williams Company (The).
    d. Hillyard, Inc.
    e. Polo-Plaz Coatings; National Coatings Company.

2. VOC Content: When calculated according to 40 CFR 59, Subpart D (EPA Method 24), as follows or per Section 01 81 13 GREEN BUILDING REQUIREMENTS. Whichever is most stringent:

    a. Finish Coats and Floor Sealers: Not more than 350 g/L.
    b. Stains: Not more than 250 g/L.

3. Stain: Penetrating and nonfading type.

a. Color: Match existing flooring.

4. Floor Sealer: Pliable, penetrating type.
5. Finish Coats: Formulated for multicoat application on wood flooring.

D. Wood Filler: Compatible with finish system components and recommended by filler and finish manufacturers for use indicated. If required to match approved Samples, provide pigmented filler.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas and conditions, with Installer present, for compliance with requirements for maximum moisture content, installation tolerances, and other conditions affecting performance of wood flooring.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Carefully remove any floor-mounted elements and store in location selected by General Contractor.

B. Protect floor borders from damage during sanding and other floor refinishing operations.

C. Remove any damaged floor and patch.

1. Weave new wood flooring into existing flooring.

D. Machine sand the wood floor to remove stains, old finish, offsets, ridges, cups, and sanding-machine marks that would be noticeable after finishing.

1. See Section 02 41 19 SELECTRIVE STRUCTURAL DEMOLITION for any abatement requirements.

2. Belt and orbital sanders should only be used by experienced personnel due to ease of damage to wood substrate.

3. Sand floor in direction of wood grain. Remove only the amount of wood necessary to remove old finish, but not more than 1/16” depth.

4. Use hand-held sanders at edges of the floor.

5. Final sanding shall be with 00 grade sandpaper.

6. Vacuum clean, remove sanding dusted with tack cloth, and immediately apply stain finish.

7. Do not allow traffic on floor until final finishing is complete.

3.3 FIELD FINISHING

A. Apply floor-finish materials in number of coats recommended by finish manufacturer for application indicated, but not less than one coat of floor sealer and three finish coats.

1. Apply stains to achieve an even color distribution matching approved Samples.
2. For water-based finishes, use finishing methods recommended by finish manufacturer to minimize grain raise.

B. Cover wood flooring before finishing.

C. Do not cover wood flooring after finishing until finish reaches full cure, and not before seven days after applying last finish coat.

3.4 PROTECTION

A. Protect installed wood flooring during remainder of construction period with covering of heavy kraft paper or other suitable material. Do not use plastic sheet or film that might cause condensation.

1. Do not move heavy and sharp objects directly over kraft-paper-covered wood flooring. Protect flooring with plywood or hardboard panels to prevent damage from storing or moving objects over flooring.

END OF SECTION 096400

SECTION 096500 - RESILIENT FLOORING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data and Samples.

B. Extra Materials:

1. Resilient Wall Base: Deliver to Owner at least 20 linear feet of each type and color of resilient wall base installed.
2. Resilient Sheet Flooring: Deliver to Owner at least 10 linear feet, in roll form and in full roll width, for each type and color of resilient sheet flooring installed.
3. Resilient Floor Tile: Deliver to Owner one box for every 30 boxes or fraction thereof, of each type and color of resilient floor tile installed.

PART 2 - PRODUCTS

2.1 POLLUTANT CONTROL STANDARDS:

A. All adhesives, sealants and caulking shall comply with Section 4.504.2.1 of the 2013 California Green Building Standards Code, and shall meet the VOC limits specified in Table 4.504.1 “Adhesive VOC Limit” and Table 4.504.2 “Sealant VOC Limit.”

B. All resilient flooring shall comply with one or more of the following per 2013 California Green Building Standards Code:

1. VOC emission limits defined in the Collaborative for High Performance Schools (CHPS) High Performance Products Database.
2. Products compliant with CHPS criteria certified under the Greenguard Children & Schools program.
3. Certification under the Resilient Floor Covering Institute (RFCI) FloorScore program.
4. Meet the California Department of Public Health, "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers," Version 1.1, February 2010 (also known as Specification 01350).

2.2 RESILIENT BASE

A. Basis of Design Product: Burke Mercer Flooring Products “BurkeBase”, or approved equal

B. Color and Pattern: As selected by Owner’s Representative.

C. ASTM F 1861, Type TS (rubber, vulcanized thermoset.

D. Group (Manufacturing Method): I (solid, homogeneous).

E. Style: Cove (base with toe) unless otherwise specified

F. Minimum Thickness: 0.125 inch.

G. Height: 4 inches (unless otherwise specified).

H. Lengths: Cut lengths 48 inches long or coils in manufacturer's standard lengths.

I. Outside Corners: Preformed (unless otherwise specified).

J. Inside Corners: Preformed (unless otherwise specified).

K. Finish: As selected by Owners Representative.

2.3 RESILIENT STAIR ACCESSORIES

A. Basis of Design Product: Burke Mercer Flooring Products “Endura” series, or approved equal

B. Color and Pattern: As selected by Owner’s Representative.

C. Treads: ASTM F 2169, Type TS (rubber, vulcanized thermoset).

1. Surface Design:
   a. Class 2, Pattern: As selected by Owner’s Representative.

2. Nosing Style: Square, adjustable to cover angles between 60 and 90 degrees
3. Nosing Height: As required
4. Size: Lengths and depths to fit each stair tread in one piece.

D. Risers: Smooth, flat, coved-toe risers, 7 inches (or as needed) high x length matching treads and of same manufacturer and material as treads.

1. Thickness: Min. 0.080 inch.

E. Stringers: Of same thickness as risers, height and length after cutting to fit risers and treads and to cover stair stringers, and of same manufacturer and material as treads.

2.4 RESILIENT MOLDING ACCESSORY

A. Basis of Design Manufacturer: Burke Mercer Flooring Products, or approved equal.

B. Color: As selected by Owner’s Representative.

C. Description: [Cap for cove carpet] [Cap for cove resilient sheet floor covering] [Carpet bar for tackless installations] [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] <as needed on a per-project basis. Verify with Owner’s Representative.>.

D. Material: Rubber.

E. Profile and Dimensions: [As indicated] <Insert profile and dimensions>.

2.5 SHEET VINYL FLOOR COVERING

A. Basis of Design Product:
1. Johnsonite “Optima” series
2. Armstrong “Corlon” series
3. Or approved equal.

B. Color and Pattern: As selected by Owner’s Representative.

C. Unbacked Sheet Vinyl Floor Covering: ASTM F 1913, 0.080 inch thick.

D. Fire-Test Response: Critical radiant flux classification of Class I, not less than 0.45 W/sq. cm per ASTM E 648.

E. Sheet Width: As standard with manufacturer.

F. Seaming Method: Heat welded

2.6 LINOLEUM SHEET FLOOR COVERING

A. Basis of Design Product: Forbo Flooring, Inc., “Marmoleum”, or approved equal

B. Color and Pattern: As selected by Owner’s Representative

C. Linoleum Floor Covering: ASTM F 2034, Type I, linoleum sheet with backing.

D. Fire-Test Response: Critical radiant flux classification of Class I, not less than 0.45 W/sq. cm per ASTM E 648.

E. Thickness: 0.10 inch.

F. Roll Size: In manufacturer's standard length, but not less than 78 inches wide.

G. Seaming Method: Heat welded.

2.7 RUBBER SHEET FLOOR COVERING

A. Basis of Design Product: Nora Systems, Inc., “Noraplan Degree”, or approved equal

B. Color and Pattern: As selected by Owner’s Representative

C. Fire-Test Response: Critical radiant flux classification of Class I, not less than 0.45 W/sq. cm per ASTM E 648.

D. Thickness: 0.12 inch.

E. Roll Size: In manufacturer's standard length, but not less than 48 inches wide.

F. Seaming Method: Heat welded.

2.8 SOLID VINYL TILE

A. Basis of Design Product: Johnsonite “Optima” series, or approved equal

B. Color and Pattern: As selected by Owner’s Representative.

C. ASTM F 1700; Class I, Monolithic Vinyl Tile; Type A, Smooth Surface.

D. Fire-Test Response: Critical radiant flux classification of Class I, not less than 0.45 W/sq. cm per ASTM E 648.

E. Thickness: 0.080 inch.

F. Size: 24 by 24 inches, or as selected by Owner’s Representative.

2.9 RUBBER FLOOR TILE

A. Basis of Design Product: Nora Systems, Inc., “norament® grano”, or approved equal

B. Color and Pattern: As selected by Owner’s Representative.

C. Tile Standard: ASTM F 1344, Class I-B, homogeneous rubber tile, through mottled.

D. Fire-Test Response: Critical radiant flux classification of Class I, not less than 0.45 W/sq. cm per ASTM E 648.

E. Hardness: Manufacturer's standard hardness.

F. Wearing Surface: Textured.

G. Thickness: 0.14 inch.

H. Size: As selected by Owner’s Representative from manufacturer’s standard sizes.

2.10 VINYL COMPOSITION FLOOR TILE

A. Basis of Design Product: Armstrong., “Excelon Stonetex”, or approved equal

B. Color and Pattern: As selected by Owner’s Representative.

C. ASTM F 1066, Class 2 (through-pattern tile)

D. Fire-Test Response: Critical radiant flux classification of Class I, not less than 0.45 W/sq. cm per ASTM E 648.

E. Wearing Surface: Smooth.

F. Thickness: 0.125 inch.

G. Size: 12 by 12 inches or as selected by Owner’s Representative.

2.11 LINOLEUM FLOOR TILE

A. Basis of Design Product: Forbo Flooring, Inc., “MCT”, or approved equal.

B. Color and Pattern: As selected by Owner’s Representative.

C. Floor Tile: ASTM F 2195, Type I, linoleum floor tile with fibrous backing.

D. Fire-Test Response: Critical radiant flux classification of Class I, not less than 0.45 W/sq. cm per ASTM E 648.

E. Thickness: 0.08 inch.

F. Nominal Floor Tile Size: Manufacturer's standard, or as selected by Owner’s Representative.

2.12 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement- or blended hydraulic cement-based formulation provided or approved by flooring manufacturer for applications indicated.

B. Stair-Tread-Nose Filler: Two-part epoxy compound recommended by resilient tread manufacturer to fill nosing substrates that do not conform to tread contours.

C. Adhesives: Water-resistant type recommended by manufacturer to suit floor covering and substrate conditions indicated.

1. Low-Emitting Materials: Adhesives shall have a VOC content of 60 g/L or less.

D. Heat-Welding Bead: Solid-strand product of floor covering manufacturer.

1. Color: Match floor covering.

E. Chemical-Bonding Compound: Manufacturer's product for chemically bonding seams.

F. Metal Edge Strips (if used): 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.

G. Integral-Flash-Cove-Base Accessories (if required): 1-inch-radius cove strip and square metal, vinyl, or rubber cap; both provided or approved by floor covering manufacturer.

1. Provide metal inside and outside corners and end stops if required by manufacturer.

H. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Prepare concrete substrates according to ASTM F 710. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

B. For resilient sheet flooring:
   1. Unroll sheet floor coverings and allow them to stabilize before cutting and fitting.
   2. Maintain uniformity of resilient sheet flooring direction, and match edges for color shading at seams.
   3. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches away from parallel joints in substrates.

C. For resilient floor tile:
   1. Lay out tiles so tile widths at opposite edges of room are equal and are at least one-half of a tile.
   2. Match tiles for color and pattern by selecting tiles from cartons in same sequence as manufactured and packaged. Lay tiles in patterns indicated, or if not indicated, as directed by Owner's Representative.

D. Adhesively install resilient wall base and accessories.

E. Install wall base in maximum lengths possible. Apply to walls, columns, pilasters, casework, and other permanent fixtures in rooms or areas where base is required.

F. Install stair-tread-nose filler to nosing substrates that do not conform to tread contours.

G. Install reducer strips at edges of floor coverings that would otherwise be exposed.

H. Integral Flash Cove Base (if used for project): Cove floor coverings 6 inches up vertical surfaces. Support on cove strip and butt against cap strip.

   1. Install metal corners and end stops.

I. Floor Polish (if recommended by Manufacturer): Remove soil, visible adhesive, and surface blemishes from floor covering before applying liquid floor polish.

   1. Apply number of coats as recommended by Manufacturer.

END OF SECTION 096500

SECTION 096813 - TILE CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes modular, [**fusion-bonded**] [**tufted**] <**Insert construction**> carpet tile.

B. Related Requirements:

1. Division 02 Section "Selective Structure Demolition" for removing existing floor coverings.
2. Division 09 Section "[**Resilient Base and Accessories**] [**Resilient Tile Flooring**]" for resilient wall base and accessories installed with carpet tile.
3. Division 09 Section "Sheet Carpeting."

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at [**Project site**] <**Insert location**>.

1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:

a. Review delivery, storage, and handling procedures.
b. Review ambient conditions and ventilation procedures.
c. Review subfloor preparation procedures.
d. <**Insert agenda items**>.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
2. Include installation recommendations for each type of substrate.

B. LEED Submittals:

1. Product Data for Credit EQ 4.3:

a. For carpet tile, documentation indicating compliance with testing and product requirements of CRI's "Green Label Plus" program.
b. For installation adhesive, documentation including printed statement of VOC content.

2. Laboratory Test Reports for Credit EQ 4: For carpet[**and installation adhesives**], documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Shop Drawings: Show the following:

1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
2. Carpet tile type, color, and dye lot.
3. Type of subfloor.
4. Type of installation.
5. Pattern of installation.
6. Pattern type, location, and direction.
7. Pile direction.
8. Type, color, and location of insets and borders.
9. Type, color, and location of edge, transition, and other accessory strips.
10. Transition details to other flooring materials.

D. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet Tile: Full-size Sample.
2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- (300-mm-) long Samples.

E. Product Schedule: For carpet tile. Use same designations indicated on Drawings.

F. Sustainability: Provide the Statement of the Achievement Level the carpet has attained for [**Bronze, 28 to 36**] [**Silver, 37 to 51**] [**Gold, 52 to 70**] points, based on specific Sustainable Attribute Performance for all product stages according to ANSI/NSF 140.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.

C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:

1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet Tile: Full-size units equal to [**5**] <**Insert number**> percent of amount installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the [**Commercial II**] [**Master II**] <**Insert description**> certification level.

B. Fire-Test-Response Ratings: Where indicated, provide carpet tile identical to those of assemblies tested for fire response according to NFPA 253 by a qualified testing agency.

C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockups at locations and in sizes shown on Drawings.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104.

1.10 FIELD CONDITIONS

A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.

B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at occupancy levels during the remainder of the construction period.

C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.11 WARRANTY

A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.

2. Failures include, but are not limited to, more than 10 percent edge raveling, snags, runs, [**dimensional stability,**] [**excess static discharge,**] [**loss of tuft bind strength,**] loss of face fiber, <**Insert failure characteristic**> and delamination.
3. Warranty Period: [**10**] <**Insert number**> years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE <**Insert drawing designation**>

A. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

1. <**Insert manufacturer's name; product name or designation**>.

B. Basis-of-Design Product: Subject to compliance with requirements, provide [**product indicated on Drawings**] <**Insert manufacturer's or carpet tile supplier's name; product name or designation**> or comparable product by one of the following:

1. <**Insert manufacturers' names**>.

C. Color: [**Match Architect's samples**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

D. Pattern: [**Match Architect's samples**] <**Insert pattern**>.

E. Fiber Content: [**100 percent nylon 6, 6**] [**100 percent nylon 6**] [**100 percent polypropylene**] [**100 percent wool**] [**80 percent wool; 20 percent nylon 6, 6**] [**80 percent wool; 20 percent nylon 6**] <**Insert percentage**>.

F. Fiber Type: <**Insert proprietary fiber type**>.

G. Pile Characteristic: [**Level-loop**] [**Cut**] [**Cut-and-loop**] <**Insert construction**> pile.

H. Yarn Twist: <**Insert** TPI (TPCM)>.

I. Yarn Count: <**Insert count**>.

J. Density: <**Insert** oz./cu. yd. (g/cu. cm)>.

K. Pile Thickness: <**Insert** inches (mm)> for finished carpet tile[**according to ASTM D 6859**].

L. Stitches: <**Insert stitches per** inch (mm)>.

M. Gage: <**Insert ends per** inch (mm)>.

N. Surface Pile Weight: <**Insert** oz./sq. yd. (g/sq. m)>.

O. Total Weight: <**Insert** oz./sq. yd. (g/sq. m)> for finished carpet tile.

P. Primary Backing/Backcoating: [**Manufacturer's standard composite materials**] [**PVC**] [**Fiberglass-reinforced PVC**] [**Fiberglass-reinforced amorphous resin**] [**Reinforced**

polyurethane composite cushion] [**Reinforced polyurethane composite**] [**Reinforced thermoplastic copolymer**] <**Insert specific primary backing materials; consult manufacturers**>.

Q. Secondary Backing: [**Manufacturer's standard material**] <**Insert specific secondary backing material**>.

R. Backing System: <**Insert proprietary name**>.

S. Size: [18 by 18 inches (457 by 457 mm)] [24 by 24 inches (610 by 610 mm)] [18 by 36 inches (457 by 914 mm)] [36 by 36 inches (914 by 914 mm)] <**Insert dimensions**>.

T. Applied Soil-Resistance Treatment: [**Manufacturer's standard material**] <**Insert treatment**>.

U. Antimicrobial Treatment: [**Manufacturer's standard material**] <**Insert treatment**>.

V. Performance Characteristics: As follows:

1. Appearance Retention Rating: [**Moderate traffic, 2.5**] [**Heavy traffic, 3.0**] [**Severe traffic, 3.5**] <**Insert number**> minimum according to ASTM D 7330.
2. Critical Radiant Flux Classification: Not less than [**0.45 W/sq. cm**] [**0.22 W/sq. cm**].
3. Dry Breaking Strength: Not less than 100 lbf (445 N) according to ASTM D 2646.
4. Tuft Bind: Not less than [3 lbf (13 N)] [5 lbf (22 N)] [6.2 lbf (28 N)] [8 lbf (36 N)] [10 lbf (45 N)] <**Insert value**> according to ASTM D 1335.
5. Delamination: Not less than [3.5 lbf/in. (15 N/mm)] [4 lbf/in. (18 N/mm)] <**Insert value**> according to ASTM D 3936.
6. Dimensional Tolerance: Within 1/32 inch (0.8 mm) of specified size dimensions, as determined by physical measurement.
7. Dimensional Stability: 0.2 percent or less according to ISO 2551 (Aachen Test).
8. Resistance to Insects: Comply with AATCC 24.
9. Noise Reduction Coefficient (NRC): <**Insert NRC**> according to ASTM C 423.
10. Colorfastness to Crocking: Not less than 4, wet and dry, according to AATCC 165.
11. Colorfastness to Light: Not less than 4 after [**40**] [**60**] <**Insert number**> AFU (AATCC fading units) according to AATCC 16, Option E.
12. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria, not less than 1-mm halo of inhibition for gram-negative bacteria, and no fungal growth, according to AATCC 174.
13. Electrostatic Propensity: Less than [**3.5**] [**2**] <**Insert number**> kV according to AATCC 134.
14. Emissions: Provide carpet tile that complies with testing and product requirements of CRI's "Green Label Plus" program.
15. Emissions: Provide carpet tile that complies with the product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.

1. Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Adhesives shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Metal Edge/Transition Strips: Extruded aluminum with [**mill**] <**Insert finish**> finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
2. Subfloor finishes comply with requirements specified in Division 03 Section "Cast-in-Place Concrete" for slabs receiving carpet tile.
3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

C. For wood subfloors, verify the following:

1. Underlayment over subfloor complies with requirements specified in Division 06 Section "Rough Carpentry."
2. Underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.

D. For metal subfloors, verify the following:

1. Underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.

E. For painted subfloors, verify the following:

1. Perform bond test recommended in writing by adhesive manufacturer.

F. For raised access flooring systems, verify the following:

1. Access floor complies with installation requirements specified in Division 09 Section "Access Flooring."
2. Access floor substrate is compatible with carpet tile and adhesive if any.
3. Underlayment surface is flat, smooth, evenly planed, tightly jointed, and free of irregularities, gaps greater than [1/8 inch (3 mm)] <**Insert dimension**>, protrusions more

than 1/32 inch (0.8 mm), and substances that may interfere with adhesive bond or show through surface.

G. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider and protrusions more than 1/32 inch (0.8 mm) unless more stringent requirements are required by manufacturer's written instructions.

C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.

D. Clean metal substrates of grease, oil, soil and rust, and prime if directed by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.

E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.

B. Installation Method: [**As recommended in writing by carpet tile manufacturer**] [**Glue down; install every tile with full-spread, releasable, pressure-sensitive adhesive**] [**Partial glue down; install periodic tiles with releasable, pressure-sensitive adhesive**] [**Free lay; install carpet tiles without adhesive**].

C. Maintain dye lot integrity. Do not mix dye lots in same area.

D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.

G. Install pattern parallel to walls and borders.

H. Stagger joints of carpet tiles so carpet tile grid is offset from access flooring panel grid. Do not fill seams of access flooring panels with carpet adhesive; keep seams free of adhesive.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:

1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
2. Remove yarns that protrude from carpet tile surface.
3. Vacuum carpet tile using commercial machine with face-beater element.

B. Protect installed carpet tile to comply with CRI 104, Section 16, "Protecting Indoor Installations."

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 096813

SECTION 09 75 00 - STONE FACING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following interior applications of dimension stone:
   1. Niche stools & Column bases.

1.3 SUBMITTALS

A. Product Data: For the following:

   1. Each variety of stone.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples for Initial Selection: For joint materials involving color selection.

D. Samples for Verification:

   1. For each stone type indicated, in sets of Samples not less than 12 inches square. Include four or more Samples in each set and show the full range of variations in appearance characteristics expected in completed Work. Samples will establish the standard by which stone will be judged.
   2. For each color of sealant required.

E. Qualification Data: For fabricator.

F. Sealant Compatibility Test Report: From sealant manufacturer, complying with requirements in Division 07 Section "Joint Sealants" and indicating that sealants will not stain or damage stone.

G. Maintenance Data: For interior stone facing to include in maintenance manuals. Include Product Data for stone-care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate interior stone facing similar in material, design, and extent to that indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

B. Source Limitations for Stone: Obtain each variety of stone, regardless of finish, from a single quarry, whether specified in this Section or in another Section, with resources to provide materials of consistent quality in appearance and physical properties.

1. For stone types that include same list of varieties and sources, provide same variety from same source for each.

C. Mockups: Build mockups to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of typical wall area as shown on Drawings.
2. Build mockups for the following kinds of interior stone facing:
   a. Typical stone niche stool.
   b. Typical column base, one complete column.
   c. Grouting or pointing of joints.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect in writing.
4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Lift stone with wide-belt slings; do not use wire rope or ropes that might cause staining. Move stone, if required, using dollies with cushioned wood supports.

B. Store stone on wood A-frames or pallets with non-staining separators and non-staining, waterproof covers. Ventilate under covers to prevent condensation.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions of construction to receive interior stone facing by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabrication without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 GRANITE

A. Granite: Comply with ASTM C 615.

B. Description: Uniform, fine-grained, black stone without veining.

C. Cut stone from one block or contiguous, matched blocks in which natural markings occur.

D. Finish: Polished.

E. Match Architect's samples for color, finish, and other stone characteristics relating to aesthetic effects.

2.2 SETTING MATERIALS

A. Portland Cement: ASTM C 150, Type I or II.

1. Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C 114.

B. Hydrated Lime: ASTM C 207, Type S.

C. Aggregate: ASTM C 144.

D. Water: Potable.

E. Adhesives, General: Use only adhesives formulated for stone and ceramic tile and recommended by their manufacturer for the application indicated.

F. Stone Adhesive: 2-part, epoxy-resin or polyester-resin stone adhesive with an initial set time of not more than 2 hours at 70 deg F, and with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1. Color: Match stone.

2.3 SEALANTS

A. Joint Sealants: Manufacturer's standard sealants of characteristics indicated below that comply with applicable requirements in Division 07 Section "Joint Sealants" and will not stain the stone they are applied to.
1. VOC Content: **250** g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Colors: Provide colors of exposed sealants to match colors of grout in stone adjoining sealed joints, unless otherwise indicated.

2.4 STONE ACCESSORIES

A. Cleaner: Stone cleaner specifically formulated for stone types, finishes, and applications indicated, as recommended by stone producer. Do not use cleaning compounds containing acids, caustics, harsh fillers, or abrasives.

2.5 STONE FABRICATION, GENERAL

A. Select stone for intended use to prevent fabricated units from containing cracks, seams, and starts that could impair structural integrity or function.

B. Fabricate interior stone facing in sizes and shapes required to comply with requirements indicated, including details on Drawings and Shop Drawings.

1. For granite, comply with recommendations in NBGQA's "Specifications for Architectural Granite."

C. Cut stone to produce pieces of thickness, size, and shape indicated and to comply with fabrication and construction tolerances recommended by applicable stone association.

1. Where items are installed with adhesive or where edges of stone is visible in the finished work, make items uniform in thickness and of identical thickness for each type of item; gage back of stone if necessary.
2. Clean sawed backs of stones to remove rust stains and iron particles.
3. Dress joints straight and at right angle to face, unless otherwise indicated.

D. Finish exposed faces and edges of stone to comply with requirements indicated for finish of each type of stone required and to match approved Samples and mockups.

E. Carefully inspect finished stone units at fabrication plant for compliance with requirements for appearance, material, and fabrication. Replace defective units.

1. Grade and mark stone for overall uniform appearance when assembled in place. Natural variations in appearance are acceptable if installed stone units match range of colors and other appearance characteristics represented in approved Samples and mockups.

2.6 STONE NICHE STOOLS & COLUMN BASES

A. Niche Stools & Column Bases

1. Nominal Thickness: 1 inch, unless otherwise indicated.
2. Edge Detail: Straight, slightly eased at corners.
3. Joints: Bonded joints, 1/32 inch or less in width.

2.7 MIXES

A. Setting Mortar: Comply with ASTM C 270, Proportion Specification.

1. Type: O.
2. Mix Proportions: 1 part portland cement and 2-1/2 to 4 parts lime with aggregate ratio of 2-1/4 to 3 times volume of cement and lime.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces indicated to receive interior stone and conditions under which interior stone will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean dirty or stained stone surfaces by removing soil, stains, and foreign materials before setting. Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives.

3.3 SETTING OF STONE, GENERAL

A. Do necessary field cutting as stone is set. Use power saws with diamond blades to cut stone. Cut lines straight and true, with edges eased slightly to prevent snipping.

B. Contiguous Work: Provide reveals and openings as required to accommodate contiguous work.

C. Set stone to comply with requirements indicated on Drawings and Shop Drawings. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure stone in place. Shim and adjust anchors, supports, and accessories to set stone accurately in locations indicated, with edges and faces aligned according to established relationships and indicated tolerances.

D. Erect stone units level, plumb, and true with uniform joint widths. Use temporary shims to maintain joint width.

3.4 CONSTRUCTION TOLERANCES

A. Variation from Plumb: For vertical lines and surfaces, do not exceed 1/8 inch in 96 inches maximum.

B. Variation from Level: For lintels, sills, chair rails, horizontal bands, horizontal grooves, and other conspicuous lines, do not exceed 1/8 inch in 10 feet maximum.

3.5 INSTALLATION OF STONE NICHE STOOLS AND COLUMN BASES

A. Stone Niche Stools: Set stone window stools on plaster veneered gypsum assembly over wood or metal framing or wood blocking in a full bed of adhesive. Hold adhesive back from exposed edges of joints to allow for pointing with sealant.

B. Where assemblies are too long to be installed in one piece, assemble by bonding joints with stone adhesive as units are set. Mask areas adjacent to joints to prevent adhesive smears. Clamp units in place to ensure that window stools are properly aligned and joints are minimum width.

3.6 ADJUSTING AND CLEANING

A. In-Progress Cleaning: Clean interior stone facing as work progresses. Remove adhesive, grout, mortar, and sealant smears immediately.

B. Remove and replace interior stone facing of the following description:

1. Broken, chipped, stained, or otherwise damaged stone. Stone may be repaired if methods and results are approved by Architect.
2. Defective stone facing.
3. Defective joints, including misaligned joints.
4. Interior stone facing and joints not matching approved Samples and mockups.
5. Interior stone facing not complying with other requirements indicated.

C. Replace in a manner that results in interior stone facing's matching approved Samples and mockups, complying with other requirements, and showing no evidence of replacement.

D. Clean interior stone facing no fewer than six days after completion of grouting and pointing, using clean water and soft rags or stiff-bristle fiber brushes. Do not use wire brushes, acid-type cleaning agents, cleaning compounds with caustic or harsh fillers, or other materials or methods that could damage stone.

E. Sealer Application: Apply stone sealer to comply with stone producer's and sealer manufacturer's written instructions and recommendations.

3.7 PROTECTION

A. Protect stone surfaces, edges, and corners from construction damage. Use securely fastened untreated wood, plywood, or heavy cardboard to prevent damage.

B. Before inspection for Substantial Completion, remove protective coverings and clean surfaces.

END OF SECTION 097500

SECTION 097723 - FABRIC-WRAPPED PANELS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:
   1. Product Data
   2. Shop Drawings
      a. Panel layout based on reflected ceiling plans and interior elevations
      b. Mounting details.
   3. Samples.

PART 2 - PRODUCTS

2.1 FABRIC-WRAPPED PANEL

A. Fabric: As selected from manufacturer's full range.

B. Surface-Burning Characteristics: Flame-spread and smoke-developed indexes of not more than 25 and 450, respectively, per ASTM E 84.
   1. Class A Fire Rating required.

C. Edge Profile: Square.

D. Corner Detail: Square, or as shown on drawings.

E. Core Material: Glass-fiber board; ASTM C 612; 6- to 7-lb/cu. ft. density, unfaced

F. Nominal Core Thickness: 2 inches.

G. Edge Construction: Per manufacturer.

H. Mounting Devices: Metal "Z" clips concealed on backside of panels or concealed devices as specified by manufacturer.
   1. Mounting to meet all applicable code requirements in the California Building Code.

I. Mounting Adhesives: As recommended by fabric-wrapped, panel manufacturer.

   1. Low-Emitting Materials: Adhesive shall have a VOC content of 70 g/L or less.

2.2 FABRICATION

A. Fabricate panels with fabric straight on the grain, without seams, and with patterned or directional weave fabrics matched in adjacent panels.

B. Stretch fabric tight and square without puckers, ripples, sagging, or distortion.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install panels level and aligned at top and bottom, vertical and plumb, with faces flush.

B. Panel Joints: No greater than 1/16 inch wide.

END OF SECTION 097723

SECTION 099000 - PAINTING AND COATING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data.
   a. MSDS sheets for each product
2. Samples.
   a. Letter-sized draw-downs of each selected color as requested by Owner.
3.

B. Mockups:
1. Full-coat finish sample of each type of painted coating, color, and substrate: an 8’ wide area of wall, trim, cast detail, and fascia shall be prepped and painted where directed with Owner selected color scheme for approval by Owner. **The Contractor shall make allowances for painting of 4 separate color schemes of this size prior to final selection.**
2. Full-coat finish samples of both Epoxy Slip Resistant Deck Coating for nosing stripe an approximately 4 foot long stripe shall be prepped and painted where directed for approval by owner for verification of product suitability and color. **The Contractor shall make allowances for painting of 3 separate samples of this size for each product prior to final selection**

C. Extra Materials:
1. Deliver to Owner 5 gallons of each color and type of exterior finish coat paint used on Project, in containers, properly labeled and sealed.

2. Deliver to Owner 1 gallon of each color and type of Epoxy Slip-Resistant Deck Coating

PART 2 - PRODUCTS

2.1 PAINT

A. Basis of design products: Provide materials listed below or approved equals

1. Exterior Painting Materials:
   a. Mold killing treatment – Zinsser “Jomax House Cleaner” or approved equal
   b. Primer: PPG “Seal Grip Permanizer Plus” or approved equal
   c. Paint: Glidden “Fortis 350” Exterior Semi-gloss Paint or approved equal

2. Epoxy Slip-Resistant Deck Coating:
   a. Rustoleum “Concrete Saver AS9100 System Anti-Slip High Performance Epoxy” or approved equal

B. Material Compatibility: Provide materials that are compatible with one another and with substrates.

1. 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. Use paints and coatings that comply with the following limits for VOC content:
1. Nonflat Paints, Coatings: 150 g/L.
2. Primers, Sealers, and Undercoaters: 200 g/L.

D. Colors: As selected by Owner.
1. Exterior painting scheme to include 4 colors. Refer to section 1.1 B above.
2. Exterior epoxy slip-resistant coating to include 2 colors: body and contrasting nosing stripe. Refer to section 1.1 B above.

PART 3 - EXECUTION

3.1 PREPARATION

A. Comply with recommendations in MPI's "MPI Repainting Manual" applicable to substrates indicated.

B. The existing building contains Lead Based Paint (LBP) and Lead Containing Surface Coatings (LCSC). “Appendix A” includes Specifications for Asbestos Abatement & Paint Disturbance by Brunelle & Clark Consulting for the building. Contractor shall comply with recommendations included in the report, and as required by Cal/OSHA Lead Construction Standard.

C. Remove hardware, lighting fixtures, and similar items that are not to be painted. Mask items that cannot be removed. Reinstall items in each area after painting is complete.

D. Clean and prepare surfaces in an area before beginning painting or coating in that area.
1. Schedule painting so cleaning operations will not damage newly painted surfaces.
2. Apply mold killing treatment per manufacturer’s specifications.
3. Remove existing coatings down to bare wood or prepare existing surface to allow for full warranty of paint system.
4. Use lead-safe techniques when preparing surfaces for new coatings.
5. At concrete and masonry areas, clean existing surfaces as recommended by coating manufacturers.

E. Patching Material Compatibility: Provide materials that are compatible with one another and with substrates.

1. For each patching material for use under a paint system, provide products recommended by manufacturers of topcoat for use with paint system and on substrate indicated.

3.2 APPLICATION

A. Comply with recommendations in MPI's "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Paint exposed surfaces, unless otherwise indicated.

1. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces.

2. Paint the back side of access panels.

C. Apply paints according to manufacturer's written instructions.

1. Use brushes only for exterior painting and where the use of other applicators is not practical.

D. 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.

1. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

3.3 EXTERIOR PAINT APPLICATION SCHEDULE

A. Concrete, Nontraffic Surfaces (walls, etc.):

1. Satin 100% Acrylic Latex: Two coats over primer recommended by topcoat manufacturer for exterior use on concrete.

B. Galvanized Metal (exposed flashing & trim, etc.):
1. Satin 100% Acrylic Latex: Two coats over primer recommended by topcoat manufacturer for exterior use on galvanized-metal.

C. Wood: Including wood trim, wood-based panel products, exposed beams, & T&G Decking .

1. Semigloss 100% Acrylic Latex: Two coats over primer recommended by topcoat manufacturer for exterior use on wood products.

3.4 EXTERIOR HIGH PERFORMANCE COATING APPLICATION SCHEDULE

A. Concrete, Traffic Surfaces at stair nosings:

1. Epoxy Slip-Resistant Deck Coating: One coat
   a. Nosing stripe to be selected by Owner and shall contrast with base color of concrete stairs. Verify color selection with owner prior to installation.

3.5 END OF SECTION 099000

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and the application of paint systems on **the following interior substrates:**

1. Gypsum board.
2. Plaster.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. CALGreen Submittals:

1. Product Data: For paints and coatings, including printed statement of VOC content.
2. Laboratory Test Reports: For paints and coatings, documentation indicating that they meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

1.3 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.4 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

B. MPI Standards:

1. Products: Complying with MPI standards indicated and listed in "MPI Green Approved Products List."
2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

1.5 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 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.6 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

2.2 MANUFACTURERS

A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in other Part 2 articles for the paint category indicated.

2.3 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

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: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 150 g/L.
3. Dry-Fog Coatings: 400 g/L.
4. Primers, Sealers, and Undercoaters: 200 g/L.
5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
7. Pretreatment Wash Primers: 420 g/L.
8. Floor Coatings: 100 g/L.
9. Shellacs, Clear: 730 g/L.
10. Shellacs, Pigmented: 550 g/L.

D. Low-Emitting Materials: Interior paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Colors: As selected by Architect from manufacturer's full range.

2.4 BLOCK FILLERS

A. Block Filler, Latex, Interior/Exterior: **MPI #4.**

2.5 PRIMERS/SEALERS

A. Primer Sealer, Latex, Interior: **MPI #50.**

B. Primer, Alkali Resistant, Water Based:[**MPI #3.**]

C. Primer Sealer, Interior, Institutional Low Odor/VOC:[**MPI #149.**]

D. Primer, Latex, for Interior Wood:[**MPI #39.**]

E. Primer Sealer, Alkyd, Interior:[**MPI #45.**]

F. Primer, Bonding, Water Based:[**MPI #17.**]

G. Primer, Bonding, Solvent Based:[**MPI #69.**]

H. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for use in paint systems indicated.

2.6 METAL PRIMERS

A. Primer, Rust-Inhibitive, Water Based:[**MPI #107.**]

B. Primer, Alkyd, Anti-Corrosive, for Metal:[**MPI #79.**]

C. Primer, Alkyd, Quick Dry, for Metal:[**MPI #76.**]

D. Primer, Galvanized, Water Based:[**MPI #134.**]

E. Primer, Vinyl Wash:[**MPI #80.**]

F. Primer, Quick Dry, for Aluminum:[**MPI #95.**]

2.7 WATER-BASED PAINTS

A. Latex, Interior, Flat, (Gloss Level 1):[**MPI #53.**]

B. Latex, Interior, (Gloss Level 2):[**MPI #44.**]

C. Latex, Interior, (Gloss Level 3):[**MPI #52.**]

D. Latex, Interior, (Gloss Level 4):[**MPI #43.**]

E. Latex, Interior, Semi-Gloss, (Gloss Level 5):[**MPI #54.**]

F. Latex, Interior, Gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees):[**MPI #114.**]

G. Latex, Interior, Institutional Low Odor/VOC, Flat (Gloss Level 1):[**MPI #143.**]

H. Latex, Interior, Institutional Low Odor/VOC, (Gloss Level 2):[**MPI #144.**]

I. Latex, Interior, Institutional Low Odor/VOC, (Gloss Level 3):[**MPI #145.**]

J. Latex, Interior, Institutional Low Odor/VOC, Semi-Gloss (Gloss Level 5):[**MPI #147.**]

K. Latex, Interior, High Performance Architectural, (Gloss Level 2):[**MPI #138.**]

L. Latex, Interior, High Performance Architectural, (Gloss Level 3):[**MPI #139.**]

M. Latex, Interior, High Performance Architectural, (Gloss Level 4):[**MPI #140.**]

N. Latex, Interior, High Performance Architectural, Semi-Gloss (Gloss Level 5):[**MPI #141.**]

O. Light Industrial Coating, Interior, Water Based (Gloss Level 3):[**MPI #151.**]

P. Light Industrial Coating, Interior, Water Based, Semi-Gloss (Gloss Level 5):[**MPI #153.**]

Q. Light Industrial Coating, Interior, Water Based, Gloss (Gloss Level 6):[**MPI #154.**]

2.8 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Masonry (Clay and CMU): 12 percent.
3. Wood: 15 percent.
4. Gypsum Board: 12 percent.
5. Plaster: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Plaster Substrates: Verify that plaster is fully cured.

E. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.

F. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

G. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer[**.**] [**but not less than the following:**]

1. SSPC-SP 2, "Hand Tool Cleaning."
2. SSPC-SP 3, "Power Tool Cleaning."
3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

I. Aluminum Substrates: Remove loose surface oxidation.

J. Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

K. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. 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.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed in equipment rooms:

a. Equipment, including panelboards[**and switch gear**].
b. Uninsulated metal piping.
c. Uninsulated plastic piping.
d. Pipe hangers and supports.
e. Metal conduit.
f. Plastic conduit.
g. Tanks that do not have factory-applied final finishes.
h. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
i. <**Insert mechanical items to be painted**>.

2. Paint the following work where exposed in occupied spaces:

a. Equipment, including panelboards.
b. Uninsulated metal piping.
c. Uninsulated plastic piping.
d. Pipe hangers and supports.
e. Metal conduit.
f. Plastic conduit.
g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
h. Other items as directed by Architect.

i. <**Insert mechanical items to be painted**>.

3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. 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.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:

1. Latex System:

a. Prime Coat: Primer sealer, latex, interior[**, MPI #50**].
b. Prime Coat: Latex, interior, matching topcoat.
c. Intermediate Coat: Latex, interior, matching topcoat.
d. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
e. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
f. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
g. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
h. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
i. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

2. Latex over Latex Aggregate System:

a. Prime Coat: Textured coating, latex, flat[**, MPI #42**].

b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
d. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
e. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
f. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

3. Institutional Low-Odor/VOC Latex System:

a. Prime Coat: Primer sealer, interior, institutional low odor/VOC[**, MPI #149**].
b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)[**, MPI #143**].
d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)[**, MPI #144**].
e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)[**, MPI #145**].
f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)[**, MPI #147**].

4. High-Performance Architectural Latex System:

a. Prime Coat: Primer, alkali resistant, water based[**, MPI #3**].
b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)[**, MPI #138**].
d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)[**, MPI #139**].
e. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)[**, MPI #140**].
f. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)[**, MPI #141**].

5. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer, alkali resistant, water based[**, MPI #3**].
b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
c. Topcoat: Light industrial coating, interior, water based (Gloss Level 3)[**, MPI #151**].
d. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss Level 5)[**, MPI #153**].
e. Topcoat: Light industrial coating, interior, water based, gloss (Gloss Level 6)[**, MPI #154**].

6. Alkyd System:

a. Prime Coat: Primer, alkali resistant, water based[**, MPI #3**].
b. Intermediate Coat: Alkyd, interior, matching topcoat.
c. Topcoat: Alkyd, interior, flat (Gloss Level 1)[**, MPI #49**].
d. Topcoat: Alkyd, interior, (Gloss Level 3)[**, MPI #51**].
e. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)[**, MPI #47**].
f. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[**, MPI #48**].

B. Concrete Substrates, Traffic Surfaces:

1. Latex Floor Enamel System:

a. Prime Coat: Floor paint, latex, low gloss (maximum Gloss Level 3)[**, MPI #60**].
b. Intermediate Coat: Floor paint, latex, low gloss (maximum Gloss Level 3)[**, MPI #60**].
c. Topcoat: Floor paint, latex, low gloss (maximum Gloss Level 3)[**, MPI #60**].

2. Alkyd Floor Enamel System:

a. Prime Coat: Floor enamel, alkyd, gloss (Gloss Level 6)[**, MPI #27**].
b. Intermediate Coat: Floor enamel, alkyd, gloss (Gloss Level 6)[**, MPI #27**].
c. Topcoat: Floor enamel, alkyd, gloss (Gloss Level 6)[**, MPI #27**].

3. Concrete Stain System:

a. First Coat: Stain, interior, for concrete floors[**, MPI #58**].
b. Topcoat: Stain, interior, for concrete floors[**, MPI #58**].

4. Water-Based Clear Sealer System:

a. First Coat: Sealer, water based, for concrete floors[**, MPI #99**].
b. Topcoat: Sealer, water based, for concrete floors[**, MPI #99**].

5. Solvent-Based Clear Sealer System:

a. First Coat: Sealer, solvent based, for concrete floors[**, MPI #104**].
b. Topcoat: Sealer, solvent based, for concrete floors[**, MPI #104**].

C. Clay-Masonry Substrates:

1. Latex System:

a. Prime Coat: Latex, interior, matching topcoat.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
d. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
e. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
f. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

2. Latex Aggregate System:

a. Prime Coat: Primer for textured coating, latex, flat[**, as recommended in writing by topcoat manufacturer**].
b. Intermediate Coat: Intermediate coat for textured coating, latex, flat[**, as recommended in writing by topcoat manufacturer**].
c. Topcoat: Textured coating, latex, flat[**, MPI #42**].

3. Institutional Low-Odor/VOC Latex System:

a. Prime Coat: Primer sealer, interior, institutional low odor/VOC[**, MPI #149**].
b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)[**, MPI #143**].
d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)[**, MPI #144**].
e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)[**, MPI #145**].
f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)[**, MPI #147**].

4. High-Performance Architectural Latex System:

a. Prime Coat: Primer, alkali resistant, water based[**, MPI #3**].
b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)[**, MPI #138**].
d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)[**, MPI #139**].
e. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)[**, MPI #140**].
f. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)[**, MPI #141**].

5. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer, alkali resistant, water based[**, MPI #3**].
b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
c. Topcoat: Light industrial coating, interior, water based (Gloss Level 3)[**, MPI #151**].
d. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss Level 5)[**, MPI #153**].
e. Topcoat: Light industrial coating, interior, water based, gloss (Gloss Level 6)[**, MPI #154**].

6. Alkyd System:

a. Prime Coat: Primer sealer, latex, interior[**, MPI #50**].
b. Intermediate Coat: Alkyd, interior, matching topcoat.
c. Topcoat: Alkyd, interior, flat (Gloss Level 1)[**, MPI #49**].
d. Topcoat: Alkyd, interior, (Gloss Level 3)[**, MPI #51**].
e. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)[**, MPI #47**].
f. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[**, MPI #48**].

D. CMU Substrates:

1. Latex System:

a. Block Filler: Block filler, latex, interior/exterior[**, MPI #4**].
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
d. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
e. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
f. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].

h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

2. Institutional Low-Odor/VOC Latex System:

a. Block Filler: Block filler, latex, interior/exterior[**, MPI #4**].
b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)[**, MPI #143**].
d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)[**, MPI #144**].
e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)[**, MPI #145**].
f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)[**, MPI #147**].

3. High-Performance Architectural Latex System:

a. Block Filler: Block filler, latex, interior/exterior[**, MPI #4**].
b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)[**, MPI #138**].
d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)[**, MPI #139**].
e. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)[**, MPI #140**].
f. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)[**, MPI #141**].

4. Water-Based Light Industrial Coating System:

a. Block Filler: Block filler, latex, interior/exterior[**, MPI #4**].
b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
c. Topcoat: Light industrial coating, interior, water based (Gloss Level 3)[**, MPI #151**].
d. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss Level 5)[**, MPI #153**].
e. Topcoat: Light industrial coating, interior, water based, gloss (Gloss Level 6)[**, MPI #154**].

5. Alkyd System:

a. Block Filler: Block filler, latex, interior/exterior[**, MPI #4**].
b. Sealer Coat: Primer sealer, latex, interior[**, MPI #50**].
c. Intermediate Coat: Alkyd, interior, matching topcoat.
d. Topcoat: Alkyd, interior, flat (Gloss Level 1)[**, MPI #49**].
e. Topcoat: Alkyd, interior, (Gloss Level 3)[**, MPI #51**].
f. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)[**, MPI #47**].
g. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[**, MPI #48**].

E. Steel Substrates:

1. Latex over Alkyd Primer System:

a. Prime Coat: Primer, alkyd, anti-corrosive, for metal[**, MPI #79**].

b. Prime Coat: Primer, alkyd, quick dry, for metal[**, MPI #76**].
c. Prime Coat: Primer, alkyd, anti-corrosive, for metal[**, MPI #79**] or primer, alkyd, quick dry, for metal[**, MPI #76**].
d. Prime Coat: Shop primer specified in Division 05 Section where substrate is specified.
e. Intermediate Coat: Latex, interior, matching topcoat.
f. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
g. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
h. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
i. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
j. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
k. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

2. Water-Based Dry-Fall System:

a. Prime Coat: Primer, alkyd, anti-corrosive, for metal[**, MPI #79**].
b. Prime Coat: Primer, alkyd, quick dry, for metal[**, MPI #76**].
c. Prime Coat: Primer, alkyd, anti-corrosive, for metal[**, MPI #79**] or primer, alkyd, quick dry, for metal[**, MPI #76**].
d. Prime Coat: Shop primer specified in Division 05 Section where substrate is specified.
e. Topcoat: Dry fall, latex, flat[**, MPI #118**].
f. Topcoat: Dry fall, water based, for galvanized steel, flat (Gloss Level 1)[**, MPI #133**].

3. Institutional Low-Odor/VOC Latex System:

a. Prime Coat: Primer, rust-inhibitive, water based[**MPI #107**].
b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)[**, MPI #143**].
d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)[**, MPI #144**].
e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)[**, MPI #145**].
f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)[**, MPI #147**].

4. High-Performance Architectural Latex System:

a. Prime Coat: Primer, alkyd, anti-corrosive, for metal[**, MPI #79**].
b. Prime Coat: Primer, alkyd, quick dry, for metal[**, MPI #76**].
c. Prime Coat: Primer, alkyd, anti-corrosive, for metal[**, MPI #79**] or primer, alkyd, quick dry, for metal[**, MPI #76**].
d. Prime Coat: Shop primer specified in Division 05 Section where substrate is specified.
e. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
f. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)[**, MPI #138**].
g. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)[**, MPI #139**].
h. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)[**, MPI #140**].
i. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)[**, MPI #141**].

5. Water-Based Light Industrial Coating System:

    a. Prime Coat: Primer, rust-inhibitive, water based[**MPI #107**].
    b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
    c. Topcoat: Light industrial coating, interior, water based (Gloss Level 3)[**, MPI #151**].
    d. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss Level 5)[**, MPI #153**].
    e. Topcoat: Light industrial coating, interior, water based, gloss (Gloss Level 6)[**, MPI #154**].

6. Alkyd System:

    a. Prime Coat: Primer, alkyd, anti-corrosive, for metal[**, MPI #79**].
    b. Prime Coat: Primer, alkyd, quick dry, for metal[**, MPI #76**].
    c. Prime Coat: Primer, alkyd, anti-corrosive, for metal[**, MPI #79**] or primer, alkyd, quick dry, for metal[**, MPI #76**].
    d. Prime Coat: Shop primer specified in Division 05 Section where substrate is specified.
    e. Intermediate Coat: Alkyd, interior, matching topcoat.
    f. Topcoat: Alkyd, interior, flat (Gloss Level 1)[**, MPI #49**].
    g. Topcoat: Alkyd, interior, (Gloss Level 3)[**, MPI #51**].
    h. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)[**, MPI #47**].
    i. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[**, MPI #48**].

7. Quick-Drying Enamel System:

    a. Prime Coat: Primer, alkyd, quick dry, for metal[**, MPI #76**].
    b. Intermediate Coat: Alkyd, quick dry, matching topcoat.
    c. Topcoat: Alkyd, quick dry, semi-gloss (Gloss Level 5)[**, MPI #81**].
    d. Topcoat: Alkyd, quick dry, gloss (Gloss Level 7)[**, MPI #96**].

8. Alkyd Dry-Fall System:

    a. Prime Coat: Primer, alkyd, anti-corrosive, for metal[**, MPI #79**].
    b. Prime Coat: Primer, alkyd, quick dry, for metal[**, MPI #76**].
    c. Prime Coat: Primer, alkyd, anti-corrosive, for metal[**, MPI #79**] or primer, alkyd, quick dry, for metal[**, MPI #76**].
    d. Prime Coat: Shop primer specified in Division 05 Section where substrate is specified.
    e. Topcoat: Dry fall, alkyd, flat[**, MPI #55**].

9. Aluminum Paint System:

    a. Prime Coat: Primer, alkyd, anti-corrosive, for metal[**, MPI #79**].
    b. Prime Coat: Primer, alkyd, quick dry, for metal[**, MPI #76**].
    c. Prime Coat: Primer, alkyd, anti-corrosive, for metal[**, MPI #79**] or primer, alkyd, quick dry, for metal[**, MPI #76**].
    d. Prime Coat: Shop primer specified in Division 05 Section where substrate is specified.
    e. Intermediate Coat: Aluminum paint[**, MPI #1**].
    f. Topcoat: Aluminum paint[**, MPI #1**].

F. Galvanized-Metal Substrates:

1. Latex over Waterborne Primer System:

    a. Prime Coat: Primer, galvanized, water based[**, MPI #134**].
    b. Intermediate Coat: Latex, interior, matching topcoat.
    c. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
    d. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
    e. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
    f. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
    g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
    h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

2. Water-Based Dry-Fall System:

    a. Prime Coat: Dry fall, water based, for galvanized steel, flat (Gloss Level 1)[**, MPI #133**].
    b. Topcoat: Dry fall, water based, for galvanized steel, flat (Gloss Level 1)[**, MPI #133**].

3. Institutional Low-Odor/VOC Latex System:

    a. Prime Coat: Primer, galvanized, water based[**, MPI #134**].
    b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
    c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)[**, MPI #143**].
    d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)[**, MPI #144**].
    e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)[**, MPI #145**].
    f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)[**, MPI #147**].

4. High-Performance Architectural Latex System:

    a. Prime Coat: Primer, galvanized, water based[**, MPI #134**].
    b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
    c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)[**, MPI #138**].
    d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)[**, MPI #139**].
    e. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)[**, MPI #140**].
    f. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)[**, MPI #141**].

5. Water-Based Light Industrial Coating Over Waterborne Primer System:

    a. Prime Coat: Primer, galvanized, water based[**, MPI #134**].
    b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
    c. Topcoat: Light industrial coating, interior, water based (Gloss Level 3)[**, MPI #151**].
    d. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss Level 5)[**, MPI #153**].
    e. Topcoat: Light industrial coating, interior, water based, gloss (Gloss Level 6)[**, MPI #154**].

6. Aluminum Paint System:

    a. Prime Coat: Primer, galvanized metal, as recommended in writing by topcoat manufacturer for use on galvanized-metal substrates with topcoat indicated.
    b. Intermediate Coat: Aluminum paint[**, MPI #1**].
    c. Topcoat: Aluminum paint[**, MPI #1**].

G. Aluminum (Not Anodized or Otherwise Coated) Substrates:

1. Latex System:

    a. Prime Coat: Primer, quick dry, for aluminum[**, MPI #95**].
    b. Intermediate Coat: Latex, interior, matching topcoat.
    c. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
    d. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
    e. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
    f. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
    g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
    h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

2. Institutional Low-Odor/VOC Latex System:

    a. Prime Coat: Primer, quick dry, for aluminum[**, MPI #95**].
    b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
    c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)[**, MPI #143**].
    d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)[**, MPI #144**].
    e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)[**, MPI #145**].
    f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)[**, MPI #147**].

3. High-Performance Architectural Latex System:

    a. Prime Coat: Primer, quick dry, for aluminum[**, MPI #95**].
    b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
    c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)[**, MPI #138**].
    d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)[**, MPI #139**].
    e. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)[**, MPI #140**].
    f. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)[**, MPI #141**].

4. Water-Based Light Industrial Coating System:

    a. Prime Coat: Primer, quick dry, for aluminum[**, MPI #95**].
    b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
    c. Topcoat: Light industrial coating, interior, water based (Gloss Level 3)[**, MPI #151**].
    d. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss Level 5)[**, MPI #153**].

e. Topcoat: Light industrial coating, interior, water based, gloss (Gloss Level 6)[**, MPI #154**].

5. Alkyd System:

a. Prime Coat: Primer, vinyl wash[**, MPI #80**].
b. Prime Coat: Primer, quick dry, for aluminum[**, MPI #95**].
c. Intermediate Coat: Alkyd, interior, matching topcoat.
d. Topcoat: Alkyd, interior, flat (Gloss Level 1)[**, MPI #49**].
e. Topcoat: Alkyd, interior, (Gloss Level 3)[**, MPI #51**].
f. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)[**, MPI #47**].
g. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[**, MPI #48**].

6. Aluminum Paint System:

a. Prime Coat: Primer, vinyl wash[**, MPI #80**].
b. Intermediate Coat: Aluminum paint[**, MPI #1**].
c. Topcoat: Aluminum paint[**, MPI #1**].

H. Wood Substrates: Including [**wood trim**] [**architectural woodwork**] [**doors**] [**windows**] [**wood-based panel products**] [**glued-laminated construction**] [**exposed joists**] [**exposed beams**] <**Insert description**>.

1. Latex System:

a. Prime Coat: Primer, latex, for interior wood[**, MPI #39**].
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
d. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
e. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
f. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

2. Latex over Alkyd Primer System:

a. Prime Coat: Primer sealer, alkyd, interior[**, MPI #45**].
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
d. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
e. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
f. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

3. Institutional Low-Odor/VOC Latex System:

a. Prime Coat: Primer, latex, for interior wood[**, MPI #39**].
b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)[**, MPI #143**].
d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)[**, MPI #144**].

e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)[**, MPI #145**].
f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)[**, MPI #147**].

4. High-Performance Architectural Latex System:

a. Prime Coat: Primer, latex, for interior wood[**, MPI #39**].
b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)[**, MPI #138**].
d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)[**, MPI #139**].
e. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)[**, MPI #140**].
f. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)[**, MPI #141**].

5. Alkyd System:

a. Prime Coat: Primer sealer, alkyd, interior[**, MPI #45**].
b. Intermediate Coat: Alkyd, interior, matching topcoat.
c. Topcoat: Alkyd, interior, flat (Gloss Level 1)[**, MPI #49**].
d. Topcoat: Alkyd, interior, (Gloss Level 3)[**, MPI #51**].
e. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)[**, MPI #47**].
f. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[**, MPI #48**].

I. Wood Substrates, Traffic Surfaces:

1. Latex Floor Paint System:

a. Prime Coat: Primer sealer, alkyd, interior[**, MPI #45**].
b. Intermediate Coat: Floor paint, latex, low gloss (maximum Gloss Level 3)[**, MPI #60**].
c. Topcoat: Floor paint, latex, low gloss (maximum Gloss Level 3)[**, MPI #60**].

2. Alkyd Floor Enamel System:

a. Prime Coat: Floor enamel, alkyd, gloss (Gloss Level 6)[**, MPI #27**].
b. Intermediate Coat: Floor enamel, alkyd, gloss (Gloss Level 6)[**, MPI #27**].
c. Topcoat: Floor enamel, alkyd, gloss (Gloss Level 6)[**, MPI #27**].

J. Fiberglass and Plastic Substrates:

1. Latex System:

a. Prime Coat: Primer, bonding, water based[**, MPI #17**].
b. Prime Coat: Primer, bonding, solvent based[**, MPI #69**].
c. Intermediate Coat: Latex, interior, matching topcoat.
d. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
e. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
f. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
g. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
h. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].

i. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

2. Institutional Low-Odor/VOC Latex System:

a. Prime Coat: Primer, bonding, water based[**, MPI #17**].
b. Prime Coat: Primer, bonding, solvent based[**, MPI #69**].
c. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
d. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)[**, MPI #143**].
e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)[**, MPI #144**].
f. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)[**, MPI #145**].
g. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)[**, MPI #147**].

3. High-Performance Architectural Latex System:

a. Prime Coat: Primer, bonding, water based[**, MPI #17**].
b. Prime Coat: Primer, bonding, solvent based[**, MPI #69**].
c. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)[**, MPI #138**].
e. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)[**, MPI #139**].
f. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)[**, MPI #140**].
g. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)[**, MPI #141**].

4. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer, bonding, water based[**, MPI #17**].
b. Prime Coat: Primer, bonding, solvent based[**, MPI #69**].
c. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
d. Topcoat: Light industrial coating, interior, water based (Gloss Level 3)[**, MPI #151**].
e. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss Level 5)[**, MPI #153**].
f. Topcoat: Light industrial coating, interior, water based, gloss (Gloss Level 6)[**, MPI #154**].

5. Alkyd System:

a. Prime Coat: Primer, bonding, water based[**, MPI #17**].
b. Prime Coat: Primer, bonding, solvent based[**, MPI #69**].
c. Intermediate Coat: Alkyd, interior, matching topcoat.
d. Topcoat: Alkyd, interior, flat (Gloss Level 1)[**, MPI #49**].
e. Topcoat: Alkyd, interior, (Gloss Level 3)[**, MPI #51**].
f. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)[**, MPI #47**].
g. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[**, MPI #48**].

K. [**Gypsum Board**] [**Plaster**] Substrates:

1. Latex System:

    a. Prime Coat: Primer sealer, latex, interior[**, MPI #50**].
    b. Prime Coat: Latex, interior, matching topcoat.
    c. Intermediate Coat: Latex, interior, matching topcoat.
    d. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
    e. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
    f. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
    g. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
    h. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
    i. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

2. Institutional Low-Odor/VOC Latex System:

    a. Prime Coat: Primer sealer, interior, institutional low odor/VOC[**, MPI #149**].
    b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
    c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)[**, MPI #143**].
    d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)[**, MPI #144**].
    e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)[**, MPI #145**].
    f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)[**, MPI #147**].

3. High-Performance Architectural Latex System:

    a. Prime Coat: Primer sealer, latex, interior[**, MPI #50**].
    b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
    c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 2)[**, MPI #138**].
    d. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3)[**, MPI #139**].
    e. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4)[**, MPI #140**].
    f. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5)[**, MPI #141**].

4. Water-Based Light Industrial Coating System:

    a. Prime Coat: Primer sealer, latex, interior[**, MPI #50**].
    b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
    c. Topcoat: Light industrial coating, interior, water based (Gloss Level 3)[**, MPI #151**].
    d. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss Level 5)[**, MPI #153**].
    e. Topcoat: Light industrial coating, interior, water based, gloss (Gloss Level 6)[**, MPI #154**].

5. Alkyd over Latex Primer System:

    a. Prime Coat: Primer sealer, latex, interior[**, MPI #50**].
    b. Intermediate Coat: Alkyd, interior, matching topcoat.
    c. Topcoat: Alkyd, interior, flat (Gloss Level 1)[**, MPI #49**].

d. Topcoat: Alkyd, interior, (Gloss Level 3)[**, MPI #51**].
e. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)[**, MPI #47**].
f. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[**, MPI #48**].

L. Spray-Textured Ceiling Substrates:

1. Latex (Flat) System: Spray applied.

a. Prime Coat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
b. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].

2. Latex System: Spray applied.

a. Prime Coat: Latex, interior, matching topcoat.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
d. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
e. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
f. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

3. Latex over Alkyd Primer System:

a. Prime Coat: Primer sealer, alkyd, interior[**, MPI #45**].
b. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
c. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
d. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
e. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
f. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
g. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

4. Alkyd (Flat) System:

a. Prime Coat: Alkyd, interior, flat (Gloss Level 1)[**, MPI #49**].
b. Topcoat: Alkyd, interior, flat (Gloss Level 1)[**, MPI #49**].

5. Alkyd System:

a. Prime Coat: Primer sealer, alkyd, interior[**, MPI #45**].
b. Intermediate Coat: Alkyd, interior, matching topcoat.
c. Topcoat: Alkyd, interior, flat (Gloss Level 1)[**, MPI #49**].
d. Topcoat: Alkyd, interior, (Gloss Level 3)[**, MPI #51**].
e. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)[**, MPI #47**].
f. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[**, MPI #48**].

M. [**Cotton or Canvas**] [**and**] [**ASJ**] Insulation-Covering Substrates: Including [**pipe and duct coverings**] <**Insert description**>.

1. Latex System:

a. Prime Coat: Primer sealer, latex, interior[**, MPI #50**].

b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat, (Gloss Level 1)[**, MPI #53**].
d. Topcoat: Latex, interior, (Gloss Level 2)[**, MPI #44**].
e. Topcoat: Latex, interior, (Gloss Level 3)[**, MPI #52**].
f. Topcoat: Latex, interior, (Gloss Level 4)[**, MPI #43**].
g. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5)[**, MPI #54**].
h. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees)[**, MPI #114**].

2. Institutional Low-Odor/VOC Latex System:

a. Prime Coat: Primer sealer, latex, interior[**, MPI #50**].
b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1)[**, MPI #143**].
d. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 2)[**, MPI #144**].
e. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3)[**, MPI #145**].
f. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5)[**, MPI #147**].

3. Alkyd over Latex Primer System:

a. Prime Coat: Primer sealer, latex, interior[**, MPI #50**].
b. Intermediate Coat: Alkyd, interior, matching topcoat.
c. Topcoat: Alkyd, interior, flat (Gloss Level 1)[**, MPI #49**].
d. Topcoat: Alkyd, interior, (Gloss Level 3)[**, MPI #51**].
e. Topcoat: Alkyd, interior, semi-gloss (Gloss Level 5)[**, MPI #47**].
f. Topcoat: Alkyd, interior, gloss (Gloss Level 6)[**, MPI #48**].

4. Aluminum Paint System:

a. Prime Coat: Primer sealer, latex, interior[**, MPI #50**].
b. Intermediate Coat: Aluminum paint[**, MPI #1**].
c. Topcoat: Aluminum paint[**, MPI #1**].

END OF SECTION 099123

SECTION 101400 - SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Panel signs including room identification.
2. Dimensional characters.

1.2 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."

1.3 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: 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.
2. Alumimum.
3. Cast Bronze.

D. Sign Schedule: Use same designations indicated on Drawings.

E. Maintenance Data: For signs to include in maintenance manuals.

F. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

A. Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.

B. Regulatory Requirements: Comply with applicable provisions in in ADA requirements for toilet compartments designated as accessible.

1.5 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.

1.6 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.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum Sheet and Plate: ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 5005-H32.

B. Bronze Castings: ASTM B 584, Alloy UNS No. C86500 (No. 1 manganese bronze).

C. Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), Type UVA (UV absorbing).

D. Polycarbonate Sheet: Of thickness indicated, manufactured by extrusion process, coated on both surfaces with abrasion-resistant coating:

1. Impact Resistance: 16 ft-lbf/in. (854 J/m) per ASTM D 256, Method A.
2. Tensile Strength: 9000 lbf/sq. in. (62 MPa) per ASTM D 638.
3. Flexural Modulus of Elasticity: 340,000 lbf/sq. in. (2345 MPa) per ASTM D 790.
4. Heat Deflection: 265 deg F (129 deg C) at 264 lbf/sq. in. (1.82 MPa) per ASTM D 648.
5. Abrasion Resistance: 1.5 percent maximum haze increase for 100 revolutions of a Taber abraser with a load of 500 g per ASTM D 1044.

E. Applied Vinyl: Die-cut characters from vinyl film of nominal thickness of 3 mils (0.076 mm) with pressure-sensitive adhesive backing, suitable for exterior applications.

2.2 PANEL SIGNS

A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

1. ACE Sign Systems, Inc.
2. Advance Corporation; Braille-Tac Division.
3. Allen Industries Architectural Signage
4. Allenite Signs; Allen Marking Products, Inc.

5. APCO Graphics, Inc.
6. ASI-Modulex, Inc.
7. Best Sign Systems Inc.
8. Bunting Graphics, Inc.
9. Fossil Industries, Inc.
10. Gemini Incorporated.
11. Grimco, Inc.
12. Innerface Sign Systems, Inc.
13. InPro Corporation
14. Matthews International Corporation; Bronze Division.
15. Mills Manufacturing Company.
16. Mohawk Sign Systems.
17. Nelson-Harkins Industries.
18. Seton Identification Products.
19. Signature Signs, Incorporated.
20. Supersine Company (The)
21. ADA Sign Factory

B. Interior Panel Signs Basis-of Design:
1. Product: ADA sign Factory; CA MetalGraph Copper Signs.
2. Material: MetalGraph Copper Penny with durable vandal-proof high-impact acrylic backer.
3. Mounting: Wall, unless otherwise noted, with manufacturer's recommended mounting application.
4. Edges: Square corners
5. Graphics: 1/32 inch tactile (raised graphics and wording), 5/8 inch tall text
6. Braille: Grade II CA Title 24 dome-shaped
7. 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,.

C. Exterior Panel Signs Basis-of-Design
1. Product: ComplianceSigns.com Parking Signs – Accessible
2. Material: Type IV – High Intensity Prismatic Reflective Aluminum
3. Mounting: Post, unless otherwise noted, with manufacturer's recommended mounting application.
4. Corner: Rounded
5. Thickness: 0.080 inch.
6. Text: 1 inch minimum height printed on vinyl sheeting

2.3 DIMENSIONAL CHARACTERS

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. ACE Sign Systems, Inc.
2. Advance Corporation; Braille-Tac Division.
3. A. R. K. Ramos.
4. ASI-Modulex, Inc.
5. Bunting Graphics, Inc.

6. Charleston Industries, Inc.
7. Gemini Incorporated.
8. Grimco, Inc.
9. Innerface Sign Systems, Inc.
10. Metal Arts; Div. of L&H Mfg. Co.
11. Mills Manufacturing Company.
12. Mohawk Sign Systems.
13. Nelson-Harkins Industries.
14. Signature Signs, Incorporated.
15. Southwell Company (The).

B. Cast Characters: Produce characters with smooth flat faces, sharp corners, and precisely formed lines and profiles, free of pits, scale, sand holes, and other defects. Cast lugs into back of characters and tap to receive threaded mounting studs. Alloy and temper recommended by sign manufacturer for casting process used and for use and finish indicated. Comply with the following requirements.

1. Character Material: Bronze.
2. Color(s): Bronze.
3. Height: 6 inches.
4. Mounting: Per Manufacturer’s recommendation for substrates encountered.
5. Options: All product options to be reviewed and approved by Architect before manufacturing.

2.4 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.

2.5 FABRICATION

A. General: Provide manufacturer's standard signs of configurations indicated.

1. Welded Connections: Comply with AWS standards for recommended practices in shop welding. Provide welds behind finished surfaces without distortion or discoloration of exposed side. Clean exposed welded surfaces of welding flux and dress exposed and contact surfaces.
2. Mill joints to tight, hairline fit. Form joints exposed to weather to exclude water penetration.
3. 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.
4. Conceal fasteners if possible; otherwise, locate fasteners where they will be inconspicuous.

2.6 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.

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.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of 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.

3.2 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.
2. Hook-and-Loop Tapes: Mount signs to smooth, nonporous surfaces.
3. Magnetic Tape: Mount signs to smooth, nonporous surfaces.
4. Silicone-Adhesive Mounting: Attach signs to irregular, porous, or vinyl-covered surfaces.
5. Shim Plate Mounting: Provide 1/8-inch- (3-mm-) thick, concealed aluminum shim plates with predrilled and countersunk holes, at locations indicated, and where other mounting methods are not practicable. Attach plate with fasteners and anchors suitable for secure attachment to substrate. Attach panel signs to plate using method specified above.
6. Mechanical Fasteners: Use nonremovable mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer.
7. Signs Mounted on Glass: Provide matching opaque plate on opposite side of glass to conceal mounting materials.

C. Dimensional Characters: Mount characters using standard fastening methods to comply with manufacturer's written instructions for character form, type of mounting, wall construction, and condition of exposure indicated. Provide heavy paper template to establish character spacing and to locate holes for fasteners.

3.3 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

SECTION 102113 - TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel Granite and stainless steel toilet compartments as configured as toilet enclosures.

2. Terrazzo toilet compartments as configured as toilet enclosures.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For toilet compartments. Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each type of unit indicated. Include Samples of hardware and accessories involving material and color selection.

D. Product Certificates: For each type of toilet compartment, from manufacturer.

E. Maintenance Data: For toilet compartments to include in maintenance manuals.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with applicable provisions in in ADA requirements for toilet compartments designated as accessible.

1.4 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Stainless-Steel Castings: ASTM A 743/A 743M.

2.2 GRANITE AND STAINLES STEEL UNITS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Bradley Corporation; Mills Partitions; Model Fusion Partitions or comparable product by one of the following:

1. Accurate Partitions Corporation.
2. All American Metal Corp.
3. American Sanitary Partition Corporation.
4. Ampco, Inc.
5. Bradley Corporation; Mills Partitions.
6. Flush Metal Partition Corp.
7. General Partitions Mfg. Corp.
8. Global Steel Products Corp.
9. Hadrian Manufacturing Inc.
10. Knickerbocker Partition Corporation.
11. Metpar Corp.
12. Rockville Partitions Incorporated.
13. Sanymetal; a Crane Plumbing company.
14. Shanahan's Limited.

B. Restroom Partitions Basis of Design:

1. Product: Fusion Granit – Series 400 – Sentinel
2. Mounting: Floor-Mounted with Overhead brace.
3. Edges: Permaseal Edge
4. Panels: Pre-drilled 1 3/16” thick, constructed from natural granite.
5. Doors: 1” thick, constructed from 22 gauge stainless steel, with 16 and 14 gauge internal reinforcement, with ADA compliant concealed slide latch.
6. Pilasters: Pre-drilled 1 3/16” thick, constructed from natural granite, floor edge provided with 12 gauge mounting brackets that accept a 3/8” zinc-plated jack bolt for leveling.
7. Hardware: Wraparound hinges are thru-bolted to the pilasters and the concealed slide latch includes an emergency egress feature. Doors 32" wide or less are provided with a combination coat hook/bumper. Doors 34" wide or 36" wide are provided with an individual coat hook, door bumper and door pulls. Theft-resistant fasteners.
8. Brackets: U-brackets and undrilled “L” brackets are provided with torx-head fasteners.
9. Headrail: Etched and anodized aluminum headrail is extruded with an anti-grip profile. It clamps over the pilaster and is secured at the wall with plastic brackets.
10. Shoes: 4 inch high, 300 series stainless steel with #4 satin brushed finish, secured by concealed retainer clips.
11. Options:
    a. Standard manufacturer’s hinges, door hardware (ADA compliant), brackets and Corners.

2.3 TERRAZZO UNITS

A. Cleaning:

1. Remove terrazzo toilet partitions and protect during construction

    a. Photograph all partitions before removal
    b. Clean partitions before re-installation
    c. Store additional partitions removed during selective demolition

1) Store at location specified by owner.

d. Notify Architect of any broken or damage partitions
1) Repair all damage.

2.4 FABRICATION

A. Door Size and Swings: Unless otherwise indicated, provide 24-inch- (610-mm-) wide, in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide doors with a minimum 32-inch- (813-mm-) wide, clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices. Provide blocking or other fastening substrates as required.

B. Verify site to ensure satisfactory conditions and check measurements prior to installation.

3.2 ADJUSTING

A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

B. Clean all surfaces and work area. Protect installed items.

END OF SECTION 102113

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SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes Toilet and Bath Accessories for:

1. Public-use restrooms.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated, including installation, maintenance, and care instructions.

B. Warranty: For each product with a warranty.

1.3 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.

PART 2 - PRODUCTS

2.1 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.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. A & J Washroom Accessories, Inc.
2. American Specialties, Inc.
3. Bobrick Washroom Equipment, Inc.
4. Bradley Corporation.
5. GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.
6. Tubular Specialties Manufacturing, Inc.

B. Toilet Tissue (Roll) Dispenser:

1. Basis-of-Design Product: **Bobrick B-4288, or approved equal.**
2. Description: Roll-in-reserve dispenser with hinged front secured with tumbler lockset.
3. Mounting: Surface mounted.
4. Operation: Noncontrol delivery with theft-resistant spindle.
5. Capacity: Designed for (2) standard 5 ½" rolls.
6. Material and Finish: Stainless steel, No. 4 finish (satin).

C. Combination Towel (Folded) Dispenser/Waste Receptacle:

1. Basis-of-Design Product: **Bobrick B-3944, or approved equal.**
2. Description: Combination unit for dispensing C-fold or multifold towels, with removable waste receptacle.
3. Mounting: Recessed with projecting receptacle.
4. Minimum Towel-Dispenser Capacity: 600 C-fold or 800 multifold paper towels.
5. Minimum Waste-Receptacle Capacity: 12 gal. (45.4 L).
6. Material and Finish: Stainless steel, No. 4 finish (satin).
7. Lockset: Tumbler type for towel-dispenser compartment and waste receptacle.

D. Liquid-Soap Dispenser:

1. Basis-of-Design Product: **Bobrick B-4112, or approved equal.**
2. Description: Designed for dispensing soap in liquid or lotion form.
3. Mounting: Horizontally oriented, surface mounted.
4. Capacity: 40 oz.
5. Materials: Stainless steel, No. 4 finish (satin).
6. Lockset: Tumbler type.
7. Refill Indicator: Window type.

E. Grab Bar:

1. Basis-of-Design Product: **Bobrick, or equal, meeting specifications below:**
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch (1.3 mm) thick.
    a. Finish: Smooth, No. 4 finish (satin).
4. Outside Diameter: 1-1/2 inches (38 mm).
5. Configuration and Length: As indicated on Drawings, to meet ADA requirements.

F. Sanitary-Napkin Disposal Unit:

1. Basis-of-Design Product: **Bobrick B-4112, or approved equal.**
2. Mounting: Surface mounted.
3. Door or Cover: Cover flips up for disposal of sanitary napkins and for servicing container.
4. Receptacle: Removable.
5. Material and Finish: Stainless steel, No. 4 finish (satin).

G. Seat-Cover Dispenser:

1. Basis-of-Design Product: **Bobrick B-4221, or approved equal.**
2. Mounting: Surface mounted.

3. Minimum Capacity: 250 seat covers.
4. Filling: From bottom, provide 5” min. clearance below.
5. Exposed Material and Finish: Stainless steel, No. 4 finish (satin).

H. Mirror Unit:

1. Frame: Stainless-steel channel.
2. Hangers: Produce rigid, tamper- and theft-resistant installation.
3. Size: As indicated on Drawings.

2.3 UNDERLAVATORY GUARDS

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 product indicated on Drawings or comparable product by one of the following:

1. Plumberex Specialty Products, Inc.
2. Truebro by IPS Corporation.

C. Underlavatory Guard:

1. Description: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping; allow service access without removing coverings.
2. Material and Finish: Antimicrobial, molded plastic, white.

2.4 FABRICATION

A. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 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.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf (1112 N), when tested according to ASTM F 446.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 102800

SECTION 104413 - FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fire protection cabinets for portable fire extinguishers.

1.2 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 type of exposed product and for each color and texture specified.

D. Maintenance Data: For fire protection cabinets to include in maintenance manuals.

E. Verify product options with Architect prior to ordering.

1.3 QUALITY ASSURANCE

A. Fire-Rated, Fire Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.

1.4 COORDINATION

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.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

B. Transparent Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), 1.5 mm thick, with Finish 1 (smooth or polished).

2.2 FIRE PROTECTION CABINET

A. Cabinet Type: Suitable for fire extinguisher.

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. Fire End & Croker Corporation.
b. J. L. Industries, Inc., a division of Activar Construction Products Group.
c. Kidde Residential and Commercial Division, Subsidiary of Kidde plc.
d. Larsen's Manufacturing Company.
e. Modern Metal Products, Division of Technico Inc.
f. Moon-American.
g. Potter Roemer LLC.
h. Watrous Division, American Specialties, Inc.

B. Cabinet Construction: Nonrated.

C. Cabinet Material: Steel sheet.

1. Shelf: Same metal and finish as cabinet.

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. Semirecessed 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 semirecessed cabinet installation.

1. Square-Edge Trim: 1-1/4- to 1-1/2-inch (32- to 38-mm) backbend depth.

F. Surface-Mounted Cabinet: Cabinet box fully exposed and mounted directly on wall with no trim. Provide where walls are of insufficient depth for semirecessed cabinet installation.

G. Cabinet Trim Material: Steel sheet.

H. Door Material: Steel sheet.

I. Door Style: Fully glazed, frameless, backless, acrylic panel.

J. Door Glazing: Acrylic sheet.

1. Acrylic Sheet Color: Clear transparent acrylic sheet painted white on unexposed side.

K. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

L. 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 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.

M. 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.

2.3 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.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls and partitions for suitable framing depth and blocking where recessed and semirecessed cabinets will be installed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare recesses for recessed and semirecessed fire protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

A. General: Install fire protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights indicated below:

1. Fire Protection Cabinets: 54 inches above finished floor to top of cabinet.

B. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.

C. Identification: Apply decals at locations indicated.

3.4 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire protection cabinet and mounting bracket manufacturers.

E. 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

SECTION 104416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes portable, hand-carried fire extinguishers for fire extinguishers.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher.

B. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

C. Warranty: Sample of special warranty.

1.3 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. All fire extinguisher products, mounting locations, and installation methods must be approved by authorities having jurisdiction.

1.4 COORDINATION

A. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure fit and function.

PART 2 - PRODUCTS

2.1 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.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install fire extinguishers in locations indicated and in compliance with requirements of authorities having jurisdiction.

1. Mounting: 54 inches above finished floor to top of fire extinguisher.

END OF SECTION 104416

SECTION 114000 - FOODSERVICE EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Equipment, furnishings and fixtures in food service areas.

B. Owner-Furnished Equipment: Where indicated, Owner will furnish equipment for installation by Contractor.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include the following:

1. Manufacturer's model number.
2. Accessories and components that will be included for Project.
3. Clearance requirements for access and maintenance.
4. Utility service connections for water, drainage, power, and fuel; include roughing-in dimensions.

B. Shop Drawings: For fabricated equipment. Include plans, elevations, sections, roughing-in dimensions, fabrication details, utility service requirements, and attachments to other work.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Operation and Maintenance Instructions: Include relevant instructions
1. Submit manufacturer’s installation instructions.
2. Include maintenance information on regular servicing.

E. Warranty: Provide a 12-month warranty from date of Substantial Completion.

1.3 QUALITY ASSURANCE

A. NSF Standards: Provide equipment that bears NSF Certification Mark or UL Classification Mark certifying compliance with applicable NSF standards.

1.4 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of construction contiguous with foodservice equipment by field measurements before fabrication. Indicate measurements on Coordination Drawings.

1.5 COORDINATION

A. Coordinate foodservice equipment layout and installation with other work, including layout and installation of lighting fixtures, HVAC equipment, and fire-suppression system components.

B. Coordinate locations and requirements of utility service connections.

PART 2 - PRODUCTS

2.1 GENERAL EQUIPMENT

A. See Construction Documents: Food Service Equipment Schedule.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install foodservice equipment level and plumb, according to manufacturer's written instructions.

1. Connect equipment to utilities.
2. Provide cutouts in equipment, neatly formed, where required to run service lines through equipment to make final connections.

B. Complete equipment assembly where field assembly is required.

1. Provide closed butt and contact joints that do not require a filler.
2. Grind field welds on stainless-steel equipment until smooth and polish to match adjacent finish.

C. Install equipment with access and maintenance clearances that comply with manufacturer's written installation instructions and with requirements of authorities having jurisdiction.

D. Install cabinets and similar equipment on bases in a bed of sealant.

E. Install closure-trim strips and similar items requiring fasteners in a bed of sealant.

F. Install joint sealant in joints between equipment and abutting surfaces with continuous joint backing unless otherwise indicated. Produce airtight, watertight, vermin-proof, sanitary joints.

3.2 CLEANING AND PROTECTING

A. After completing installation of equipment, repair damaged finishes.

B. Clean and adjust equipment as required to produce ready-for-use condition.

C. Protect equipment from damage during remainder of the construction period.

3.3 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain foodservice equipment.

END OF SECTION 114000

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SECTION 122113 - HORIZONTAL LOUVER BLINDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Horizontal louver blinds with wood slats.

1.2 SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show fabrication and installation details for horizontal louver blinds.

C. Samples: For each exposed product and for each color and texture specified, 12 inches (300 mm) long.

D. Samples for Initial Selection: For each type and color of horizontal louver blind.

1. Include similar Samples of accessories involving color selection.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data and Warranty: For horizontal louver blinds to include in maintenance manuals.

1.4 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.

1.5 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain horizontal louver blinds from single source from single manufacturer.

2.2 HORIZONTAL LOUVER BLINDS, WOOD SLATS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Comfortex Window Fashions.
2. Hunter Douglas Contract.
3. Levolor Contract; a Newell Rubbermaid company.
4. Springs Window Fashions.

B. Flame-Resistance Rating: Comply with NFPA 701; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

C. Slats: Hardwood, basswood.

1. Width: 2 inches (51 mm).
2. Thickness: 0.125 inch (3.2 mm).
3. Spacing: Manufacturer's standard.
4. Profile: Flat.
5. Corners: Square.

D. Headrail: Formed steel or extruded aluminum; long edges returned or rolled. Headrails fully enclose operating mechanisms on three sides and ends.

1. Capacity: One blind per headrail unless otherwise indicated.
2. Manual Lift Mechanism:

a. Lift-Cord Lock: Variable; stops lift cord at user-selected position within full operating range.
b. Operator: Extension of lift cord(s) through lift-cord lock mechanism to form cord pull.

3. Manual Tilt Mechanism: Enclosed worm-gear mechanism and linkage rod that adjusts ladders.

a. Tilt: Full.
b. Operator: Wood wand matching slats.
c. Over-Rotation Protection: Manufacturer's detachable operator or slip clutch to prevent over rotation of gear.

4. Manual Lift-Operator and Tilt-Operator Lengths: Manufacturer's standard.
5. Manual Lift-Operator and Tilt-Operator Locations: Manufacturer's standard unless otherwise indicated.

E. Bottom Rail: Hardwood matching slats that secures and protects ends of ladders and lift cords.

F. Lift Cords: Manufacturer's standard braided cord.

G. Ladders: Evenly spaced across headrail at spacing that prevents long-term slat sag.

H. Valance: Manufacturer's standard matching slats.

I. Tassels: Hardwood finished to match slats, manufacturer's standard.

J. Mounting Brackets: With spacers and shims required for blind placement and alignment indicated.

1. Type: Outside Mount.
2. Intermediate Support: Provide intermediate support brackets to produce support spacing recommended by blind manufacturer for weight and size of blind.

K. Hold-Down Brackets and Hooks or Pins: Manufacturer's standard.

L. Colors, Finishes, 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.

2.3 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. 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. Wood: Apply manufacturer's standard factory-applied finish complying with manufacturer's written instructions for surface preparation, application, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 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.

3.2 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. Install mounting and intermediate brackets to prevent deflection of headrails.
2. 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.

3.3 ADJUSTING

A. Adjust horizontal louver blinds to operate free of binding or malfunction through full operating ranges.

3.4 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.

3.5 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 122200 - CURTAINS AND DRAPES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes draperies and drapery tracks. Remove, clean and replace existing.

1.2 FIELD CONDITIONS

A. Scheduling: Do not deliver or re-install draperies until after other finish work, including painting, is complete and spaces are otherwise ready for occupancy.

PART 2 - PRODUCTS

2.1 DRAPERY TRACKS

A. Cleaning

1. Remove tracks and protect during construction
    a. Photograph all tracks before removal.
    b. Before re-installation, wipe track clean
    c. Notify Architect of any broken or damaged tracks.
        1) Replace in kind.

2.2 DRAPERIES

A. Cleaning

1. Remove draperies and protect during construction
    a. Photograph all draperies before removal.
    b. Before re-installation, dry clean all drapes per materials requirements.
    c. Notify Architect of any ripped or damaged drapes.
        1) Replace in kind.
        2) Fire-Test-Response Characteristics: For fabrics treated with fire retardants, provide products that pass NFPA 701 as determined by testing of fabrics that were treated using treatment-application method intended for use for this Project by a testing and inspecting agency acceptable to authorities having jurisdiction.

2.3 ADJUSTING

A. After hanging draperies, test and adjust each track to produce unencumbered, smooth operation.

B. Steam and dress down draperies as required to produce crease- and wrinkle-free installation.

END OF SECTION 122200

SECTION 142100 - ELECTRIC TRACTION ELEVATORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes electric traction passenger elevators.

B. Allowances: Provide finished passenger[**and service**] elevator cars under the Elevator Car Allowance specified in Division 01 Section "Allowances." Allowance includes furnishing and installing the following:

1. Car wall finishes including trim.
2. Car floor finishes.
3. Car ceiling finishes.
4. Car[**and hoistway**] door finishes.
5. Car door sills.
6. Car light fixtures.
7. Handrails.
8. Cutouts and other provisions for installing elevator signal equipment in cars.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's product data for each system proposed for use. Include the following:

1. Signal and operating fixtures, operating panels and indicators.
2. Cab design, dimensions and layout.
3. Hoistway-door and frame details.
4. Electrical characteristics and connection requirements.
5. Expected heat dissipation of elevator equipment in hoistway (BTU).
6. Color selection chart for Cab and Entrances.

B. Shop Drawings: Submit approval layout drawings. Include the following:
1. Car, guide rails, buffers and other components in hoistway.
2. Maximum rail bracket spacing
3. Maximum loads imposed on guide rails requiring load transfer to building structure.
4. Clearances and travel of car.
5. Clear inside hoistway and pit dimensions.
6. Location and sizes of access doors, hoistway entrances and frames.

C. Operations and Maintenance Manuals: Provide manufacturer's standard operations and maintenance manual.

D. Samples for Initial Selection: For finishes involving color selection.

E. Samples for Verification: For exposed finishes of cars, hoistway doors and frames, and signal equipment; 3-inch- (75-mm-) square Samples of sheet materials; and 4-inch (100-mm) lengths of running trim members.

F. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway, pit, and machine room layout and dimensions, as shown on Drawings, and electrical service, as shown and specified, are adequate for elevator system being provided.

G. Qualification Data: For Installer.

H. Operation and Maintenance Data: For elevators to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include diagnostic and repair information available to manufacturer's and Installer's maintenance personnel.

I. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.

J. Warranty: Special warranty specified in this Section.

K. Continuing Maintenance Proposal: Service agreement specified in this Section.

1.3 QUALITY ASSURANCE

A. Manufacturer: Elevator manufacturer shall be ISO 9001 certified.

B. Installer Qualifications: Elevator manufacturer.

C. Source Limitations: Obtain elevators through one source from a single manufacturer.

1. Provide major elevator components, including driving machines, controllers, signal fixtures, door operators, car frames, cabs, and entrances, manufactured by a single manufacturer.

D. Regulatory Requirements: Comply with ASME A17.1.

E. Accessibility Requirements: Comply with Section 4.10 in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."

F. Fire-Rated Hoistway Entrance Assemblies: Door and frame assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to **NFPA 252**.

G. Permits, Inspections and Certificates: The Elevator Contractor shall obtain and pay for necessary Municipal or State Inspection and permit as required by the elevator inspection authority, and make such tests as are called for by the regulations or such

authorities. These tests shall be made in the presence of such authorities or their authorized representatives.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle materials, components, and equipment in manufacturer's protective packaging.

B. Store materials, components, and equipment off of ground, under cover, and in a dry location. Handle according to manufacturer's written recommendations to prevent damage, deterioration, or soiling.

C. Should the building or the site not be prepared to receive the elevator equipment at the agreed upon date, the General Contractor will be responsible to provide a proper and suitable storage area on or off the premises.

D. Should the storage area be off-site and the equipment not yet delivered, then the elevator contractor, upon notification from the General Contractor, will divert the elevator equipment to the storage area. If the equipment has already been delivered to the site, then the General Contractor shall transport the elevator equipment to the storage area. The cost of elevator equipment taken to storage by either party, storage, and redeliver to the job site shall not be at the expense of the elevator contractor.

1.5 COORDINATION

A. Coordinate installation of sleeves, block outs, elevator equipment with integral anchors, and other items that are embedded in concrete or masonry for elevator equipment. Furnish templates, sleeves, elevator equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.

B. Coordinate sequence of elevator installation with other work to avoid delaying the Work.

C. Coordinate locations and dimensions of other work relating to electric traction elevators including pit ladders, sumps, and floor drains in pits; entrance subsills; and electrical service, electrical outlets, lights, and switches in pits and machine rooms.

1.6 WARRANTY

A. Special Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to repair, restore, or replace defective elevator work within specified warranty period.

1. Warranty Period: **One year** from date of Substantial Completion.

1.7 MAINTENANCE SERVICE

A. Maintenance service consisting of regular examinations, adjustments and lubrication of the elevator equipment shall be provided by the elevator contractor for a period of 12 months

months after the elevator has been turned over for the customer's use. This service shall not be subcontracted but shall be performed by the elevator contractor. All work shall be performed by competent employees during regular working hours of regular working days and shall include emergency 24-hour callback service. This service shall not cover adjustments, repairs or replacement of parts due to negligence, misuse, abuse or accidents caused by persons other than the elevator contractor. Only genuine parts and supplies as used in the manufacture and installation of the original equipment shall be provided.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Otis Elevator Co.
2. KONE Inc.
3. Mitsubishi Electric
4. ThyssenKrupp Elevator.

2.2 EQUIPMENT: CONTROLLER COMPONENTS

A. Controller: A microcomputer based control system shall be provided to perform all of the functions of safe elevator operation. The system shall also perform car and group operational control.
1. All high voltage (110V or above) contact points inside the controller shall be protected from accidental contact when the controller doors are open.
2. Controller shall be separated into two distinct halves; Motor Drive side and Control side. High voltage motor power conductors shall be routed so as to be physically segregated from the rest of the controller.
3. Field conductor terminations points shall be segregated; high voltage (>30 volts DC and 110 VAC,) and low voltage (< 30 volts DC)
4. Controllers shall be designed and tested for Electromagnetic Interference (EMI) immunity according to the EN 12016 (May 1998): "EMC Product Family Standards for lifts, escalators, and passenger conveyors Part 2 – immunity"
5. Controller shall be located inside the wall next to the top landing entrance frame. Emergency access shall be provided through an access panel in the entrance frame secured by a key lock.

B. Drive: A Variable Voltage Variable Frequency AC drive system shall be provided. The drive shall be set up for regeneration of AC power back to the building grid.

2.3 EQUIPMENT: Machine and GOVERNOR

A.

2.4 SYSTEMS AND COMPONENTS

A. General: Provide manufacturer's standard elevator systems. Where components are not otherwise indicated, provide standard components published by manufacturer as included in standard preengineered elevator systems and as required for complete system.

B. Elevator Machines: [**Provide variable-voltage, variable-frequency, ac-type hoisting machines**] [**At manufacturer's option, provide either variable-voltage, variable-frequency, ac-type or variable-voltage, dc-type hoisting machines**]. Provide solid-state power converters.

1. Provide [**regenerative**] [**or**] [**nonregenerative**] system.
2. Limit total harmonic distortion of regenerated power to 5 percent per IEEE 519.
3. Provide means for absorbing regenerated power when elevator system is operating on standby power.
4. Provide line filters or chokes to prevent electrical peaks or spikes from feeding back into building power system.

C. Fluid for Oil Buffers: If oil buffers are used, use only fire-resistant hydraulic fluid containing antioxidant, anticorrosive, antifoaming, and metal-passivating additives.

1. Available Product: Subject to compliance with requirements, a product that may be incorporated into the Work includes, but is not limited to, "Hydro Safe (FR)" by Hydro Safe Oil Division, Inc.

D. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work where installation of devices is specified in another Section.

E. Machine Beams: Provide framing to support elevator hoisting machine and deflector sheaves from the building structure. Comply with Division 05 Section "Metal Fabrications" for materials and fabrication.

F. Car Frame and Platform: Welded steel units.

G. Guides: Provide roller guides[**or polymer-coated, nonlubricated sliding guides**] at top and bottom of car and counterweight frames.

2.5 OPERATION SYSTEMS

A. General: Provide manufacturer's standard microprocessor operation system [**for each elevator**] [**for each group of elevators**] as required to provide type of operation system indicated.

B. Group Automatic Operation with Demand-Based Dispatching: Provide[**reprogrammable**] group automatic system that assigns cars to hall calls based on a dispatching program designed

to minimize passenger waiting time. System automatically adjusts to changes in demand for different traffic conditions including heavy incoming, heavy two-way, heavy outgoing, and light off-hours as variations of normal two-way traffic.

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. Fujitec America, Inc.; Millennium.
    b. KONE Inc.; KCM 831.
    c. Otis Elevator Co.; Elevonic.
    d. Schindler Elevator Corp.; Miconic TX.
    e. ThyssenKrupp Elevator; Traflomatic.
    f. <**Insert manufacturer's name; product name or designation.**>

C. Destination-Based Group Automatic Operation: Provide reprogrammable group automatic system that assigns elevators leaving the main lobby in the up direction to a selected group of floors and directs passengers to an elevator serving their destination floor. System dispatches cars in a regulated sequence for optimum system efficiency; dispatch is based on origin and destination of calls. System automatically adjusts to changes in demand for different traffic conditions including heavy incoming, heavy two-way, heavy outgoing, and light off-hours as variations of normal two-way traffic.

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. Otis Elevator Co.; Elevonic with Channeling Operation.
    b. Schindler Elevator Corp.; Miconic 10.
    c. ThyssenKrupp Elevator; TAC50 with Destination Dispatch.
    d. <**Insert manufacturer's name; product name or designation.**>

D. [**Single-Car**]Auxiliary Operations: In addition to primary operation system features, provide the following operational features for elevators where indicated:

1. Standby Power Operation: On activation of standby power, car is returned to a designated floor and parked with doors open. Car can be manually put in service on standby power, either for return operation or for regular operation, by switches in control panel located at [**main lobby**] [**fire command station**] <**Insert location**>. Manual operation causes automatic operation to cease.
2. Standby Powered Lowering: On activation of standby power, if car is at a floor, it remains at that floor, opens its doors, and shuts down. If car is between floors, it is lowered to the next floor below, opens its doors, and shuts down.
3. Battery-Powered Lowering: If power fails and car is at a floor, it remains at that floor, opens its doors, and shuts down. If car is between floors, it is lowered to the next floor below, opens its doors, and shuts down. System includes rechargeable battery and automatic recharging system.
4. Automatic Dispatching of Loaded Car: When car load exceeds 80 percent of rated capacity, doors will begin closing.

5. Nuisance Call Cancel: When car calls exceed a preset number while car load is less than a predetermined weight, all car calls are canceled. Preset number of calls[**and predetermined weight**] can be adjusted.

E. Group Auxiliary Operations: In addition to primary operation system features, provide the following operational features for elevators and elevator groups where indicated:

1. Standby Power Operation: On activation of standby power, cars are returned to a designated floor and parked with doors open. One car is returned at a time, with priority given to loaded cars. If a car cannot be returned after two attempts, it is removed from the system. When all cars have been returned or removed from the system, one car is automatically placed in service. If car selected for service cannot operate within 60 seconds, the system removes car from service and places another car in service. Cars can be manually put in service on standby power, either for return operation or for regular operation, by switches in control panel located at [**main lobby**] [**fire command station**] <**Insert location**>. Manual operation causes automatic operation to cease.
2. Standby Power Operation: On activation of standby power, cars are returned, one at a time, to a designated floor and parked with doors open. If a car cannot be returned, it is removed from the system. When all cars have been returned or removed from the system, one car can be put in service on standby power by a selector switch in control panel located at [**main lobby**] [**fire command station**] <**Insert location**>.
3. Battery-Powered Lowering: If power fails, cars that are at a floor remain at that floor, open their doors, and shut down. Cars that are between floors are lowered one at a time to the next floor below, open their doors, and shut down. System includes rechargeable battery and automatic recharging system.
4. Automatic Dispatching of Loaded Car: When car load exceeds 80 percent of rated capacity, doors will begin closing.
5. Nuisance Call Cancel: When car calls exceed a preset number while the car load is less than a predetermined weight, all car calls are canceled. Preset number of calls[**and predetermined weight**] can be adjusted.
6. [**Emergency Hospital**] [**Priority**] Service: Service is initiated by a [**keyswitch**] [**card reader**] [**remote switch**] at designated floors. One elevator is removed from group operation and directed to the floor where service was initiated. On arriving at the floor, elevator opens its doors and parks[**and a lighted sign directs passengers to exit elevator**]. Car is placed in operation by selecting a floor and pressing door close button or by operating keyswitch to put car in independent service. After responding to floor selected or being removed from independent service, car is returned to group operation. If car is not placed in operation within a preset time after being called, it is returned to group operation.
7. Independent Service: Keyswitch in car control station removes car from group operation and allows it to respond only to car calls. Key cannot be removed from keyswitch when car is in independent service. When in independent service, doors close only in response to door close button.
8. Loaded-Car Bypass: When car load exceeds 80 percent of rated capacity, car will respond only to car calls, not to hall calls.
9. Distributed Parking: When cars are not required for response to calls, they are parked with doors closed, distributed in predetermined zones throughout the building. One zone shall include the main floor and adjacent floors; remaining floors shall be divided into approximately equal zones.

F. Security Features: Provide the following security features, where indicated. Security features shall not affect emergency firefighters' service.

1. Card-Reader Operation: System uses card readers at [**car control stations**] [**and**] [**hall push-button stations**] to authorize calls. Security system determines which landings and at what times calls require authorization by card reader. Provide required conductors in traveling cable and panel in machine room for interconnecting card readers, other security access system equipment, and elevator controllers. [**Allow space as indicated for card reader in car**] [**Provide stripe-swipe card reader integral with each car control station**].

   a. Security access system equipment is specified in Division 28 Section "Access Control."
   b. Security access system equipment is not in the Contract.

2. Keyswitch Operation: Push buttons are activated and deactivated by security keyswitches at [**car control stations**] [**and**] [**hall push-button stations**]. Key is removable [**only in deactivated position**] [**in either position**].
3. Keypad Operation: Allows each landing to be restricted or unrestricted. When a restricted landing button is pressed, a "Restricted Floor" lamp lights and remains lit until landing access code has been entered into a keypad or predetermined time period has elapsed. Car calls for restricted landings do not register until landing access code is entered into keypad within predetermined time period after landing button is pressed.

   a. Access codes are programmed at each car operating panel using a security keyswitch. Keypad operation can be activated and deactivated by security keyswitch at main landing.

4. Car-to-Lobby Feature: Feature, activated by keyswitch at main lobby, that causes [**car**] [**all cars in a group**] to return immediately to lobby and open doors for inspection. On deactivation by keyswitch, calls registered before keyswitch activation are completed and normal operation is resumed.

2.6 DOOR REOPENING DEVICES

A. Infrared Array: Provide door reopening devices with uniform array of 36 or more microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more of the light beams shall cause doors to stop and reopen.

B. Nudging Feature: After car doors are prevented from closing for predetermined adjustable time, through activating door reopening device, a loud buzzer shall sound and doors shall begin to close at reduced kinetic energy.

2.7 FINISH MATERIALS

A. General: Provide the following materials for exposed parts of elevator car enclosures, car doors, hoistway entrance doors and frames, and signal equipment as indicated.

B. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, commercial steel, Type B, exposed, matte finish.

C. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, commercial steel, Type B, pickled.

D. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.

1. Textured Stainless-Steel Sheet: Product with [**coined**] [**embossed**] texture rolled into exposed surface.

a. Available Product: Subject to compliance with requirements, a product that may be incorporated into the Work includes, but is not limited to, "<**Insert product name**>" by <**Insert manufacturer's name**>.
b. Product: Subject to compliance with requirements, provide "<**Insert product name**>" by <**Insert manufacturer's name**>.
c. Metal surface is [**satin polished**] [**satin relieved**] [**titanium nitride colored**] [**oxide colored**] [**satin polished and titanium nitride colored**] [**satin relieved and titanium nitride colored**] [**satin polished and oxide colored**] [**satin relieved and oxide colored**] [**color coated and satin relieved**] [**color coated and bright relieved**] after rolling.

E. Stainless-Steel Bars: ASTM A 276, Type 304.

F. Stainless-Steel Tubing: ASTM A 554, Grade MT 304.

G. Bronze Plate and Sheet: ASTM B 36/B 36M, Alloy UNS No. C28000 (muntz metal).

H. Bronze Extrusions: ASTM B 455, Alloy UNS No. C38500 (architectural bronze).

I. Bronze Tubing: ASTM B 135 (ASTM B 135M), Alloy UNS No. C23000 (red brass, 85 percent copper).

J. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063.

K. Nickel Silver Extrusions: ASTM B 151/B 151M, Alloy UNS No. C74500 or No. C77600.

L. Plastic Laminate: High-pressure type complying with NEMA LD 3, [**Type HGS for flat applications**] [**Type HGL for flat applications**] [**Type HGP for postformed applications**] [**and**] [**Type BKV for panel backing**].

2.8 CAR ENCLOSURES

A. General: Provide [**enameled-steel car enclosures to receive removable**] [**steel-framed car enclosures with nonremovable**] wall panels, with [**removable**]car roof, access doors, power door operators, and ventilation.

1. Provide standard railings complying with ASME A17.1 on car tops where required by ASME A17.1.
2. Provide finished car including materials and finishes specified below.

3. Refer to "Allowances" Paragraph in Part 1 "Summary" Article for items to be provided under the Elevator Car Allowance. Provide items not included in the Elevator Car Allowance as needed for finished car[**including materials and finishes specified below**].

B. Materials and Finishes: Provide manufacturer's standards, but not less than the following:

1. Subfloor: Underlayment grade, exterior plywood, 5/8-inch (16-mm) nominal thickness.
2. Floor Finish: [**Specified in a Division 09 Section**] [**Elevator manufacturer's standard level-loop nylon carpet; color as selected by Architect from manufacturer's full range**].
3. Enameled-Steel Wall Panels: Flush, hollow-metal construction; fabricated from cold-rolled steel sheet. Provide with factory-applied enamel finish; colors as selected by Architect from manufacturer's full range.
4. Stainless-Steel Wall Panels: Flush, hollow-metal construction; fabricated from stainless-steel sheet.
5. Bronze Wall Panels: Flush, hollow-metal construction; fabricated from bronze sheet.
6. Plastic-Laminate Wall Panels: Plastic laminate adhesively applied to [**1/2-inch (13-mm) fire-retardant-treated particleboard**] [**manufacturer's standard honeycomb core**] with[**plastic-laminate panel backing and**] manufacturer's standard protective edge trim. Panels have a flame-spread index of [**25**] [**75**] or less, when tested according to ASTM E 84. Plastic-laminate color, texture, and pattern as selected by Architect from [**plastic-laminate**] [**elevator**] manufacturer's full range.
7. Fabricate car with recesses and cutouts for signal equipment.
8. Fabricate car door frame integrally with front wall of car.
9. Enameled-Steel Doors: Flush, hollow-metal construction; fabricated from cold-rolled steel sheet. Provide with factory-applied enamel finish; colors as selected by Architect from manufacturer's full range.
10. Stainless-Steel Doors: Flush, hollow-metal construction; fabricated [**from stainless-steel sheet**] [**or**] [**by laminating stainless-steel sheet to exposed faces and edges of enameled cold-rolled steel doors using adhesive that fully bonds metal to metal without telegraphing or oil-canning**].
11. Bronze Doors: Flush, hollow-metal construction; fabricated by laminating bronze sheet to exposed faces and edges of enameled cold-rolled steel doors using adhesive that fully bonds metal to metal without telegraphing or oil-canning.
12. Plastic-Laminate Doors: Flush, hollow-metal construction; fabricated by laminating plastic laminate to exposed faces of enameled cold-rolled steel doors and covering edges with protective edge trim[**matching return panels**]. Plastic-laminate color, texture, and pattern as selected by Architect from [**plastic-laminate**] [**elevator**] manufacturer's full range.
13. Sight Guards: Provide sight guards on car doors.
14. Sills: Extruded metal, with grooved surface, 1/4 inch (6.4 mm) thick.
15. Luminous Ceiling: Fluorescent light fixtures and ceiling panels of translucent acrylic or other permanent rigid plastic.
16. [**Metal**] [**Metallic-Finish, Plastic-Laminate**] Ceiling: Flush panels, with [**incandescent downlights in the center of**] [**four low-voltage downlights in**] each panel.[**Align ceiling panel joints with joints between wall panels.**]
17. Handrails: Manufacturer's standard handrails, of shape, metal, and finish indicated.

2.9 HOISTWAY ENTRANCES

A. General: Provide manufacturer's standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Provide frame size and profile to coordinate with hoistway wall construction.

1. Where gypsum board wall construction is indicated, provide self-supporting frames with reinforced head sections.

B. Materials and Fabrication: Provide manufacturer's standards, but not less than the following:

1. Enameled-Steel Frames: Formed from cold-rolled or hot-rolled steel sheet. Provide with factory-applied enamel finish; colors as selected by Architect from manufacturer's full range.
2. Steel Subframes: Formed from cold-rolled or hot-rolled steel sheet with factory-applied enamel finish or corrosion-inhibiting primer. Fabricate to receive applied finish as indicated.
3. Stainless-Steel Frames: Formed from stainless-steel sheet.
4. Bronze Frames: Formed from cold-rolled or hot-rolled steel sheet, with enamel finish, and with formed-bronze sheet laminated to steel frames using adhesive that fully bonds metal to metal without telegraphing or oil-canning.
5. Enameled-Steel Doors[**and Transoms**]: Flush, hollow-metal construction; fabricated from cold-rolled steel sheet. Provide with factory-applied enamel finish; colors as selected by Architect from manufacturer's full range.
6. Stainless-Steel Doors[**and Transoms**]: Flush, hollow-metal construction; fabricated [**from stainless-steel sheet**] [**or**] [**by laminating stainless-steel sheet to exposed faces and edges of enameled cold-rolled steel doors using adhesive that fully bonds metal to metal without telegraphing or oil-canning**].
7. Bronze Doors[**and Transoms**]: Flush, hollow-metal construction; fabricated by laminating bronze sheet to exposed faces and edges of enameled cold-rolled steel doors using adhesive that fully bonds metal to metal without telegraphing or oil-canning.
8. Plastic-Laminate Doors[**and Transoms**]: Flush, hollow-metal construction; fabricated by laminating plastic laminate to exposed faces of enameled cold-rolled steel doors and covering edges with protective edge trim[**matching door frames**]. Plastic-laminate color, texture, and pattern as selected by Architect from [**plastic-laminate**] [**elevator**] manufacturer's full range.
9. Sight Guards: Provide sight guards on doors matching door edges.
10. Sills: Extruded metal, with grooved surface, 1/4 inch (6.4 mm) thick.
11. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107.

2.10 SIGNAL EQUIPMENT

A. General: Provide hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Fabricate lighted elements with [**long-life incandescent lamps and acrylic or other permanent, nonyellowing translucent plastic diffusers**] [**or**] [**LEDs**].

B. General: Provide signal equipment designed for destination-based system. Fabricate lighted elements with [**long-life incandescent lamps and acrylic or other permanent, nonyellowing translucent plastic diffusers**] [**or**] [**LEDs**].

C. Car Control Stations: Provide manufacturer's standard [**recessed**] [**or**] [**semirecessed**] car control stations. Mount in return panel adjacent to car door, unless otherwise indicated.

D. Swing-Return Car Control Stations: Provide car control stations mounted on rear of hinged return panel adjacent to car door and with buttons, switches, controls, and indicator lights projecting through return panel but substantially flush with face of return panel.

1. Mark buttons and switches with standard identification for required use or function that complies with ASME A17.1. Use both tactile symbols and Braille.
2. Provide "No Smoking" sign matching car control station, either integral with car control station or mounted adjacent to it, with text and graphics as required by authorities having jurisdiction.

E. Emergency Communication System: Provide system that complies with ASME A17.1 and the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)." On activation, system dials preprogrammed number of monitoring station and identifies elevator location to monitoring station. System provides two-way voice communication without using a handset and provides visible signals that indicate when system has been activated and when monitoring station has responded. System is contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.

F. Firefighters' Two-Way Telephone Communication Service: Provide [**flush-mounted cabinet**] [**telephone jack**] in each car and required conductors in traveling cable for firefighters' two-way telephone communication service specified in Division 28 Section "Fire Detection and Alarm."

G. Car Position Indicator: Provide [**illuminated,**]digital-type car position indicator, located above car door or above car control station. Also provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served.

1. Include travel direction arrows if not provided in car control station.

H. Hall Push-Button Stations: Provide one hall push-button station at each landing[**for each single elevator or group of elevators, but not less than one station for each four elevators in a group**].

I. Hall Push-Button Stations: Provide hall push-button stations at each landing as indicated.

1. Provide manufacturer's standard wall-mounted units.
2. Provide units with flat faceplate for mounting with body of unit recessed in wall.
3. Equip units with buttons for calling elevator and for indicating desired direction of travel.
4. Equip units with [**buttons**] [**or**] [**touch screen**] for calling elevator and for indicating direction of travel or destination as required by system. Provide a signaling system to verify floor selection, where destination registration is required, and to direct passengers to appropriate car.

a. Provide a means for passengers to indicate that they have disabilities so control system can allow extra room in assigned car.
b. Provide for connecting units that require destination registration to building security access system so a card reader can be used to register calls.

5. Provide telephone jack in each unit for firefighters' two-way telephone communication service specified in Division 28 Section "Fire Detection and Alarm."

J. Hall Lanterns: Units with illuminated arrows; but provide single arrow at terminal landings. Provide[**one of**] the following:

1. Manufacturer's standard wall-mounted units, for mounting above entrance frames.
2. Units with flat faceplate for mounting with body of unit recessed in wall and with illuminated elements projecting from faceplate for ease of angular viewing.
3. Units mounted in both jambs of entrance frame[**for each elevator**].
4. Units mounted in both car door jambs[**; may be used only for single elevators or for two-car groups**].

K. Hall Annunciator: With each hall lantern, provide audible signals indicating car arrival and direction of travel. Signals sound once for up and twice for down.

1. At manufacturer's option, audible signals may be placed on[**each**] car.

L. Hall Position Indicators: Provide [**illuminated,**]digital-display-type position indicators, located above[**each**] hoistway entrance at ground floor. Provide units with flat faceplate for mounting with body of unit recessed in wall.

1. Integrate ground-floor hall lanterns with hall position indicators.

M. Standby Power Elevator Selector Switches: Provide switches, as required by ASME A17.1, where indicated. Adjacent to switches, provide illuminated signal that indicates when normal power supply has failed.[**For each elevator, provide illuminated signals that indicate when they are operational and when they are at the designated emergency return level with doors open.**]

N. Fire Command Center Annunciator Panel: Provide panel containing illuminated position indicators for each elevator, clearly labeled with elevator designation; include illuminated signal that indicates when elevator is operational and when it is at the designated emergency return level with doors open. Provide standby power elevator selector switch(es), as required by ASME A17.1, adjacent to position indicators. Provide illuminated signal that indicates when normal power supply has failed.

O. Corridor Call Station Pictograph Signs: Provide signs matching hall push-button stations, with text and graphics as required by authorities having jurisdiction, indicating that in case of fire elevators are out of service and exits should be used instead. Provide one sign at each hall push-button station, unless otherwise indicated.

2.11 ELEVATORS

A. Elevator Description:

1. Group Number: <**Insert a different number for each group of elevators that share a group operation system.**>
2. Elevator Number(s): <**Insert elevator number(s) as shown on Drawings.**>
3. Service Elevator Number(s): <**Insert elevator number(s) as shown on Drawings.**>
4. Type: [**Geared**] [**Gearless**] traction.
5. Machine Location: [**Machine room above hoistway**] [**Hoistway; no machine room is provided**].
6. Rated Load: [**2000 lb (908 kg)**] [**2100 lb (953 kg)**] [**2500 lb (1135 kg)**] [**3000 lb (1362 kg)**] [**3500 lb (1589 kg)**] [**4000 lb (1816 kg)**] [**4500 lb (2043 kg)**] [**5000 lb (2270 kg)**] <**Insert load**>.
7. Freight Loading Class for Service Elevator(s): Class A.
8. Rated Speed: [**200 fpm (1.0 m/s)**] [**350 fpm (1.8 m/s)**] [**400 fpm (2.0 m/s)**] [**450 fpm (2.3 m/s)**] [**500 fpm (2.5 m/s)**] [**700 fpm (3.6 m/s)**] [**800 fpm (4.1 m/s)**] [**1000 fpm (5.1 m/s)**] [**1200 fpm (6.1 m/s)**] [**1400 fpm (7.1 m/s)**] <**Insert speed**>.
9. Operation System: [**Selective collective automatic operation**] [**Group automatic operation**] [**Group automatic operation with demand-based dispatching**] [**Destination-based group automatic operation**].
10. Auxiliary Operations:

    a. Standby power operation.
    b. Standby powered lowering.
    c. Battery-powered lowering.
    d. Earthquake Emergency Operation: Comply with requirements in ASME A17.1.
    e. Automatic dispatching of loaded car.
    f. Nuisance call cancel.
    g. [**Emergency hospital**] [**Priority**] service at [**all**] <**Insert floor designations**> floors.
    h. Independent service for [**service elevator**] [**all cars in group**].
    i. Loaded-car bypass.
    j. Distributed parking.

11. Security Features: [**Card-reader operation**] [**Keyswitch operation**] [**Keypad operation**] [**Car-to-lobby feature**].
12. Dual Car Control Stations: Provide two car control stations[**in each elevator**]; equip only one with required keyswitches if any.
13. Car Enclosures:

    a. Inside Width: [**64 inches (1626 mm)**] [**68 inches (1727 mm)**] [**80 inches (2032 mm)**] [**92 inches (2337 mm)**] <**Insert width**> from side wall to side wall.
    b. Inside Depth: [**51 inches (1295 mm)**] [**53 inches (1346 mm)**] [**57 inches (1448 mm)**] [**65 inches (1651 mm)**] [**87-1/2 inches (2222 mm)**] [**90 inches (2286 mm)**] [**93 inches (2362 mm)**] [**93-1/2 inches (2375 mm)**] [**96 inches (2438 mm)**] [**101 inches (2565 mm)**] [**102 inches (2591 mm)**] <**Insert depth**> from back wall to front wall (return panels).
    c. Inside Height: [**88 inches (2235 mm)**] [**92 inches (2337 mm)**] [**94 inches (2388 mm)**] [**100 inches (2540 mm)**] [**104 inches (2642 mm)**] [**108 inches (2743 mm)**] [**112 inches (2845 mm)**] <**Insert height**> to underside of ceiling.
    d. Front Walls (Return Panels): [**Polished stainless steel, No. 8 finish**] [**Satin stainless steel, No. 4 finish**] [**Polished bronze, lacquered**] [**Satin bronze, lacquered**].

e. Car Fixtures: [**Polished stainless steel, No. 8 finish**] [**Satin stainless steel, No. 4 finish**] [**Polished bronze, lacquered**] [**Satin bronze, lacquered**].
f. Side and Rear Wall Panels: [**Enameled steel**] [**Plastic laminate**] [**Satin stainless steel, No. 4 finish**] [**Textured stainless steel**].
g. Reveals: [**Enameled steel**] [**Polished stainless steel, No. 8 finish**] [**Satin stainless steel, No. 4 finish**] [**Polished bronze, lacquered**] [**Satin bronze, lacquered**].
h. Door Faces (Interior): [**Enameled steel**] [**Polished stainless steel, No. 8 finish**] [**Satin stainless steel, No. 4 finish**] [**Textured stainless steel**] [**Polished bronze, lacquered**] [**Satin bronze, lacquered**] [**Plastic laminate**].
i. Door Sills: [**Aluminum, mill finish**] [**Bronze, polished**] [**Nickel silver, polished**].
j. Ceiling: [**Luminous ceiling**] [**Polished stainless steel, No. 8 finish**] [**Satin stainless steel, No. 4 finish**] [**Polished bronze, lacquered**] [**Reflective metallic-finish, plastic-laminate, stainless steel**] [**Reflective metallic-finish, plastic-laminate, bronze**].
k. Handrails: [**1-1/2 inches (38 mm) round**] [**1/2 by 2 inches (13 by 50 mm) rectangular**] <**Insert description**> [**mirror-polished stainless steel, No. 8 finish**] [**satin stainless steel, No. 4 finish**] [**mirror-polished bronze, lacquered**] [**satin bronze, lacquered**], at [**sides**] [**and**] [**rear**] of car.
l. Floor: Manufacturer's standard carpet.
m. Floor prepared to receive carpet (specified in Division 09 Section "Sheet Carpeting").
n. Floor prepared to receive resilient tile (specified in Division 09 Section "Resilient Tile Flooring").
o. Floor prepared to receive sheet vinyl (specified in Division 09 Section "Resilient Sheet Flooring").
p. Floor recessed and prepared to receive [**dimension stone tile (specified in Division 09 Section "Stone Tiling")**] [**ceramic tile (specified in Division 09 Section "Tiling")**].
q. Floor Thickness, Including Setting Materials: <**Insert thickness**> above plywood subfloor.

14. Hoistway Entrances: As follows:

a. Width: [**36 inches (914 mm)**] [**42 inches (1067 mm)**] [**48 inches (1219 mm)**] [**54 inches (1372 mm)**] <**Insert width**>.
b. Height: [**84 inches (2134 mm)**] [**96 inches (2438 mm)**] <**Insert height**>.
c. Type: [**Single-speed side sliding**] [**Two-speed side sliding**] [**Single-speed center opening**] [**Two-speed center opening**].
d. Fire-Protection Rating: [**1 hour**] [**1-1/2 hours**] <**Insert rating**>[**with 30-minute temperature rise of 450 deg F (250 deg C)**].
e. Frames [**at First Floor**] [**at Basement Floors**]: [**Enameled steel**] [**Polished stainless steel, No. 8 finish**] [**Satin stainless steel, No. 4 finish**] [**Polished bronze, lacquered**] [**Satin bronze, lacquered**].
f. Frames at Other Floors: [**Enameled steel**] [**Polished stainless steel, No. 8 finish**] [**Satin stainless steel, No. 4 finish**] [**Polished bronze, lacquered**] [**Satin bronze, lacquered**].
g. Doors [**and Transoms**] [**at First Floor**] [**at Basement Floors**]: [**Enameled steel**] [**Polished stainless steel, No. 8 finish**] [**Satin stainless steel, No. 4 finish**]

[**Textured stainless steel**] [**Polished bronze, lacquered**] [**Satin bronze, lacquered**] [**Plastic laminate**].

h. Doors[**and Transoms**] at Other Floors: [**Enameled steel**] [**Polished stainless steel, No. 8 finish**] [**Satin stainless steel, No. 4 finish**] [**Textured stainless steel**] [**Polished bronze, lacquered**] [**Satin bronze, lacquered**] [**Plastic laminate**].

i. Sills [**at First Floor**] [**at Basement Floors**]: [**Aluminum, mill finish**] [**Bronze, polished**] [**Nickel silver, polished**].

j. Sills at Other Floors: [**Aluminum, mill finish**] [**Bronze, polished**] [**Nickel silver, polished**].

15. Hall Fixtures [**at First Floor**] [**at Basement Floors**]: [**Polished stainless steel, No. 8 finish**] [**Satin stainless steel, No. 4 finish**] [**Polished bronze, lacquered**] [**Satin bronze, lacquered**] [**Recessed type with no exposed-metal surfaces**].
16. Hall Fixtures at Other Floors: [**Polished stainless steel, No. 8 finish**] [**Satin stainless steel, No. 4 finish**] [**Polished bronze, lacquered**] [**Satin bronze, lacquered**] [**Recessed type with no exposed-metal surfaces**].
17. Additional Requirements:

    a. Provide inspection certificate in each car, mounted under acrylic cover with frame made from [**polished stainless steel, No. 8 finish**] [**satin stainless steel, No. 4 finish**] [**polished bronze, lacquered**] [**satin bronze, lacquered**].
    b. Provide blanket hooks[**in all cars**] and [**one**] [**two**] <**Insert number**> complete set(s) of full-height protective blankets.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elevator areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance. Examine hoistways, hoistway openings, pits, and machine rooms as constructed; verify critical dimensions; and examine supporting structure and other conditions under which elevator work is to be installed.

1. For the record, prepare a written report, endorsed by Installer, listing dimensional discrepancies and conditions detrimental to performance or indicating that dimensions and conditions were found to be satisfactory.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions.

B. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.

C. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts designed to minimize transmission of vibrations to structure and thereby minimize structure-borne noise from elevator system.

D. Lubricate operating parts of systems, including ropes, as recommended by manufacturers.

E. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with car. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.

F. Leveling Tolerance: 1/8 inch (3 mm), up or down, regardless of load and direction of travel.

G. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.

H. Locate hall signal equipment for elevators as follows, unless otherwise indicated:

1. For groups of elevators, locate hall push-button stations between two elevators at center of group or at location most convenient for approaching passengers.
2. Place hall lanterns either above or beside each hoistway entrance.
3. Mount hall lanterns at a minimum of 72 inches (1829 mm) above finished floor.

3.3 FIELD QUALITY CONTROL

A. Acceptance Testing: On completion of elevator installation and before permitting use (either temporary or permanent) of elevators, perform acceptance tests as required and recommended by ASME A17.1 and by governing regulations and agencies.

B. Operating Test: Load [**elevator**] [**each elevator**] [**one elevator of each type, capacity, speed, and travel distance**] to rated capacity and operate continuously for 30 minutes over full travel distance, stopping at each level and proceeding immediately to the next. Record temperature rise of elevator machine during 30-minute test period. Record failure to perform as required.

C. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times tests are to be performed on elevators.

3.4 PROTECTION

A. Temporary Use: [**Limit temporary use for construction purposes to one elevator.**]Comply with the following requirements for[**each**] elevator used for construction purposes:

1. Provide car with temporary enclosure, either within finished car or in place of finished car, to protect finishes from damage.
2. Provide strippable protective film on entrance and car doors and frames.
3. Provide padded wood bumpers on entrance door frames covering jambs and frame faces.
4. Provide other protective coverings, barriers, devices, signs, and procedures as needed to protect elevator and elevator equipment.
5. Do not load elevators beyond their rated weight capacity.

6. Engage elevator Installer to provide full maintenance service. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as necessary for proper elevator operation at rated speed and capacity. Provide parts and supplies same as those used in the manufacture and installation of original equipment.
7. Engage elevator Installer to restore damaged work, if any, so no evidence remains of correction. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to operate[**, adjust, and maintain**] elevator(s). Refer to Division 01 Section "Demonstration and Training."

B. Check operation of[**each**] elevator with Owner's personnel present and before date of Substantial Completion. Determine that operation systems and devices are functioning properly.

C. Check operation of[**each**] elevator with Owner's personnel present not more than one month before end of warranty period. Determine that operation systems and devices are functioning properly.

END OF SECTION 142100

SECTION 144200 – WHEELCHAIR LIFTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Vertical platform lifts.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components, and finishes for lifts.
2. Include rated capacities, operating characteristics, electrical characteristics, safety features, controls, finishes, and accessories.

B. Shop Drawings: For each lift.

1. Include plans, elevations, sections, details, attachments to other work, and required clearances.
2. Indicate dimensions, weights, loads, and points of load to building structure.
3. Include details of equipment assemblies, method of field assembly, components, and location and size of each field connection.
4. Include diagrams for power, signal, and control wiring.

C. Samples for Initial Selection: For each finished product specified, provide two complete sets of color chips representing manufacturer's full range of available colors and patterns.

D. Samples for Verification: For each finished product specified, two samples, minimum size 1-3/4” x 2-1/4”, representing actual product, color, and patterns.

1.3 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of lift.

1. Include statement that runway, ramp or pit, dimensions as shown on Drawings, and electrical service as shown and specified are adequate for lift being provided.

B. Sample Warranty: For special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of lift to include in operation and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

    a. Parts list with sources indicated.
    b. Recommended parts inventory list.

B. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted use of lifts.

C. Continuing Maintenance Proposal: Submit a continuing maintenance proposal from Installer to Owner, in the form of a standard one year maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

1.5 QUALITY ASSURANCE

A. Manufacturer: Provide wheelchair lifts manufactured by a firm with a minimum of 10 years experience in fabrication of wheelchair lifts equivalent to those specified.

B. Installer: Wheelchair lifts shall be installed by the manufacturer or who is trained and approved by manufacturer.

C. Regulatory Requirements: Wheelchair lift system design and installation shall comply with the latest versions of applicable codes including national and local jurisdictional codes. It shall be the manufacturer's responsibility to indicate which codes apply and to verify compliance.

1. Wheelchair lift shall be designed in response to Americans with Disabilities Act Accessibility Guidelines (ADAAG).

2. Any applicable seismic code requirements.

3. Wheelchair lifts shall be in compliance with:

    a. ASME A18.1 – Safety Standard for Platform Lifts and Stairway Chairlifts
    b. ASME A17.1 – Safety Code for Elevators and Escalators
    c. ASME A17.5 – Elevator and Escalator Electrical Equipment
    d. NFPA 70 – National Electric Code

4. Wheelchair lifts shall be in compliance with:

    a. CSA B355 – Lifts for Persons with Physical Disabilities.
    b. CSA B44.1/ASME A17.5 – Elevator and Escalator Electrical Equipment
    c. CSA – National Electric Code.

D. Permits and Inspections: Provide licenses and permits and perform required inspections and tests.

1.6 DELIVERY, STORAGE AND HANDLING

A. Should the building or the site not be prepared to receive the wheelchair lift equipment at the agreed upon date, the General Contractor will be responsible to provide a proper and suitable storage area on or off the premises.

B. Should the storage area be off-site and the equipment not yet delivered, then the wheelchair lift contractor, upon notification from the General Contractor, will divert the wheelchair lift equipment to the storage area. If the equipment has already been delivered to the site, then the General Contractor shall transport the elevator equipment to the storage area. The cost of wheelchair lift equipment taken to storage by either party, storage, and redeliver to the job site shall not be at the expense of the wheelchair lift contractor.

C. Store products in manufacturer's unopened packing until ready for installation.

D. Store components off the ground in a dry covered area, protected from adverse weather conditions.

1.7 PROJECT CONDITIONS

A. Do not use wheelchair lift for hoisting materials or personnel during construction period.

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of lifts that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Extended Warranty: Provide an extended manufacturer's warranty for the entire warranty period covering the wheelchair lift materials and workmanship for the following additional extended period beyond the initial warranty. Preventive Maintenance agreement required.

1. Warranty Period: Five additional years.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Garaventa Lift or approved equal.

2.2 EQUIPMENT

A. Capacity: 750 lbs (340 kg) rated capacity.

B. Mast Height: 45 inches (1143 mm) maximum lifting height.

C. Platform Size and Nominal Clear Platform Dimensions:

1. Standard: 36 inches (914 mm) by 48-7/8 inches (1242 mm) clear platform dimensions.

D. Platform Configuration:

1. Straight Through: Front and rear openings.

E. Landing Openings: Gates shall be self-closing type.

1. Gate Height: 42-1/8 inches.
2. Platform Gate: Travels with platform and opens at lower landing.
3. Upper Landing Gate: Installed at upper landing.

F. Power Gate Operators:

1. Location:

a. Platform Gate: Travels with platform and opens with lower landing.
b. Upper Landing Gate.

2. Automatically opens the gate when platform arrives at a landing. Will also open at landing by pressing call button.
3. ADA Compliant and obstruction sensitive.
4. Low voltage, 24 VDC with all wiring concealed.

G. Lift Components

1. Machine Tower: Custom aluminum extrusion.
2. Base Frame: Structural steel.
3. Platform Side Wall Panels: 16 gauge (1.5 mm) galvanized steel sheet.
4. Side Guard Panels: 42-1/8 inches (1070 mm) high mounted on platform.

H. Base Mounting at Lower Landing:

1. Pit Mount: Lift to be mounted in pit with dimensions to meet manufacturers requirements for the platform size specified. Pit construction shall be in accordance to Section 03300.

I. Leadscrew Drive:

1. Drive Type: Self-lubricating acme screw drive.
2. Emergency Operation: Manual handwheel device to raise or lower platform.
3. Battery Powered Emergency Lowering: Battery powered platform lowering device that automatically activates in the event of power failure. Allows passenger to drive platform downward to lower landing. Does not operate lift in up direction.
4. Safety Devices:

a. Integral safety nut assembly with safety switch.

5. Travel Speed: 10 fpm (3.0 m/minute)
6. Motor: 2.0 hp (560 W).
7. Power Supply:

a. 120 VAC single phase; 60 Hz on a dedicated 20 amp circuit.
b. 208/240 VAC, single phase; 50 Hz on a dedicated 16 amp circuit.

J. Hydraulic Drive:

1. Drive Type: Chain hydraulic
2. Emergency Operation: Manual device to lower platform and battery auxiliary power to raise or lower platform.
3. Safety Devices:

    a. Slack chain safety device.
    b. Shoring device.

4. Travel Speed: 17 fpm (5.2 m/minute).
5. Motor: 3.0 hp (2.2 kW); 24 volts DC.
6. Power Supply:

    a. 120 VAC single phase; 60 Hz on a dedicated 15 amp circuit.
    b. 208/240 VAC, single phase; 50 Hz on a dedicated 16 amp circuit.
    c. Powered by continuous building mains converted to 24 VDC, equipped with auxiliary power system capable of running lift up and down for a minimum of 5 trips with rated load.
    d. Powered by continuously charged battery system.

K. Platform Controls: 24 VDC control circuit with the following features.

1. Direction Control: Constant pressure rocker switch.
2. Illuminated and audible emergency stop switch shuts off power to lift and activates audio alarm with battery backup.
3. Keyless operation.
4. Emergency Telephone: Platform shall be equipped with ADA compliant integrated telephone with a stainless steel faceplate. Telephone shall operate in the event of power failure. A telephone line shall be supplied to the lift site as specified under Division 16.
5. Arrival Gong and Digital Floor Display

L. Call Station Controls: 24 VDC control circuit with the following features.

1. Direction Control:

    a. Constant pressure rocker switch.

2. Keyless operation
3. Call Station Mounting

    a. Lower: Wall mounted surface
    b. Upper: Wall mounted surface

M. Safety Devices and Features:

1. Grounded electrical system with upper, lower, and final limit switches.
2. Tamper resistant interlock to electrically monitor that the gate is in the closed position and the lock is engaged before lift can move from landing.
3. Pit stop switch mounted on mast wall (if required by jurisdiction codes).
4. Electrical disconnect shall shut off power to the lift.
5. Under platform safety pan with five waterproof safety switches to detect obstruction under platform.

N. Finishes

1. Aluminum Extrusions: Champagne anodized finish.
2. Ferrous Components: Electrostatically applied baked powder finish, fine textured.

    a. Color: Satin Grey, RAL 7030.

3. Lift Finish: Baked powder coat finish as selected by the Architect from manufacturer's optional RAL color chart.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Verify required landings and openings are of correct size and within tolerances.

C. Verify electrical rough-in is at correction location.

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. 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 platform lifts in accordance with applicable regulatory requirements including ASME A 18.1, California Title 8 and the manufacturer's instructions.

B. Install system components and connect to building utilities.

C. Accommodate equipment in space indicated.

D. Startup equipment in accordance with manufacturer's instructions.

E. Adjust for smooth operation.

3.4 FIELD QUALITY CONTROL

A. Perform test in compliance with ASME A18.1 and as required by authorities having jurisdiction

B. Schedule tests with agencies and Architect, Owner, and Contractor present.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 144200

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SECTION 220000 - PLUMBING AND PLUMBING SYSTEMS

PART 1 GENERAL

1.1 General Requirements

A. The plumbing work as on the drawings and described in these Specifications shall be subject to all provisions of the General and Special conditions of the contract documents.

B. The work described on the plans and in these specifications includes all labor, materials, equipment, transportation, testing and startup of the plumbing devices and systems, as outlined in the Summary of Work.

C. The plumbing contractor shall submit the initial bid price to include all costs with overhead and profit to complete the construction described in the plans and specifications through start up and acceptance by the owner.

D. The requirements outlined in the specifications shall be in addition to the plans.

1.2 Responsibility

A. The contractor shall be responsible for staffing this division of work with qualified persons experienced in the particular work described herein. All material shall be new and of the best quality. All work shall be installed in a manner so as to result in a completed section of work with a neat orderly appearance. The contractor shall coordinate this work with other portions of the project to result in completely operable systems.

B. The intent of the plans and specifications is to describe the general scope of the plumbing work and plumbing systems. It is not the intent of these plans and specifications to preclude the submittal of alternative methods or materials. Manufacturer's names and catalog numbers are stated to identify the type and quality of the equipment or materials required for the project. The contractor may submit shop drawings and/or technical information on alternative equipment, materials or installation details to accomplish the intent of the plans and specifications. Approval of the alternative equipment, materials or installation details shall not relieve the contractor of any responsibility for complying with the intent of the plans and specifications.

C. The contractor shall construct the project in conformance with the plans, specifications, and related codes and installation standards. Deviations from the plans and specifications shall be requested through a "Request for Information(RFI), Authorization to deviate from the plans and specifications shall be by a written response to the RFI. Verbal understandings do not exist.

1.3 Summary of work

Provide and install the following plumbing fixtures, equipment and systems and/or modifications thereto:

A. All plumbing fixtures shown in the architectural and plumbing plans.

Reference the architectural plans for fixture locations and dimensions.

B. All cold water piping, valves, fittings, supports and controls from the point of connection to the yard piping or existing building systems, to each point of use, including service and connection to all water heaters. Reference the site utility plan or site plumbing plan for connection from the yard piping to the building system piping. Provide and install access panels for each concealed valve.

C. All hot water piping, valves, fittings, insulation, supports and controls from the water heaters to the points of use. Provide circulation pumps with related valves and piping in the case of re-circulated systems. Provide and install access panels for each concealed valve.

D. All waste piping, fittings and supports from the point of connection at each fixture to the connection with the onsite waste collection system including indirect waste fittings and clean outs.

E. All vent piping, fittings and supports from the points of connection with the waste piping through the vent terminations above the roof. Provide roof jacks and storm collars for each roof penetration.

F. All fuel gas piping fittings, supports, and painting exposed piping from gas meter to each point of use, and secondary regulators in the case of two stage systems. Provide shut off valves at the entry into each building. Provide UL listed connectors and shut off valves at each gas fired appliance. Provide a dielectric union, 6" above grade at the entry into each building, for all underground metallic gas piping.

G. All rainwater piping fittings and supports from gutters and roof decks to connection to site storm water piping. Provide site storm water piping and related fixtures when shown on the plans.

H. All site piping, trenching, backfill, fittings, back flow prevention valves, isolation valves and boxes with covers. Provide H-20 composite material or concrete boxes with covers for in ground installations.

I. All valves, including pressure reducing, ball, check, gate and globe.

J. All water heaters, including flues and combustion air provisions for gas or oil fueled units, and safety valve drain piping extended through an exterior wall. Provide isolation valves on both cold water and hot water connections to the water heater.

K. All floor drains, trap primers and related piping from nearest lavatory, sink or flush valve to the floor drain.

L. All floor sinks related to commercial kitchens and indirect wastes.

M. All clean outs, including floor, wall and grade types.

1.4 Division 15 Responsibilities

A. Assume responsibility for the installation and proper functioning of the plumbing systems in the entirety. Furnish and install all low voltage (24 volts or less) systems. Providing disconnects, contactors, stop/start and protective devices, for switching power

circuits is the responsibility of the electrical contractor.

B. Coordinate all electric power and control requirements with the electrical contractor to assure complete, operable systems.

C. The electrical voltage and phase designation for plumbing equipment is based on a commonly available voltage and phase for equipment listed in the Plumbing Equipment Schedule on the plans, and coordinated with the electrical design. Any revision in the voltage and phase configuration requested by the contractor shall be paid for in total by the contractor.

1.5 Division 16 Electrical Responsibilities

A. Furnish and install all raceways, conductors, disconnects, contactors, start/stop and protective devices necessary for electrical power supply and switching, all control wiring conduit, and line voltage control wiring to all motors and equipment.

1.6 Work Not Described

A. Include all minor work not typically shown or specified, as required to produce complete, operational, plumbing systems.

1.7 Rules and regulations

All work and materials shall comply with the latest rules and regulations of:

A. The California Building Code, California Code of Regulations (CCR), Title 24, Part 2

B. The California Plumbing Code, CCR Title 24, Part 5, including all related International Association of Plumbing and Mechanical Officials (IAPMO), installation standards.

C. The California Energy Code, CCR, Title 24, Part 6

D. The California Green Code, CCR, Title 24, Part 11

F. The National Fuel Gas Code, NFPA 54.

Strict compliance with the latest adopted codes and regulations is mandatory.

1.8 Site Examination

Thoroughly examine the site and verify the actual work conditions. No extra compensation will be allowed for expenses due to failure to discover site conditions which affect the work.

1.9 Plan and specifications accuracy

A. The plans and specifications are diagrammatic in nature and do not represent exact locations or distances except where specifically noted. Include all required offsets, bends, and other special fittings. Coordinate with the other building trades and make all modifications required at no extra costs.

B. The plans showing existing plumbing systems in areas to be remodeled show the systems as illustrated in the best available as-built documents and on limited field inspection of the site by the Engineer. Inspect and field-verify actual existing conditions. The plans reflect the desired new configurations. Include all required modifications to implement the new configuration at no extra cost.

1.10 Substitutions and submittals

A. Provide six submittals of all equipment and materials described in the equipment schedules as shown on the plans and exposed plumbing materials. Provide wiring and/or piping diagrams for all control systems. Submittal data shall be sufficient to verify complete compliance with the plans and specifications. Provide complete data even if using materials specified. Submittals shall conform to the requirements of the General Conditions and be submitted in one package to expedite the review process.

B. Provide shop drawings for all fabricated equipment.

C. Submit all proposed deviations from the plans or specifications in material type, size, configuration, quantity, or routing, through a Request for Information (RFI) for Engineer's review. Requested deviations shall be accepted, modified or denied by a written respond to the RFI. Verbal understandings do not exist.

D. Submittal review is for the purpose of determining general conformance with the intent of the plans and specifications, the favorable review of part of all or the submittal does not relieve the contractor of any responsibility for compliance with the contract documents.

E. The contractor is responsible for reviewing plumbing equipment and fixture sizes, at the time of submittal, coordinating sizes with all other construction crafts on the project and for submitting a (RFI) through the general contractor to resolve any interferences.

1.11 As built drawings

A. Provide and keep up-to-date, a complete set of prints, which shall be regularly corrected, and shall show every change from the original contract drawings, include change orders. Deliver as-built set to the Engineer upon project completion and acceptance. Include dimensions, exact locations, and invert elevations of all exterior and interior underground piping.

1.12 Demolition and removal

A. Demolish and remove from the site all portions of the plumbing systems not specifically required for the intended operation of the systems and equipment described herein.

B. Remove all equipment and materials not required for continuing operation and dispose of it in an environmentally accepted manner. The owner shall have the right to take possession of any materials and equipment they deem suitable for other use.

1.13 Quality

A. Install only new materials. No used materials, other than equipment shown as "Existing Relocate" (ER), may be installed.

B. Do not install materials received in a damaged in a damaged condition or damaged at job-site. Return all damaged components. Repair of minor and incidental damage, if first

approved by Engineer and manufacturer, is acceptable.

1.14 Equipment sleeves, inserts and anchors

A. Install all sleeves, inserts, anchorages, etc. required for this Division and which are embedded in work of other trades.

1.15 Foundations and supports

A. Install equipment on concrete foundation pads anchored to the slab floor, if shown on the Plans, listed in the Specifications, or recommended by the manufacturer. Anchor equipment to the pad to meet normal load and seismic requirements.

B. Securely attach all equipment, piping, etc. to the building as detailed in the related construction code, or as described in these plans and specifications. Allow for expansion and contractions.

1.16 Cutting and patching

A. Make all cuts and patches required to install the work according to good construction practice. Modification of structural building components shall be made only with the Engineer's specific written approval.

B. Do not cover concealed piping or other systems installed under this Division until inspected and approved by Engineer and all other required construction inspectors. If systems are covered before inspection and approval, Contractor will remove covering and replace after inspection at no extra cost.

1.17 Training for operation and maintenance

A. After all plumbing systems have been tested and accepted, provide at least 4 hours training to the Owners maintenance crew. Cover operating and maintenance procedures for all plumbing systems and components installed.

B. Submit four (4) bound sets of Operations and Maintenance (O&M) Manuals to the Owner. Submit a draft copy to the Engineer for approval prior to issuing the final copies. The O&M Manuals shall include, at a minimum:

All available manufacturer's O&M literature, parts lists, etc. Wiring

diagrams

Controls diagrams of all pneumatic, electrical, and electronic control systems. Written

sequence of operations of all controls.

Any unusual or unique system O&M procedures not covered by manufacturer's literature.

Summary maintenance schedule showing maintenance intervals as recommended by the manufacturers,

A copy of the manufacturers warranties.

The Contractor is required to meet the guarantee requirements of the General Conditions

1.18 Seismic construction

A. Provide seismic bracing for plumbing components and piping as shown on the plans.

1.19 Testing

A. Perform pressure tests on all plumbing systems in conformance with the C PC. Failure of any pressure test requires repair of the nonconforming section and retesting until the test criteria is satisfied. Failure of a pressure test in gas piping requires the replacement of the nonconforming section of pipe. Re-test the repaired/replaced section of piping to acceptance. Service test all systems to assure the function and equipment. Provide an operational test on each system.

B. Pressure test requirements:

1. Domestic water piping - Hydrostatic or air test to 50 psi or line pressure, which ever is greater for a period of not less than 15 minutes with no drop in pressure.

2. Waste and Vent piping - Hydrostatic test waste piping to 10 feet of head above the highest fixture connection, for a period of not less than 15 minutes with no drop in liquid level, and no apparent leaks at any joints or connections. Hydrostatic test vent piping to the top of the lowest connected vent through roof, for a period of not less than 15 minutes, with not drop in liquid level, and no apparent leaks at any joints or connections.

3. Gas piping - Air or Nitrogen test to 10 psi for a period of not less than 30 minutes for systems operating at less than 14"W.C., and 60 psi for a period of not less than 30 minutes for systems operating at 14"W.C. or greater, with no drop in pressure.

1.20 Warranty

A. Provide one year unconditional warranty on all plumbing equipment and systems.

PART 2 - PRODUCTS

2.1 Water Closets

A. Standard and Accessible Type: Floor mounted flush valve model, vitreous china elongated siphon jet with 1-1/2" top spud, 1.28 gallon flush valve and seat, color, white. Handicapped water closet shall have a minimum seat height of 17" and a maximum seat height of 19".

2.2 Urinals

A. Standard and Accessible Type: Wall mounted, vitreous china, 0.5 gal/flush, siphon jet, 3/4"

spud inlet, 2" back outlet, wall hangers, color white. Mounting height shall conform with the Architectural Plans.

2.3 Lavatories and sinks

A. Standard and Accessible Type Lavatories: Wall mounted vitreous china with 4" faucet centers, drilled for concealed carrier arms, 3/8" hot and cold water angle stops, 1-1/4" P trap, lever handle, 0.5 gpm faucets, color white. Provide anchorage in in conformance with the plan details, if shown, or the manufacturers recommendations, if details are not shown in the plans.

B. Service Sink: Floor mounted precast terrazzo with SS caps on all curbs, faucet, hose and bracket, gasket and mop bracket. Provide non-removable vacuum breaker on the faucet.

C. Stainless Steel sinks: Minimum 20 ga. Self riming, punched to match the faucet set.

2.4 Drinking Fountains

A. Standard and Accessible Type: Type 18 gauge SS chrome plated, bubbler, front push bar, self closing valve 1/2" IPS stop, 1-1/4" IPS trap. Provide mounting plate, attach to studs.

2.5 Floor Drains

A. Lacquered cast iron two piece body with double drainage flange, weep holes, reversible clamping collar and round, adjustable nickel-bronze
heel proof strainer, for cast iron waste systems. Provide with trap primer connection.

2.6 Domestic Water Piping

A. Inside building, above floor - Type "L" hard copper tubing, conforming to ASTM B-88, with wrought copper fittings and 95/5 solder or pressed fitting joints. Type "M" may be used for un-pressurized drain piping. P.E. PEX piping may be used for branch piping with brass connectors.

B. Beneath floor slab, below grade - Type K, copper tubing conforming to ATM B-88, with wrought copper fittings and 95/5 solder or pressed fitting joints, double wrapped with 20 mil P.E. pipe wrap. P.E. PEX listed piping is accepted for below slab on grade, with brass connectors. All brass connectors to be double wrapped with 20 mil P.E. pipe wrap.

C. Outside building - Schedule 40 PVC pipe conforming to ASTM D1785, PVC with solvent cemented joints.

2.7 Sanitary Soil, Waste and Vent and Rainwater Piping

A. Soil and waste piping, vent and rainwater piping above and below grade - Acrylonite-Buladiene-Styrene (ABS), conforming to ASTM D2661-85a, with solvent cemented fittings, or Poly Vinyl Chloride (PVC), conforming to ASTM D2665-85a, with solvent cemented fittings. Use only listed adapters for connection to non-plastic pipe. Provide standard weight cast iron piping with no hub connectors for all vertical waste and rainwater piping within walls, above grade. Type DWV CU with solder fittings may be used for above

grade vent piping.

B. Soil and waste piping, vent and rainwater piping above and below grade - standard weight cast iron conforming to ASTM A 888 with heavy duty stainless steel shielded no hub couplings, conforming to ASTM C 1540

C. Sanitary sewer piping, outside of building perimeter, below grade, Poly Vinyl Chloride (PVC) SDR 35, conforming to ASTM D3034 with gasket joints. Sand bedded and backfill with # 2 base, compacted to 95% of native soil compaction.

D. Storm Drain piping, below grade, double wall High Density Polyethylene (HDPE), with bell and spigot or bell and bell soil tight joints. Bed and backfill to 12 inches above pipe, compacted to 90% of native soil compaction. Minimum cover 1 foot.

2.8 Fuel Gas Piping

A. Gas piping within the building envelope - Schedule 40 black steel with threaded fittings for 2" and smaller pipe, and flanged fittings for 2 ½" and larger pipe.

B. Gas piping below grade and outside of the building perimeter, NFPA approved PE piping or Schedule 40 black steel with continuous extruded plastic coating. Minor damage to extruded plastic coating, fittings and bare ends shall be repaired with two layers of 20 mil P.E. pipe wrap.

2.9 Insulation

A. All concealed tempered water (120 F.) and hot water (140 F.) piping shall be insulated with; a minimum 1" thick closed cell P.E. insulation for ½" and 3/4" pipe size, 1 ½" thick closed cell P.E. insulation for 1" and larger pipe.

B. All exposed tempered water (120 F) and hot water (140 F) piping shall be Insulated with; a minimum 1" thick closed cell P.E. insulation for ½" and 3/4" pipe, and 1 ½" thick closed cell P.E. insulation. All exposed hot water piping insulation to be covered with a 24ga Aluminum jacket.

C. All cold water piping, above kitchens, and within the building insulation envelope, minimum 3/4" thick closed cell P.E. insulation. All cold water pipe insulation exposed within a kitchen shall be covered with a 24ga Aluminum jacket.

D. All cold water piping, above grade and outside the building insulation envelope shall be insulated with a minimum 3/4" thick closed cell P.E. insulation.

E. All piping located outside of the building and above grade shall be covered with a minimum 24 ga aluminum jacket.

2.10 Pipe Hangers and Supports

A. Hangers for 1/2" and 3/4" piping with wood construction may be preformed wire type. Hangers for 1" to 4" and cold pipe size 6" and over shall be adjustable wrought steel clevis or trapeze hangers. Provide copper plated hangers for copper piping.

C. Provide steel hanger rods, threaded at both ends, threaded one end or continuous threaded.

2.11 Flashing

A. Steel flashing: 26 gauge galvanized steel.

B. Caps: Steel 22 gauge minimum.

2.12 Sleeves

A. Pipe through floors - Form with 18 gauge galvanized steel.

B. Pipes through walls, fire proofing, footings, and potentially wet floors - Form with 18 gauge galvanized steel.

2.13 Valve connections

A. Provide valves suitable to connect to adjoining as specified for pipe joints. Use pipe size valves.

B. Thread pipe sizes 2 inches smaller. Flange or mechanical joints for 2 ½" and larger.

C. Solder or thread to solder adapters for copper tubing.

2.14 Check Valves

A. Bronze, swing disc, solder or screwed ends.

B. Swing check for horizontal installation only. Provide valve listed for vertical installations, for vertical positions.

C. Iron body, bronze trim, swing disc, renewable disc and seat, flanged ends.

2.15 Hose Bibbs

A. Bronze or red brass, replaceable hexagonal disc, hose thread spout, chrome plated where exposed.

B. Chrome plated, polished bronze, wall plate, recessed box, hose thread spout, and removable key.

C. Provide non-removable vacuum breaker on each hose bibb.

2.16 Ball Valves

A. Bronze body, bronze trim, solder or screwed ends. Provide ball valves for all isolation service.

2.17 Gas Cocks

A. Bronze body, bronze tapered plug. Non-lubricated, teflon packing, screwed

ends.

2.18 Pressure Reducing valves

A. Bronze body construction, ss integral strainer, renewable ss seat, high temperature resistant diaphragm, and built in thermal expansion by-pass equalizing feature.

2.19 Back flow preventers

A. Bronze body construction, modular design with replaceable seats, ball type test cocks, and quarter turn, full port ball shutoff valves.

2.20 Pressure Ratings

A. Unless otherwise indicated, use valves suitable for 125 minimum psig, WSP, and 450^0 F. and 200 psig, and 250^0 F.

2.21 Valve Operators

A. Provide suitable handwheels for gate, globe or angle valves.

B. Provide loose key operator for all hose bibs.

2.22 Cleanouts and Cleanout Access Covers

A. Provide caulked or threaded type extended to finished floor or wall surfaces. Ensure ample clearance at cleanout for routing of drainage system.

B. Floor cleanout access covers in unfinished areas shall be round with nickel bronze scored frames and plates. Provide round access covers in finished areas with depressed center section to accommodate floor finish. Wall cleanouts to have plated caps.

B. Grade cleanout, provide with cleanout plug and 16" x 16" x 5" deep concrete pond, flush with grade.

2.23 Water Hammer Arrestors

A. Fit water supply to each fixture or group of fixtures with air chamber. Provide air chambers same size as supply line of 3/4" minimum, and minimum 18" long.

2.24 Grease Interceptors

A. Recessed concrete two compartment, with concrete traffic lid, two 24" man holes and sample box. Provide with H20 rated rings and covers.

2.23 Water Heater

A. Fuel gas Fired: Glasslined tank, R-16 insulation, anode rod protection, automatic thermostat set at 140^0 F., UL listed. Listed for fuel type (natural gas or LPG), supplied.

1. Provide two sources of combustion air to each gas fired water heater, one stopped

at the ceiling and one extended to within 12" of the floor of the water heater enclosure, or single source 1 ½ times the open area required for a two source arrangement.

2. Provide UL listed double wall vent to the exterior of the building for each gas fired water heater.

3. Provide T&P drain through exterior wall, down to within 12" of grade, looking down, or to a service sink or condensate drain.

C. Install water heaters in conformance with the UL listing.

D. Install water heaters located in ground floor garages or warehouses on a minimum 6" high concrete pad.

2.24 Hot water Circulation Pump

A. Closed centrifugal impeller, inline bronze fitted with motor, plumbing seal and flanged pipe connections. Provide aguastat control.

PART 3 - EXECUTION

3.1 Piping Connections

A. Threaded joint steel piping up to and including 2". Flange or mechanical joint for 2 ½" diameter and larger.

B. Make threaded joint with full cut standard taper pipe threads with teflon tape or teflon-based pipe dope applied to male threads only.

C. Steel to ABS of PVC connections shall be made with listed adapters.

D. Make connections to equipment with unions or flanges.

E. Provide non-conductive di-electric union type connections wherever joining dissimilar metals in open systems, such as copper to steel. Brass fittings and valves are acceptable with either copper or steel systems. Provide di-electric union 6" above grade on all metal piping which extends down below grade.

3.2 Piping Route and Grades

A. Route piping in orderly manner and maintain proper grades. Install install all cold and hot water piping concealed in the attic or ceiling space, except as noted in the plans. Run exposed piping parallel to walls.

B. On closed systems, equip low points with 3/4" drain valves and hose nipples.
Provide collecting chambers and high capacity float operated automatic air vents, at high points within the system.

C. Make horizontal reductions in water pipes with eccentric reducing fittings installed to provided drainage and venting.

D. Make horizontal sanitary sewer drainage piping 1/4" per foot minimum, within the building perimeter, except as noted on plans.

E. Grade horizontal rain water drainage piping 1/4" per foot minimum, within the building perimeter, except as noted on plans.

F. Install piping to allow for expansion and contraction without stressing pipe or equipment connected.

G. Provide clearance for installation of insulation and for access to valves, air vents, drains and unions.

I. Install same type piping material specified for inside building to 8' outside building.

3.3 PIPE HANGERS AND SUPPORTS

A. Support horizontal copper piping as follows:

Nominal Pipe Size(in.)	Distance Between Supports (ft.)	Hanger Rod Diameter(in.)
½ to 1 1/2"	6	3/8
2" to 4"	10	3/8

B. Support horizontal steel piping as follows:

Nominal Pipe Size(in.)	Distance Between Supports (ft.)	Hanger Rod Diameter(in.)
3/4" and smaller	10	3/8
1" to 4"	12	3/8

Support all horizontal ABS and PVC piping on maximum 4' centers.

C. Install hangers to provide minimum 1/2" clear space between finished covering and adjacent work.

D. Place a hanger within one foot of each horizontal elbow.

E. Use hangers which are vertically adjustable 1-1/2" minimum after piping is erected.

F. Support horizontal soil pipe near each hub, with 5' maximum spacing between hangers.

G. Support vertical piping at every other floor. Support vertical soil pipe at each floor at hub.

H. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

I. Where practical support riser piping independently of connected horizontal piping.

3.4 PAINTING

A. Prime coat and finish paint to match building, all exposed pipe, steel hangers, and supports. Do not paint Aluminum jackets. Hangers and supports, located in crawl spaces, pipes, shafts and suspended ceiling are not considered exposed. Label all gas pipes with yellow "GAS" labels every 25 feet.

3.5 FLASHING

A. Flash vents and soil pipes projecting 6" minimum above finished roof surface. Provide roof jacks, storm collars and seal weather tight.

3.6 SLEEVES

A. Set sleeves in position in advance of concrete work. Provide suitable reinforcing around sleeves.

B. Extend sleeves through potentially wet floors, one (1) inch above finished floor level. Caulk sleeves full depth and provide floor plate.

C. Where piping passes through floor, ceiling or wall, close off space between pipe of duct and construction with 2-hour non-combustible insulation. Provide tight fitting metal caps on both sides and caulk.

D. Install chrome plate escutcheons where piping passes through finished surfaces.

3.7 VALVES

A. Install valves with stems upright or horizontal, not inverted.

B. Ball valves for shut-off and isolating service, to isolate equipment, part of systems or vertical risers.

C. Install back flow prevention valves at the service fill connection of each piping system or component requiring a water service protection.

D. Provide and install access covers for all concealed valves. Provide fire rated access covers for rated walls, floors and ceilings.

3.8 PENETRATIONS THROUGH FIRE-RATED WALLS

A. Seal all pipe penetrations through rated walls with a UL approved sealant rated at same exposure level as the wall.

3.9 PLUMBING SYSTEMS

A. Bury outside water and drainage pipe minimum 2'. Provide one foot minimum vertical and horizontal offset of water and sewer piping, installed in a joint trench.

B. Lubricate cleanout plugs with mixture of graphite and linseed oil. Prior to building turnover, remove cleanout plugs, re-lubricate and re-install using only enough force to ensure permanent leakproof joint.

C. Install vacuum breakers on plumbing lines where contamination of domestic water may occur and all hose bibbs and flush valves.

D. Install gas piping in open or ventilated spaces. Pitch lines and provide drip legs for condensation collection points.

E. Install pressure reducing valves to limit maximum static pressure at plumbing fixtures to 60 psi.

3.10 PLUMBING FIXTURES AND TRIM

A. Install each fixture with trap easily removable for servicing and cleaning. At completion, thoroughly clean plumbing fixtures and equipment.

B. Provide chrome plated rigid or flexible supplies to fixtures with screw driver stops, reducers and escutcheons.

C. Install wall mounted lavatories, urinals and water closets, with approved wall carriers, model to suit installation. Reference architectural plans for mounting locations and heights.

D. Solidly attach floor mounted water closets to floor with lag screws. Lead flashing shall not hold closet in place.

E. Install hose and faucet connections with vacuum breakers.

F. Install water heaters with T&P safety valve, pipe drain from T&P valve through outside wall. Provide and install two seismic safety straps on all water heaters, one at one third height and one at two thirds height.

G. Provide lever handles on each manually operated lavatory and sink with a maximum 5 lb. Operating force.

3.11 PIPING INSULATION

A. Install piping insulation in conformance with the manufacturers instructions.

Do not insulate valve bodies. Install insulation in a manner which will prevent crushing or collapsing the insulation.

END OF SECTION 220000

SECTION 230000 – MECHANICAL DEVICES AND SYSTEMS

PART 1 GENERAL

1.1 General Requirements

A. The mechanical work as on the drawings and described in these Specifications shall be subject to all provisions of the General and Special conditions of the contract documents.

B. The work described on the plans and in these specifications includes all labor, material, equipment, transportation, testing and startup of the mechanical devices and mechanical systems for the scope described in the Summary of Work.

C. The mechanical contractor shall include in the bid, all costs including overhead and profit to complete the project through start up and acceptance by the owner. The cost of complying with all applicable codes shall be included in the bid.

D. The requirements outlined in the specifications shall be in addition the plans.

1.2 Responsibility

A. The contractor shall be responsible for staffing this division of work with qualified persons experienced in the particular work described herein. All material shall be new and of the best quality. All work shall be installed in a manner so as to result in a completed section of work with a neat orderly appearance. The contractor shall coordinate this work with other portions of the project to result in completely operable systems.

B. The intent of the plans and specifications is to describe the general scope of the mechanical work and mechanical systems. It is not the intent of these plans and specifications to preclude the submittal of alternative methods or materials. Manufacturers names and catalog number are stated to identify the type and quality of the equipment or materials required for the project. The contractor may submit shop drawings and/or technical information on alternative equipment, materials or installation details to accomplish the intent of the plans and specifications. Approval of the alternative equipment, materials or installation details shall not relieve the contractor of any responsibility for complying with the intent of the plans and specifications. The contractor shall submit four copies of the manufacturers technical information, shop drawings, and/or written description of alternative methods for each item described by manufacturers name and catalog number and for each component, equipment, material or installation detail required.

1.3 SUMMARY OF WORK

Provide and install the following mechanical equipment, components, systems and controls and/or modifications thereto:

A. All air handling systems including: makeup air, exhaust air, and circulating air systems, and blowers, economizers, ductwork, duct insulation, supports and anchors, dampers, louvers, grills and registers.

B. All warm air space heating equipment, including; gas and oil fired furnaces and heaters, combustion air ducts to each gas or oil fired furnace, flues or condensate drains.

C. All system controls, including: temperature and schedule controls. Provide and install all low voltage components and wiring.

D. All air system balancing. Provide and install all volume dampers required to achieve system balance.

1.4 Division 15 Responsibilities

A. Assume responsibility for the installation and proper functioning of the HVAC systems in the entirety.

B. Provide and install all low voltage (24vac) wiring and control components.
Line voltage (120, 208, 240 and 480 vac) wiring, conduit, disconnects, starters, stop/start devices and protective devices required for switching power circuits are the responsibility of the electrical contractor.

C. Provide and install 24 volt AC coil interlocking relays required to control associated transfer or exhaust fans. Provide transformers as needed.

D. The electrical voltage and phase designation for mechanical equipment is based on a commonly available voltage and phase for equipment listed in the Mechanical Equipment Schedule on the plans, and coordinated with the electrical design. Any revision in the voltage and phase configuration requested by the contractor shall be paid for in total by the contractor.

E. Coordinate all electric power and control requirements with the electrical contractor to assure complete, operable systems.

1.5 Division 16 Electrical Responsibilities

A. Furnish and install all raceways, conductors, disconnects, starters, stop/start and protective devices, necessary for electrical power supply and switching, all control wiring conduit, and line voltage control devices and wiring to all motors and equipment.

1.6 Work Not Described

A. Include all minor work not typically shown or specified, as required to produce complete, operational, mechanical systems.

1.7 RULES AND REGULATIONS

All work and materials shall comply with the latest rules and regulations of:

A. California Building Code (CBC), Title 24, Part 2

B. California Mechanical Code (CMC),Title 24, Part 4.

C. California Energy Code, Title 24, Part 6

D. All applicable National Fire Protection Association (NFPA) codes. Strict compliance with the latest adopted codes and regulations is mandatory.

1.8 SITE EXAMINATION

A. Thoroughly examine the site and verify the actual work conditions. No extra compensation will be allowed for expenses due to failure to discover site conditions which affect the work.

1.9 PLAN AND SPECIFICATION ACCURACY

A. The plans and specifications are diagrammatic in nature and do not represent exact locations or distances except where specifically noted. Include all required offsets, bends, and other special fittings. Coordinate with the other building trades and make all modifications required at no extra costs.

B. The plans showing existing mechanical systems in areas to be remodeled show the systems as illustrated in the best available as-built documents and on limited field inspection of the site by the Engineer. Inspect and field-verify actual existing conditions. The plans reflect the desired new configurations. Include all required modifications to implement the new configuration at no extra cost.

1.10 SUBSTITUTIONS AND SUBMITTALS

A. Provide six submittals of all equipment and materials described in the equipment schedules as shown on the plans and exposed mechanical materials. Provide wiring and/or piping diagrams for all control systems. Submittal data shall be sufficient to verify compliance with the intent of the plans and specifications. Provide complete data even if using materials specified. Submittals shall conform to the requirements of the General Conditions and be submitted in one package to expedite the review process.

B. Provide shop drawings for all fabricated equipment.

C. Submit all proposed deviations from the plans or specifications in material type, size, configuration, quantity, or routing for Engineer's review. All proposed deviations from the plans and specifications shall be submitted through a Request for Information (RFI). Deviations are accepted, revised or denied by a written response to an RFI only. Verbal understandings do not exist.

D. Submittal review is for the purpose of determining general conformance with the intent of the plans and specifications, the favorable review of part of all or the submittal does not relieve the contractor of any responsibility for compliance with the contract documents. The contractor is responsible for reviewing the size of submitted equipment with respect to the space intended for installation of the equipment, at the time of equipment submittal. All interferences shall be reported through a Request for Information (RFI).

1.11 AS-BUILT DRAWINGS

A. Provide and keep up-to-date, a complete set of prints which shall be regularly corrected, and show every change from the original contract drawings, include change orders. Deliver as-built set to the Engineer upon project completion and acceptance.

1.12 SEISMIC CONSTRUCTION

A. All devices and system components shall be anchored using seismic restraint systems and devices, sized to match component weights. SMACNA seismic restraint systems may be used in place of the restraints detailed in the plans.

1.13 DEMOLITION AND REMOVAL

A. Demolish and remove from the site all portions of the mechanical systems not specifically required for the intended operation of the systems and equipment described herein.

B. Remove all equipment and materials not required for continuing operation and dispose of same in an environmentally accepted manner. The owner shall have the right to take possession of any materials and equipment they deem suitable for other use.

1.14 QUALITY

A. Install only new materials. No used materials, other than equipment shown as "Existing Relocate" (ER), may be installed.

B. Do not install materials received in a damaged in a damaged condition or damaged at job-site. Return all damaged components. Repair of minor and incidental damage, if first approved by Engineer and manufacturer, is acceptable.

1.15 EQUIPMENT SUPPORTS, SLEEVES, CHASES, INSERTS AND OPENINGS

A. Install all sleeves, inserts, anchorages, etc. required for this Division and which are embedded in work of other trades.

1.16 TESTS

A. Upon completion of the mechanical work, all mechanical systems shall be performance tested at one time to the Engineer's satisfaction. No system will be accepted until it proves satisfactory in every detail. Provide engineer 48 hours notice before testing.

1.17 FOUNDATION AND SUPPORTS

A. Install equipment on concrete foundation pads anchored to the slab floor, if shown on the Plans, listed in the Specifications, or recommended by the manufacturer. Anchor

equipment to the pad to meet normal load and seismic requirements.

B. Securely attach all equipment, ductwork, etc. to the building as detailed in the related construction code, or as described in these plans and specifications. Allow for expansion and contractions.

1.18 CUTTING AND PATCHING

A. Make all cuts and patches required to install the work according to good construction practice. Modification of structural building components shall be made only with the Engineer's specific written approval.

B. Do not cover concealed piping, ductwork, or other systems installed under this Division until inspected and approved by Engineer and all other required construction inspectors. If systems are covered before inspection and approval, Contractor will remove covering and replace after inspection at no extra cost.

1.19 TRAINING, OPERATION AND MAINTENANCE

A. After all mechanical systems have been tested and accepted, provide at least 4 hours training to the Owners maintenance crew. Cover operating and maintenance procedures for all mechanical systems and components installed.

B. Submit four (4) bound sets of Operations and Maintenance (O&M) Manuals to the Owner. Submit a draft copy to the Engineer for approval prior to issuing the final copies. The O&M Manuals shall include, at a minimum:

1. All available manufacturer's O&M literature, parts lists, etc.

2. Wiring diagrams

3. Controls diagrams of all pneumatic, electrical, and electronic control systems.

4. Written sequence of operations of all controls.

5. Any unusual or unique system O&M procedures not covered by manufacturer's literature.

6. Summary maintenance schedule showing maintenance intervals as recommended by the manufacturers.

PART 2 - PRODUCTS

2.1 Heating and cooling equipment certification

A. Equipment shall be certified in conformance with CCR, Title 24. All fuel fired equipment shall be UL listed.

2.2 Duct Furnaces

A. Natural draft, horizontal duct furnace with natural gas burners, electronic pilot.

B. Provide self-contained, packaged, factory assembled, and pre-wired unit consisting of cabinet, heat exchanger, burner and controls.

C. Stainless steel heat exchanger and burners with 10 year warranty, acceptable for type "B" venting. Performance as shown on plans.

D. AFUE of 80%.

E. Make, model and size as shown on plans.

F. Furnace vents - Type "B" UL listed double wall gas vent with draft hoods and roof caps.

G. Gas valves - 2 stage to allow operation at 50% or 100% of unit rating.

2.3 Downflow, Horizontal and Upflow Furnaces

A. Natural draft furnace with natural gas burners and electronic pilot.

B. Gravity vented or condensing furnace, as listed in the Mechanical Equipment Schedules.

C. Self-contained, packaged, factory assembled and prewired unit consisting of:

1. All welded cabinet.

2. Four pass aluminized steel heat exchanger with 20 year warranty.

3. Burner and burner control with draft and combustion airflow safety switches.

4. Controls with all accessory connections wired to terminal board.

5. Multiple speed permanent split capacitor (PSC) motor.

6. Furnace vent, UL listed type B double wall with draft hood and roof caps, in the case of gravity vented furnaces, or PVC vent with roof or side wall termination kit in the case of condensing furnaces. All furnaces shall be vented above the roof unless specifically noted in the plans.

7. Provide duct flanges, filter racks and seismic restrained spring type vibration isolators.

8. Provide economizers where shown with the furnaces in the Mechanical Equipment Schedules.

9. Make, model and size as shown on plans.

2.4 Indoor Cabinet Fans

A. Indoor cabinet fan with reinforced steel case, 1"-3/4# density mat-faced fiberglass insulation, belt-driven centrifugal fan, and combination filter\mixing box section.

B. Fan double width, double inlet forward curved, dynamically balanced. Belt drive with motor external to unit. Fan and motor ball bearings to have 200,000 hour 1-10 bearing life. Include extended grease lines for shaft bearings internally mounted.

C. Filter mixing section to have same case construction as fan section. Dampers to be parallel blade type with nylon or teflon bearings. Filter rack to hold and include 2" pleated 30% efficiency filters. Include Dwyer inclined tube manometer filter gauge with 0-1" scale.

D. Make, model, and size as shown on plans.

2.5 Ceiling Exhaust Fan

A. Galvanized steel constructed with adjustable angle mounting brackets. Insulation lined housing.

B. Forward incline centrifugal wheel. Dynamically balanced.

C. Permanent split capacitor motor with thermal overload. Motor mounted on vibration isolators.

D. Access to wheel and motor assembly through grill.

E. Baked white enamel finished aluminum grill.

F. Motor speed controller mounted adjacent to exhaust fan, speed set to provide design air flow.

G. Outlet duct connection.

H. Provide seismic restrained neoprene vibration isolators.

I. Make, model and size as shown on plans.

2.6 Inline Fan

A. Galvanized steel housing with swing out wheel and drive assembly.

B. Backward inclined, dynamically balanced centrifugal wheel.

C. Belt driven with permanent split capacitor motor.

D. Duct flanges.

E. Provide seismic restrained spring type vibration isolators, for units without internal vibration isolators.

F. Provide fan speed control, mounted adjacent to inline fan, speed set to provide design air flow.

G. Make, model and size as shown on plans.

2.7 Kitchen Exhaust Hood

A. Single shell canopy type fabricated from 18 gauge type 304 SS complete with grease extractors, vapor proof lights and wet chemical fire suppression system. Provide UL listed 2hr fire rated exhaust duct between the hood and exhaust fan.

B. Fabrications to conform with NFPA Bulletin #96 and shall be UL listed.

C. Make and model as shown on plans.

2.8 Exhaust Fan

A. Centrifugal upblast exhaust fan.

B. Backward inclined belt driven wheel.

C. Factory fabricated curb.

D. Make, model, flow volume, static pressure and horsepower as shown on plans.

2.9 Filtered Supply Fan

A. In-line centrifugal fan.

B. Backward inclined belt driven wheel.

C. Make, model, flow volume, static pressure and horsepower as shown on plans.

2.10 DUCTWORK

A. Use galvanized steel for all ductwork except the last 10 feet connected to a register, grill or louver. Use thicknesses, seams and stiffening procedures as recommended in SMACNA low-pressure duct standards. Rectangular duct may be substituted for round duct, or vice versa, if the Contractor first submits revised duct layouts showing all new duct sizes to the Engineer. New duct sizes shall provide equivalent friction drop rates as duct sizes as shown on plans.

B. Use flexible ducting to connect terminal units to the sheet metal ducts.
Flexible ducts to be 10 feet long maximum. Flexible ductwork to be steel wire heliz reinforced polyester, wrapped with 1-1/2" fiberglass insulation and reinforced mylar or vinyl jacket. UL smoke/flame rating of 50/25 or less and be listed as Class 0 or Class 1 and be so labeled.

C. Use air foil duct turns at all rectangle tees and elbows.

D. Provide turning vanes at all rectangular miter bends.

E. Use metal straps or angle iron to support ductwork, space and size supports as shown on

plans or SMACNA standards.

F. Provide R-8 fiberglass insulation with kraft or foil cover around all supply and return ductwork, located in vented attic spaces and un-conditioned crawl spaces. Supply and return ductwork located within conditioned spaces may be un-insulated.

G. Provide 24ga Aluminum jacket over R-8 insulation for all supply and return ductwork located outside of the building weather envelope.

H. Lap metal ducts in direction of air flow. Hammer down edges and slips to leave smooth duct interior.

I. Construct tees, bends, and elbows with radius of not less than 1-1/2 times diameter of duct on center lines.

J. Increase duct sizes and construct square to round fittings, not exceeding 15^0 divergence wherever possible. Maximum divergence upstream of equipment to be 30^0 and 40^0 convergence downstream.

K. Rigidly construct metal ducts with joints mechanically tight, substantially air tight, braced and stiffened so as not to breathe, rattle, vibrate or sag. Caulk duct joints and connections with sealants as ducts are being assembled.

L. Construct plenums of galvanized panels jointed by standing seams on outside of casing riveted or bolted on approximately 12" centers. Reinforce with steel angles and provide diagonal bracing. Tightly fit at apparatus and seal with sealant.

M. Seal all ductwork joints and seams, air tight with materials conforming to UL 181, 181A and 181B.

2.11 FLASHING

A. Flash and counterflash where mechanical equipment passes through weather- or waterproofed walls, floors and roofs.

2.12 Dampers

A. Provide multi-blade, opposed blade dampers for outside air ducts with stainless steel shafts and teflon bearings.

B. Provide single blade dampers for duct sizes to 18" diameter.

C. Provide multi-blade, parallel action gravity balanced backdraft damper with blades, a maximum of 6" width having felt or flexible vinyl sealing edges, linked together in a rattle-free manner and with adjustment device to permit setting of varying differential static pressure.

D. Provide a radial opposed balancing blade damper for each supply return and exhaust grill, not directly connected to an exhaust fan. The opposed blade damper shall be equipped with a quadrant operator located outside the duct.

E. Provide 24v normally closed motor driver damper for outside air and normally open motor driven return air damper, or fabric blade draft damper faced in the direction of air flow.

F. Use outside lever operated branch volume dampers. Provide accessible operators with linkages and access plates for dampers in inaccessible locations.

G. Use extraction dampers at each appropriate diffuser take off.

H. Provide equalizing grids on supply diffusers.

2.13 Flexible Connections

A. Fabricate of neoprene coated flame proof fabric approximately 2" wide, tightly crimped into metal edging strip and attach ducting to equipment by screws or bolts at 6" intervals.

2.14 DIFFUSERS, REGISTERS, AND GRILLES

A. Base air outlet application on space noise level of NC 35 maximum.

B. Provide supply outlets with sponge rubber seal around edge.

C. Provide baffles to direct air away from walls, columns, or other obstructions within radius of diffuser operation.

D. Ceiling diffusers for all tee-bar ceilings to be white steel, with volume dampers, and adjustable grids. Include UL listed ceiling diffusers in 1 hour rated ceilings. All diffusers shall be louver faced.

E. Ceiling diffusers for all gypsum board ceilings to be white square steel, with adjustable center cones. Include volume dampers. Include UL listed ceiling dampers and insulation pads on diffusers in 1 hour rated ceilings. All diffusers shall be louver faced.

F. Wall supply registers to be white steel, double adjustable deflection with horizontal face bars, column damper. UL listed fire dampers at all rated penetrations.

G. Ceiling return and exhaust registers for tee-bar ceilings to be white perforated steel, identical to supply diffusers except without deflectors. UL listed ceiling fire dampers with insulation pads at all fire rated penetrations.

H. Ceiling return and exhaust registers for gypsum board ceiling to be white perforated steel with single horizontal fixed bars fixed at 45^0. Include volume dampers, UL listed ceiling fire dampers at all fire rated penetrations.

I. Wall return and exhaust registers to be identical to ceiling returns and exhaust registers, except with zero degree fixed bars.

J. Floor supply registers to be linear, anodized aluminum, with balancing dampers, equalizing grids, hidden trim hardware, and debris screens. Provide bracing for floor loads.

K. Ceiling and sidewall diffusers and registers factory baked white enamel finish.

2.15 Outside Louvers

A. Four inch deep louvers with blades on 45^0 slope, center baffle and return bend heavy channel frame. Provide 1/4" mesh galvanized hardware cloth bird screen.

B. Fabricate of 16 gauge galvanized steel and provide welded assembly.

C. Primer paint and finish paint to match exterior wall color.

2.16 Door Grilles

A. One inch deep louvers with inverted V cross section.

B. Fabricate of steel or aluminum extrusions.

C. Provide 1-1/4" margin frame with countersunk screw holes.

D. Primer paint and finish paint to match door color.

2.17 MOTORIZED OUTSIDE AIR DAMPER

A. Steel parallel blade dampers with stainless steel shafts and teflon bearings to resist corrosion and seizing.

2.18 FILTERS

A. Pleated disposable extended area filters with 30% ASHRAE dust spot efficiency, 2" thick, 0.2: maximum initial pressure drop at 400 feet per minute maximum face velocity. Filter media and combustible framing to be UL Class 2 rated and approved using California SFM-51.6 test method, Article 80, Title 19 California Administrative Code.

2.19 VIBRATION ISOLATORS

A. Spring isolators with neoprene cushions, housed springs, seismic snubbers, 2" rated spring travel, leveling boats. Provide isolators on all equipment which does not have internal vibration isolators.

2.20 CONTROLS

A. Damper controls - Automatic dampers to have 24VAC control, spring return motors, electric or electronic bulb-type air temperature sensors in the ducts. Provide control transformers.

B. Interlock controls - provide 24VAC coil relay with normally open contacts, mounted at the zone furnace or HVAC unit, with the relay coil wired parallel with the furnace or HVAC unit blower.

C. Ventilation controls - provide carbon dioxide control where shown on plans. Control to be parallel with the temperature or interlock control.

2.21 Thermostats

A. Zone thermostats to be automatic change-over type with 5^0 dead band between full heat and full cooling. Provide locking Lexan thermostat guards. Make and model as shown on plans.

2.22 Smoke Detectors

A. Duct smoke detector, interlocked to shutdown zone blower for system air flows in excess of 2,000 cfm.

B. Duct smoke detector installed in main supply duct or total coverage smoke- detection system with interlock to shutdown zone blower when detector alarms.

PART 3 - EXECUTION

3.1 DUCT SEALING

A. Seal all duct work seams with SMACNA Class A or B sealing system, sealing material and application to conform with UL 181, 181A or 181B.

B. Seal weld all kitchen hood exhaust ductwork. A vibration isolator shall be installed between a Type I hood and the grease duct, to include a non- combustible packing in the sleeve joint.

3.2 FLEXIBLE DUCTS

A. Maximum flexible duct length to be 10 feet, with duct supported at mid-length. Use only factory supplied connection collars. Install in compliance with the manufacturers recommendations.

3.3 EQUIPMENT SUPPORTS

A. Support all equipment and duct work to prevent vertical and horizontal movement during a seismic event. Provide lateral bracing to withstand horizontal loads equal to the vertical load. Horizontal ducts to be laterally braced on 30 ft centers, and longitudinally on 60 ft centers.

3.4 HEATING AND COOLING EQUIPMENT

A. Install the equipment in accordance with manufacturer's instructions.

B. Provide two combustion air sources for each gravity gas fired heating unit.

C. Provide PVC combustion air and vent piping for each condensing gas fired heating unit. Provide and install condensate piping from the heating unit condensate trap to; an indirect plumbing waste condensate drain, or into the inlet side of a sink or lavatory trap, if located within the same zone as the heating units. Provide condensate pump as necessary.

D. All filters to be accessible for replacement using hinged and gasketed access door.

3.5 DUCTWORK

A. Clean duct system and force air at high velocity through duct to remove accumulated dust.

B. Connect return grilles to low pressure ducts with 5' minimum length of flexible duct. Hold in place with strap or clamp.

C. At each joint where ducts pass through partitions, seal joints around duct with non-combustible material.

D. Support the horizontal ductwork in conformance with the following schedule:

Duct Diameter	Support Requirement
10" and less	1" wide galvanized steel strap x 22ga. on 12' centers or 12ga galvanized wire on 12' centers, on 1/4" rods.
12" to 18"	1" wide galvanized steel strap x 22ga. on 12' centers or 8ga wire on 12' centers, on 1/4" rods.
20" to 24"	1" wide galvanized steel strap x 22ga on 12" centers or Two 10ga wires on 12' centers, on 1/4" rods.
Rect. Duct max. Side	
Side + Top < 30"	1" wide galvanized steel strap x 22ga on 10' centers, on 1/4" rods.
Side + Top < 72"	1" wide galvanized steel strap x 18ga on 10' centers, on 3/8" rods.
Side + Top < 120"	1" wide galvanized steel strap x 16ga on 10' centers, on 3/8" rods.

3.6 DUCT ACCESSORIES

A. Provide balancing dampers at points on low pressure supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing.

B. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and equipment subject to forced vibrations.

3.7 DIFFUSERS, REGISTERS AND GRILLES

A. Install items in accordance with manufacturer's printed instructions.

B. Paint ductwork, visible behind air outlets, matt black.

3.8 FANS

A. Supply and install sheaves as necessary for final air balancing.

B. Set roof mounted fans on minimum 6" high curbs.

C. Provide vibration isolators as required to minimize the transfer of vibration into the building, and to minimize noise transmission.

3.9 TESTING AND BALANCING

A. Balance systems after building is complete, with all doors and windows closed or under normal traffic. Install clean filters before balancing. Adjust until all supply, return, and exhaust air quantities are within 10% of flows shown on plan.

B. Use branch volume dampers, splitter dampers, and extraction dampers to adjust air flows.

C. Adjust air diffusers and registers to achieve proper throw and air distribution into the rooms.

D. Submit air balance report to the Engineer after all balancing is complete, show actual fan RPM and horsepower, actual individual register and total fan air flows, actual static pressures. Contractor is to include the ventilation air for each system, expressed as a percent of supply air in the balance report.

E. Leak Testing

Leak testing is required if all of the following criteria are met:

1. The duct system provides conditioned air to an occupied space for a constant volume, single zone, air conditioning system, and

2. The space conditioning system serves less than 5,000 square feet of conditioned floor area, and

3. The combined surface area of the ducts located in the following spaces is more than 25 percent of the total surface area of the entire duct system:

   a. Outdoors.
   b. In a space directly under a roof that has fixed vents or openings to the outside or unconditioned spaces.
   c. In an unconditioned crawl space
   d. In other unconditioned spaces.

3.10 PAINTING

A. Treat all exposed ductwork within the building with metal etch, prime and paint with one coat epoxy paint, color to match ceiling or exposed trusses.

B. Ductwork located in concealed spaces need not be painted.

END OF SECTION 230000

SECTION 260100 – ELECTRICAL REQUIREMENTS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including general and supplementary conditions apply to this section.

1.2 INCLUDED

A. This section covers electrical work, complete. Work includes furnishing, installing, calibrating, adjusting, testing, documenting, and starting up equipment in accordance with these Specifications, the accompanying Plans, and the directions of the Engineer.

1.3 INTENT OF PLANS

A. Electrical plan drawings show only general locations of equipment, devices, and raceway unless specifically dimensioned. The Contractor is responsible for the proper routing of raceway, subject to the approval of the Engineer.

B. Make adjustments as necessary to wiring, conduit, disconnects, branch circuit protection, and other affected material or equipment to accommodate actual equipment supplied for this project.

1.4 CODES, PERMITS, AND REGULATIONS

A. Do all work and install materials and equipment in accordance with the requirements of the California Electrical Code (CEC), applicable State and local laws and ordinances, and the power company.

B. Conflicts, if any, that may exist among the above items will be resolved at the discretion of the Engineer.

C. Wherever the requirements of the Specifications or Plans exceed those of the items above, the requirements of the Specifications or Plans shall govern.

1.5 SUBMITTALS

A. Refer to the Special Provisions for additional submittal guidelines. Before any material is fabricated or shipped, furnish to the Engineer full details, shop drawings, dimensions, catalog cuts, schematic (elementary) diagrams, and other descriptive matter as required to fully describe the equipment specified under the Section.

B. For service entrance equipment, meter base, and other related materials, obtain written approval of submittals from the serving utility before submitting to the Engineer.

1.6 DIVISION OF WORK BETWEEN ELECTRICAL AND MECHANICAL

A. Close coordination between the electrical and mechanical trades is a part of the work that is required by this contract. No allowance will be made for omissions based on incorrectly

assuming another trade will be performing your work. Confirm your scope of work with the general contractor.

B. The division of responsibilities between trades supplying equipment in other Divisions may vary. For instance, electrical contractor may be required to supply disconnect switches and starters for non-HVAC mechanical equipment supplied under other Divisions.

1.7 MECHANICAL RESPONSIBILITIES

A. Assume responsibility for the proper functioning of the HVAC and plumbing systems in their entirety. Furnish and install all conductors and conduit required for control of HVAC equipment. Make all terminations with the exception of power conductors. Furnish and install all control panels and devices to provide a complete and functional controls system, including all controls transformers. Furnish and install motor starters for all equipment specified by mechanical. All electrical work performed under mechanical shall conform to the requirements of ELECTRICAL REQUIREMENTS.

1.8 ELECTRICAL RESPONSIBILITIES

A. Furnish and install all raceways, conduit, disconnect switches, and conductors necessary for electrical power supply. Make all power supply terminations to motors, starters, disconnect switches, control transformers, and other mechanical devices. Coordinate all work with mechanical contractors.

PART 2 – PRODUCTS

A. Unless otherwise indicated, provide all first-quality new materials, free from any defects, and suitable for the intended use and the space provided. Provide materials approved by UL wherever standards have been established by that organization.

B. Furnish and install all incidental items not specifically shown or specified which are required by good practice to provide the complete systems specified herein.

C. Where two or more units of the same class of material or equipment are required, provide products of a single manufacturer. Component parts of materials or equipment need not be products of the same manufacturer.

2.1 STANDARD PRODUCTS

A. Unless otherwise indicated, provide materials and equipment which are products of manufacturers regularly engaged in the production of such materials and equipment. Provide the manufacturer's latest design that conforms to these Specifications.

2.2 EQUIPMENT FINISH

A. Unless otherwise indicated, finish for electrical equipment and enclosures shall be manufacturer's standard gray or ANSI 61 gray over a primer and rust inhibitor.

2.3 OUTLET AND DEVICE BOXES

A. Sheet Steel: One-piece drawn type, zinc- or cadmium-plated.

B. Cast Metal:

1. Box: Malleable iron.
2. Cover: Gasketed, weatherproof, malleable iron, with stainless steel screws.
3. Hubs: Threaded.
4. Lugs (Cast Mounting) Manufacturers:

   a. Crouse-Hinds; Type FS or FD.
   b. Appleton; Type FS or FD.
   c. Or equal.

2.4 JUNCTION AND PULL BOXES

A. Outlet Boxes Used as Junction or Pull Box: As specified under Article OUTLET AND DEVICE BOXES.

B. Large Sheet Steel Box: NEMA 1.

1. Box: Code-gauge, galvanized steel.
2. Cover: Full access, screw type.
3. Machine Screws: Corrosion-resistant.

C. Large Weatherproof: NEMA 3R.

1. Box: Galvanized steel.
2. Cover: Screw with provisions for pad locking.
3. Embossed mounting holes on back of enclosure.
4. No gasketing.
5. Manufacturers:

   a. Hoffman.
   b. Or equal.

2.5 CONDUIT AND TUBING

A. Galvanized Rigid Steel Conduit (GRS):

1. Meet requirements of ANSI C80.1 and UL 6.
2. Material: Hot-dip galvanized, with chromated protective layer.

B. Electric Metallic Tubing (EMT):

1. Meet requirements of ANSI C80.3 and UL 797.
2. Material: Hot-dip galvanized, with chromated and lacquered protective layer.

C. PVC Schedule 40 Conduit:

1. Meet requirements of NEMA TC2 and UL 651.
2. UL listed for concrete encasement, underground direct burial, concealed or direct sunlight exposure, and 90°C insulated conductors.

D. Flexible Metal, Liquid-Tight Conduit:

1. UL 360 listed for 105°C insulated conductors.

2. Material: Galvanized steel, with an extruded PVC jacket.

E. Galvanized Steel Flexible Conduit:

1. Hot-dip galvanized.
2. UL 1 and UL 1479.

F. Raceway Warning Tape:

1. Heavy-gauge, yellow plastic tape of 6-inch minimum width for use in trenches containing electric circuits.
2. Utilize tape made of material resistant to corrosive soil.
3. Printed warning that an electric circuit is located below the tape.

2.6 FITTINGS

A. Galvanized Rigid Steel:

1. Meet requirements of UL 514B.
2. Type: Threaded, galvanized. Setscrew fittings not permitted.
3. Material: Malleable iron with insulated throat.

B. Electric Metallic Tubing:

1. Meet requirements of UL 514B.
2. Type: Set screw type.

C. PVC Conduit:

1. Meet requirements of NEMA TC-3 and UL 514B.
2. Type: PVC, slip-on.

D. Flexible Metal, Liquid-Tight Conduit:

1. Insulated throat and sealing O-rings.

E. Galvanized Steel Flexible Conduit:

1. Cast, screw-in type or two-screw clamp type.

2.7 CONDUCTORS

A. All conductors shown on the Plans shall be new unless otherwise indicated.

B. Conductor Type:

1. 120 VAC and 277 VAC lighting: Solid copper.
2. 120 VAC receptacle circuits: Solid copper.
3. All other circuits: Stranded copper.

C. Insulation: Type THHN/THWN, 90°C dry or 75°C wet.

2.8 CONDUCTOR ACCESSORIES

A. Tape:

1. General Purpose, Flame Retardant: 7-mil, vinyl plastic, rated for 90°C minimum meeting requirements of UL 510.
2. Flame Retardant, Cold and Weather Resistant: 8.5 mil, vinyl plastic.

B. Cable Ties:

1. Nylon, adjustable, and self-locking.

C. Heat Shrinkable Insulation:

1. Thermally stabilized, crosslinked polyofin.

2.9 WIRING DEVICES

A. Manual Switch:

1. NEMA WD 1 and FS W-S-896E.
2. Specification grade, totally enclosed, AC type, with quiet tumbler switches and screw terminals.
3. Capable of controlling 100% tungsten filament and fluorescent lamp loads.
4. Rating: 20 A, 120/277 VAC.
5. Color: To be determined.
6. Manufacturers:

    a. Bryant.
    b. Leviton.
    c. Pass and Seymour.
    d. Or equal.

B. Duplex Receptacle:

1. NEMA WD 1 and FS W-C-596.
2. Specification grade, two-pole, three-wire grounding type with screw type terminals suitable for No. 10.
3. High strength thermoplastic base color.
4. Color: To be determined.
5. Contact Arrangement: Contact to be made on two sides of each inserted blade without detent.
6. Rating: 120 VAC, 20 A.
7. Configuration: 5-20 R.
8. Manufacturers:

    a. Bryant.
    b. Leviton.
    c. Pass and Seymour.
    d. Or equal.

C. Ground Fault Interrupter (GFI) Receptacle:

1. NEMA WD 1.
2. Rating: 120 VAC, 20 A.
3. Configuration: 5-20 R.
4. Protection: Trips at 5 mA and capable of interrupting 1,000 A without damage.
5. Color: To be determined.
6. Provision for testing.
7. Manufacturers:

a. Bryant.
b. Leviton.
c. Pass and Seymour.
d. Or equal.

D. Occupancy Sensing Switch: As indicated on the Plans.

E. Ceiling Mounted Occupancy Sensor: As indicated on the Plans.

2.10 DEVICE PLATES

A. Plastic:

1. Material: Nylon high impact material noncombustible.
2. Color: To match associated wiring device.
3. Mounting Screw: Oval-head metal, color matched to plate.
4. UL 514C.
5. Arrangement: Provide the number of gang devices as shown on Plans.

B. Weatherproof:

1. For Receptacles:

a. Provide rainproof protection while outlet is in use.
b. Die-cast zinc housing with polyester powder coat paint for corrosion resistance.
c. Stainless steel screws and springs.
d. Fully gasketed.
e. UL Listed tamper resistant and capable of accepting a padlock.
f. NEMA 3R rated while in use.
g. Manufacturers:

i. TayMac Corp.
ii. Or equal.

2.11 SERVICE ENTRANCE EQUIPMENT

A. Provide a service entrance switchboard, underground pull section, and other materials as required by the electric utility, which will provide service to the facility, for installation of metering equipment and attachment of service conductors.

B. Ratings:

1. The assembly shall be rated to withstand mechanical forces exerted during short-circuit conditions when connected directly to a power source having available fault current as shown on the Plans.

C. Construction:

1. The entire assembly shall be front accessible and shall consist of utility pull section, main circuit breaker, utility metering, and distribution panel as shown on the Plans.
2. All metering shall be in accordance with utility requirements.
3. The service section shall include:

    a. Main lugs mounted at the top of the section for overhead feed or for used with an underground pull section.
    b. A metering and current transformer compartment with busing for utility bar type current transformers.

4. Provide underground pull sections as required with lug landing kits providing studs for incoming cables per utility company.

D. Bus:

1. All bus bars shall be tin-plated aluminum. Main horizontal bus bars shall be mounted with all three phases arranged in the same vertical plane. Bus sizing shall be based on NEMA standard temperature rise criteria of 65°C over a 40°C ambient (outside the enclosure).
2. Provide a full capacity neutral bus where a bus is indicated on the Plans.
3. A copper ground bus (minimum ¼- ×2-inch), shall be furnished firmly secured to each vertical section structure, and shall extend the entire length of the switchboard.
4. All hardware used on conductors shall be high-tensile strength and zinc-plated. All bus joints shall be provided with conical spring-type washers.

E. Enclosures:

1. Outdoor: NEMA 3R enclosure.

    a. Outdoor enclosure shall be non-walk-in and meet applicable NEMA 3R requirements of UL.
    b. Enclosure shall have flat roof.
    c. Doors shall have provisions for padlocking.
    d. Ventilating openings shall be provided complete with replacement air filters.

F. Nameplates:

1. Engraved nameplates, mounted on the face of the assembly, shall be furnished for all main and feeder circuits as indicated on the Plans. Nameplates shall be laminated plastic, white characters on black background. Characters shall be 3/16-inch high, minimum. Nameplates shall give item designation and circuit number as well as frame ampere size and appropriate trip rating. Furnish master nameplate giving switchboard designation, voltage ampere rating, short-circuit rating, manufacturer’s name, general order number, and item number.

G. Finish:

1. All exterior and interior steel surfaces of the switchboard shall be properly cleaned and provided with a rust-inhibiting phosphatized coating. Color and finish of the switchboard shall be ANSI 61 light gray.

H. Surge Protection Device: See Section MSB SURGE PROTECTION DEVICE (SPD).

2.12 LIGHTING AND POWER DISTRIBUTION PANELBOARD

A. NEMA PB 1, CEC, and UL 67.

B. Panelboard and Circuit Breakers: Suitable for use with 75°C wire at full CEC, 75°C ampacity.

C. Short-Circuit Current Equipment Rating: Fully rated; series connected unacceptable.

D. Rating: Applicable to a system with available short-circuit current at the value shown on the Plans.

E. Cabinet:

1. NEMA 1, Industrial Use, unless otherwise shown.
2. Material: Galvanized sheet steel.
3. Wiring Gutter: Minimum 4-inch square; both sides, top and bottom.
4. Front:

   a. Fastened with adjustable clamps.
   b. Trim Size:

      i. Surface Mounted: Same as box.
      ii. Flush Mounted: ¾-inch larger than box on all sides.

   c. Finish: Rust inhibitor prime, with manufacturer's standard baked enamel or lacquer.

5. Interior:

   a. Factory assembled, complete with circuit breakers.
   b. Capable of circuit breaker replacement without disturbing adjacent circuit breakers or without removing main bus.
   c. Spaces: Cover openings with easily removable metal cover.

6. Door Hinges: Concealed.
7. Locking Device:

   a. Flush type.
   b. Doors over 30 inches in height: Multipoint.
   c. Identical keylocks, with two milled keys each lock.

8. Circuit Directory: Metal frame with transparent plastic face and enclosed card on interior of door.

F. Bus Bar:

1. Material: Tin-plated aluminum, full sized throughout length. Provide bolted connections with Belleville washers.
2. Provide for mounting of future circuit breakers along full length of bus regardless of number of units and spaces shown. Machine, drill, and tap as required for current and future positions.
3. Ground: Copper, installed on panelboard frame, bonded to box with at least one terminal screw for each circuit.
4. Lugs and Connection Points:

    a. Suitable for either copper or aluminum conductors.
    b. Solderless main lugs for main, neutral, and ground bus bars.
    c. Subfeed or through-feed lugs as shown.

5. Bolt together and rigidly support bus bars and connection straps on molded insulators.

G. Circuit Breakers:

1. NEMA AB 1 and UL 489.
2. Thermal-magnetic, quick-make, quick-break, molded case, of the indicating type showing ON/OFF and TRIPPED positions of operating handle.
3. Noninterchangeable, in accordance with CEC.
4. Provisions for handle padlocking, unless otherwise shown.
5. Bolt-on circuit breakers in all panelboards.
6. Multi-pole circuit breakers designed to automatically open all poles when an overload occurs on one pole.
7. Do not substitute single-pole circuit breakers with handle ties for multiple breakers.
8. Do not use tandem or dual circuit breakers in normal single-pole spaces.

H. Manufacturers:

1. Eaton.
2. Square D.
3. Or equal.

2.13 MSB SURGE PROTECTIVE DEVICE (SPD)

A. SPD shall have the following features:

1. Connect to panelboard main bus via cabling to circuit breaker. Maximum cable length shall be 12". Longer cable lengths are not acceptable.
2. Integral to panelboard. The panelboard and surge protective device manufacturer shall be the same.
3. Local LED display with status and fault indicating lights on the front of the panelboard.
4. Maximum Continuous Operating Voltage: 275 Vrms for 120/240 VAC system.
5. Peak Surge Currents: As shown on the Plans.
6. Noise Attenuation: 38 dB normal mode, 34 dB common mode.
7. Response Time: Less than 1 nanosecond.
8. Protection Mode: Normal mode – dedicated L-N and L-L; Common mode – dedicated L-G and N-G.
9. UL listed 1449 3rd edition.
10. System Voltage: 120/208 V.

2.14 DISCONNECT SWITCH, INDIVIDUAL, 0 TO 600 VOLTS

A. NEMA KS 1.

B. Quick-make, quick-break, motor rated, load-break, heavy-duty (HD) type with external markings clearly indicating ON/OFF positions.

C. Suitable for use with 75°C wire at full CEC, 75°C ampacity.

D. Enclosure: NEMA 12, Industrial Use, NEMA 3R, Denoted by WP, unless otherwise shown.

E. Interlock: Enclosure and switch to prevent opening cover with switch in the ON position.

F. Lockable in the open position. Provide tag reading "DO NOT OPEN UNDER LOAD."

G. Rating:

1. Fused: Fuse rating as shown on the Plans.
2. Non-fused: Switch rating as shown on the Plans.

2.15 LUMINAIRES

A. Luminaires as shown on the Plans, with proper hangers, pendants, canopies, lamps, etc., necessary for complete installation.

B. "Feed thru" or separate junction boxes.

C. Wire leads not smaller than 18 AWG and with all electrical components easily accessible and replaceable without removing the luminaire from the ceiling.

D. Special Requirements:

1. Pole and luminaire combinations capable of withstanding, without damage, 100-mile per hour steady winds. Extruded aluminum, poles of size, type, and finish shown on the Drawings. Concrete pole bases. See detail.
2. Luminaires installed outdoors with SUITABLE FOR WET LOCATIONS label and a removable prewired ballast.
3. Swinging luminaries with a safety cable attached to the structure and the luminaire at each support capable of supporting four times the vertical load.

E. Manufacturer: See types listed on Plans.

PART 3 – EXECUTION

A. Perform work in a workmanlike manner by craftsmen skilled in the particular trade. Perform work in accordance with the Plans, Specifications, manufacturer's recommendations, and the best practice of the trade. Completed work shall present a neat and finished appearance.

B. Coordinate electrical work with the Owner and the work of other trades to avoid conflicts, errors, delays, and unnecessary interference during construction.

3.1 PROTECTION DURING CONSTRUCTION

A. Following installation, protect materials, equipment, and insulation from corrosion, physical damage, and moisture. Cap conduit runs during construction with manufactured seals. Keep openings in boxes or equipment closed during construction.

3.2 MATERIAL AND EQUIPMENT INSTALLATION

A. Follow the manufacturer's installation recommendations unless otherwise indicated. Follow the Engineer's decision, wherever any conflict arises between the manufacturer's instructions, State or other codes and regulations, and these Contract Documents. Keep copy of the manufacturer's installation instructions available on the jobsite for review at all times.

B. Install freestanding equipment in accordance with the manufacturer's recommendations. Secure freestanding equipment rigidly to floors or mounting pads with anchor bolts, expansion shields, or other approved means.

3.3 CUTTING AND PATCHING

A. Do not cut or notch any structural member or building surface without specific approval of the Engineer. Carefully carry out any cutting, channeling, chasing, or drilling of floors, walls partitions, ceilings, paving, or other surfaces required for the installation, support, or anchorage of conduit, raceways, or other electrical materials and equipment. Following such work, restore surfaces neatly to new condition using skilled craftsmen of the trades involved.

3.4 CLEANING AND TOUCH-UP PAINTING

A. Keep the premises free from accumulation of waste material or rubbish. Upon completion of work, remove materials, scraps, and debris from the premises and from the interior and exterior of all devices and equipment. Refinish damaged surfaces to new condition using skilled craftsmen of the trades involved.

3.5 RACEWAY SYSTEM

A. Unless otherwise specified or indicated, wiring shall consist of insulated conductors installed in raceways of the types indicated:

B. Diameter: As shown on Plans.

C. Exterior, Exposed: Galvanized Rigid Steel.

D. Interior, Exposed: Electric Metallic Tubing.

E. Interior, Concealed (Not Embedded in Concrete):

1. Galvanized Steel Flex; Use only in indoor, dry locations for final connection to fixtures in lay in applications or other equipment subject to vibration or movement.
2. Electric Metallic Tubing: All other areas.

F. Direct Earth Burial: PVC Schedule 40.

G. All conduit penetrations through concrete floor slabs shall be galvanized rigid entire depth of floor slab.

H. All underground conduit originating outside the building and entering the building shall be equipped with a conduit sealing bushing as specified. The conduit and associated fittings from the slab to the enclosure shall be galvanized steel and watertight.

I. For equipment where flexible connection is required to minimize vibration:

1. Flexible metal, liquid-tight conduit.
2. Length: 18-inch minimum, 60-inch maximum of sufficient length to allow movement or adjustment of equipment.

J. Box Type (All Raceway Systems):

1. Exterior Locations: Weatherproof Type 3R.

2. Interior Dry Locations: Sheet steel, Type 1.

K. Install pull boxes where shown and where necessary to terminate, tap-off, or redirect multiple conduit runs.

L. Install pull boxes where necessary in raceway system to facilitate conductor installation.

M. Install pull boxes in underground conduit runs with large changes in elevation to relieve hydraulic pressure in the conduit.

N. Install pull boxes in conduit runs at least every 150 feet or after the equivalent of three right-angle bends.

O. Use outlet boxes as junction and pull boxes wherever possible and allowed by applicable codes.

P. Install plumb and level.

Q. Support boxes independently of conduit by attachment to building structure or structural member.

R. Install bar hangers in frame construction, or fasten boxes directly with wood screws on wood, bolts and expansion shields on concrete or brick, toggle bolts on hollow masonry units, and machine screws or welded threaded studs on steelwork.

S. Threaded studs driven in by powder charge and provided with lock washers and nuts are acceptable in lieu of expansion shields.

3.6 RACEWAY INSTALLATION

A. Conduit and tubing sizes shown are based on the use of copper conductors.

B. All installed work shall comply with NECA 5055.

C. Crushed or deformed raceways not permitted.

D. Maintain raceway entirely free of obstructions and moisture.

E. Immediately after installation, plug or cap raceway ends with watertight and dust-tight seals until time for pulling in conductors.

F. Group raceways installed in same area.

G. Proximity to Heated Piping: Install raceways minimum 12 inches from parallel runs.

H. Follow structural surface contours when installing exposed raceways. Avoid obstruction of passageways.

I. Run exposed raceways parallel or perpendicular to walls, structural members, or intersections of vertical planes.

J. Install watertight conduit sealing bushings in outdoor, underground, or wet locations.

K. All metal conduit to be reamed, burrs removed, and cleaned before installation of conductors, wires, or cables.

L. Do not install raceways in concrete equipment pads, foundations, or beams.

M. Horizontal raceways installed under floor slabs shall lie completely under slab, with no part embedded within slab.

N. Install concealed, embedded, and buried raceways so that they emerge at right angles to surface and have no curved portion exposed.

O. For empty conduits install a nylon pull cord to be used for future installations.

3.7 RACEWAY PENETRATIONS

A. Make at right angles, unless otherwise shown.

B. Notching or penetration of structural members, including footings and beams, not permitted.

C. Fire-Rated Walls, Floors, or Ceilings: Fire-stop openings around penetrations to maintain fire-resistance rating.

D. Apply single layer of wraparound duct band to all metallic conduit protruding through concrete floor slabs to a point 2 inches above concrete surface.

E. Concrete Walls, Floors, or Ceilings (Aboveground): Provide nonshrink grout dry-pack, or use watertight seal device.

F. Entering Structures:

1. Seal raceway at the first box with a conduit sealing bushing to prevent the entrance of gases or liquids from one area to another.
2. Heating, Ventilating, and Air Conditioning Equipment:

a. Penetrate equipment in area established by manufacturer.

3.8 RACEWAY SUPPORT

A. Support from structural members only, at intervals not exceeding CEC requirements, and in any case not exceeding 10 feet. Do not support from piping, pipe supports, or other raceways.

B. Wall brackets and associated hardware in contact with concrete or masonry shall be stainless steel. Provide galvanized steel at all other locations. Strap hangers and ceiling trapeze including hardware, shall be galvanized steel.

C. Provide and attach wall brackets, strap hangers, or ceiling trapeze as follows:

1. Wood: Wood screws.
2. Hollow Masonry Units: Toggle bolts.
3. Concrete or Brick: Expansion shields, or threaded studs driven in by powder charge, with lock washers and nuts.
4. Steelwork: Machine screws.

D. Nails or wooden plugs inserted in concrete or masonry for attaching raceway not permitted. Do not weld raceways or pipe straps to steel structures. Do not use wire in lieu of straps or hangers.

3.9 RACEWAY BENDS

A. Install concealed raceways with a minimum of bends in the shortest practical distance.

B. Make bends and offsets of longest practical radius.

C. Install with symmetrical bends or cast metal fittings.

D. Avoid field-made bends and offsets, but where necessary, make with acceptable hickey or bending machine. Do not heat metal raceways to facilitate bending.

E. Make bends in parallel or banked runs from same center or centerline with same radius so that bends are parallel.

F. Factory elbows may be installed in parallel or banked raceways if there is change in plane of run, and raceways are same size.

G. PVC Conduit:

1. Bends 30° and Larger: Provide factory-made elbows.
2. 90° Bends: Provide galvanized rigid steel elbows; except on utility service runs if not allowed by the utility.
3. Use manufacturer's recommended method for forming smaller bends.

H. Flexible Conduit: Do not make bends that exceed allowable conductor bending radius of cable to be installed or that significantly restricts conduit flexibility.

3.10 EXPANSION/DEFLECTION FITTINGS

A. Provide on all raceways at structural expansion joints.

3.11 PVC CONDUIT

A. Solvent Welding:

1. Provide manufacturer recommended solvent; apply to all joints.
2. Install such that joint is watertight.

B. Adapters:

1. PVC to Metallic Fittings: PVC terminal type.
2. PVC to Rigid Metal Conduit: PVC female adapter.

C. Belled End Conduit: Bevel the unbelled end of the joint prior to joining.

3.12 TERMINATION AT ENCLOSURES

A. Sheet Metal Boxes, Cabinets, and Enclosures:

1. Galvanized Rigid Steel Conduit:

a. Provide one lock nut each on inside and outside of enclosure.
b. Install grounding bushing.
c. Provide bonding jumper from grounding bushing to equipment ground bus or ground pad; if neither ground bus nor pad exists, connect jumper to lag bolt attached to metal enclosure.
d. Install insulated bushing on ends of conduit where grounding is not required.
e. Provide insulated throat when conduit terminates in sheet metal boxes having threaded hubs.

2. Electric Metallic Tubing: Provide gland compression, insulated connectors.
3. Flexible Metal Conduit: Provide two screw type, insulated, malleable iron connectors.

3.13 UNDERGROUND RACEWAYS

A. Cover: Maintain minimum 2-foot cover above conduit, unless otherwise shown.

B. Make routing changes as necessary to avoid obstructions or conflicts.

C. Installation with other piping systems:

1. Crossing and parallel runs: Maintain minimum 12-inch separation unless otherwise indicated.
2. Installation over valves or couplings not permitted.

3.14 CONDUCTORS

A. Do not splice incoming service conductors and branch power distribution conductors No. 6 AWG and larger unless specifically indicated or approved by Engineer.

B. Connections and Terminations:

1. Install wire nuts only on solid conductors.
2. Install nylon self-insulated crimp connectors and terminators for circuit conductors No. 6 AWG and smaller.
3. Install uninsulated crimp connectors and terminators for circuit conductors No. 4 AWG through No. 2/0 AWG.
4. Install uninsulated, bolted, two-way connectors and terminators for circuit conductors No. 4/0 AWG and larger.
5. Tape insulate all uninsulated connections.
6. Place no more than one conductor in any single-barrel pressure connection.

7. Install crimp connectors with tools approved by connector manufacturer.
8. Compression Lugs:

    a. Attach with a tool specifically designed for purpose.
    b. Tool shall provide complete, controlled crimp and shall not release until crimp is complete.
    c. Do not use plier type crimpers.

C. Do not use soldered mechanical joints.

D. Splices and Terminations:

1. Indoors: Use general purpose, flame retardant tape.
2. Outdoors: Use flame retardant, cold- and weather-resistant tape.

E. Cabinets and Panels:

1. Remove surplus wire, bridle and secure.
2. Where conductors pass through openings or over edges in sheet metal, remove burrs chamfer edges, and install bushings and protective strips of insulating material to protect the conductors.

3.15 GROUNDING

A. Unless otherwise indicated, ground all exposed noncurrent-carrying metallic parts of electrical equipment, raceway systems, and the neutral of all wiring systems in accordance with the CEC, State, and other applicable laws and regulations.

B. Where ground rods are indicated or used, they shall be copper clad, not less than ¾-inch in diameter, 10 feet long, driven full length into the earth.

C. Make ground connections by brazing, thermite welding, or with approved pressure terminals or mechanical grounding devices, except inaccessible connections shall be made by thermite welding.

D. The point of contact of each thermite weld shall be wire brushed or filed to a bare metal surface. Thermite welding cartridges and molds shall be used in accordance with the manufacturer's recommendations. After the welds have been made and cooled, slag shall be brushed from the welded area and the joint thoroughly cleaned. Use materials made by Burndy, Erico (Cadweld), or equal.

3.16 LIGHTING FIXTURES

A. Deliver lamps to the project in their original cartons. After construction of the total project is completed, wash fixtures, clean lamps, touch up any paint scratches or chips, remove labels from fixture lenses, and replace noisy ballasts.

3.17 TESTING, GENERAL

A. Testing, test plans, and test reports shall be provided by the Contractor as specified herein. The Contractor shall provide labor, instruments, and other material to complete the test.

3.18 OPERATIONAL READINESS TEST (ORT)

A. The entire installed electrical system shall be certified (inspected, tested, and documented) that it is ready for operation. The objective of this test is to demonstrate that the electrical system is complete and ready for use.

This test shall consist, as a minimum of:

1. Insulation Resistance Test:

   a. Perform insulation resistance test on each conductor No. 6 and larger with respect to ground. Applied potential to be 1,000 VDC for one minute.
   b. Record test values and submit to the Engineer. Insulation resistance to be 50 megohm minimum.
   c. Measure insulation resistance of complete circuits with the circuit breakers open.
   d. Notify the Engineer one week prior to the insulation test.

2. Demonstration:

   a. Demonstrate proper circuiting.
   b. Demonstrate proper switching of fixtures.
   c. Demonstrate that all receptacles are energized, polarity correct and properly grounded.
   d. Demonstrate that all fixtures are operating and all lamps are lit.
   e. Demonstrate proper operation of GFCI receptacles (use GFCI Tester).
   f. Demonstrate proper panel relabeling.

3. Lighting System: The lighting system shall be tested and documented for conformance to the Plans in accordance with 2008 Title 24 Non-residential Compliance Manual. Acceptance testing shall include, but not be limited to:

   a. Wiring for multi-level lighting control.
   b. Lighting control in day lit zones.
   c. Location of lighting control devices.
   d. Documentation for each device with programmed settings.
   e. Automatic day lighting controls.
   f. Manual day lighting controls.
   g. Occupancy sensing devices.
   h. Automatic shut-off controls.

B. Forms: Example ORT forms are provided in the supplement at the end of this section.

3.19 SUPPLEMENTS

A. Supplements listed below are part of this specification.

1. No. 1 — Example ORT forms.

SUPPLEMENT NO. 1

EXAMPLE
ORT FORMS

PACE ENGINEERING OPERATIONAL READINESS TEST (ORT) - INSULATION RESISTANCE TEST

INSULATION RESISTANCE TEST REPORT

Project:	Location:	Date:
		Tested By:
PNL Identification:	Test Equipment Used:	

T E S T D A T A

	INSULATION RESISTANCE IN MEGOHMS							
CIRCUIT DESIGNATION	A-GND	B-GND	C-GND	A-B	A-C	B-C	TEST VOLTAGE	DURATION

NOTES:

SECTION 311000 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Protecting existing trees to remain.
2. Removing existing trees, shrubs, ground cover plants and grasses.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.
6. Disconnecting, capping or sealing, and removing site utilities.
7. Temporary erosion- and sedimentation-control measures.

1.3 DEFINITIONS

A. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

B. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow.

D. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.

E. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and indicated on Drawings.

F. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated

G. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 MATERIAL OWNERSHIP

A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 SUBMITTALS

A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.

1. Use sufficiently detailed photographs or videotape.
2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 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 authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or 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.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Division 31 Section "Earth Moving."

1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Locate and clearly flag trees, shrubs, and other vegetation to remain.

C. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 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 Erosion & Sediment Control Plan, or requirements of authorities having jurisdiction, whatever is more stringent.

B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

C. Inspect, maintain, and repair erosion- and sedimentation-control measures throughout construction.

D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 TREE AND PLANT 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 zone, unless otherwise indicated.

C. Repair or replace trees, shrubs, and other vegetation indicated to remain that are damaged by construction operations, in a manner approved by Architect.

3.4 EXISTING UTILITIES

A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed.

1. Arrange with utility companies to shut off indicated utilities.

B. Interrupting 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.

3.5 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.

1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches (200 mm), and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.

1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; trash, debris, weeds, roots, and other waste materials.

C. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.

3.7 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.

1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. 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.

B. 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. Do not interfere with other Project work.

END OF SECTION 311000

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SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Preparing subgrades for slabs-on-grade, walks, pavements, and landscaped areas.
2. Excavating and backfilling for buildings and structures.
3. Drainage course for concrete slabs-on-grade.
4. Subbase course for concrete walks and pavements.
5. Subbase course and base course for asphalt paving.
6. Subsurface drainage backfill for walls and trenches.
7. Excavating and backfilling trenches for utilities and pits for buried utility structures.

1.3 DEFINITIONS

A. Backfill: Soil material or controlled low-strength 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.

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 for 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: 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.

1.4 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth moving operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.

1. Do not proceed with work on adjoining property until directed by Architect.

C. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth moving operations.

D. Existing Utilities: Do not interrupt 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.

PART 2 - PRODUCTS

2.1 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 (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.

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 (37.5-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

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 (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.

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 (25-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

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 (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.

G. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch (25-mm) sieve and 0 to 5 percent passing a No. 4 (4.75-mm) sieve.

H. Sand: ASTM C 33; fine aggregate.

I. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility; Or as otherwise approved by PG&E and authority having jurisdiction.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by 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 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

3.3 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.

3.4 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch (25 mm) or per Structural Engineering, whichever is more stringent for the specific applicaiton. 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.
2. Cut and protect roots according to standard industry practice to protect existing trees as indicated.

3.5 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.6 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 (300 mm) 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.

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 standard industry practice to protect existing trees as indicated.

3.7 SUBGRADE INSPECTION

A. Proof-roll subgrade below the building slabs and pavements with a 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, as directed by Architect, without additional compensation.

3.8 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.

3.9 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.

3.10 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for Record Documents.
3. Testing and inspecting underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring and bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.11 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. Backfill trenches excavated under footings and within 18 inches (450 mm) of bottom of footings, or as identified by Structural Drawings, with satisfactory soil; fill with concrete 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 (25 mm) in any dimension, to a height of 12 inches (300 mm) 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.

F. Place and compact final backfill of satisfactory soil to final subgrade elevation.

G. Install warning tape directly above utilities, 12 inches (300 mm) below finished grade, except 6 inches (150 mm) below subgrade under pavements and slabs.

3.12 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.

3.13 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.

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.

3.14 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches (200 mm) in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches (100 mm) 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 (300 mm) of existing subgrade and each layer of backfill or fill soil material at 95 percent.
2. Under walkways, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 92 percent.
3. Under turf or unpaved areas, scarify and recompact top 6 inches (150 mm) 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.

3.15 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.

1. Provide a smooth transition between adjacent existing grades and new grades.

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 (25 mm).
2. Walks: Plus or minus 1/2 inch (13 mm). Notify Architect immediately upon discovery of potential conflict in grades.
3. Pavements: Plus or minus 1/2 inch (13 mm). Notify Architect immediately upon discovery of potential conflict in grades.

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch (13 mm) when tested with a 10-foot (3-m) straightedge.

3.16 SUBBASE AND BASE COURSES

A. Place subbase course **and base course** on subgrades free of standing water, 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.
   2. 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 unit weight according to ASTM D 698.

3.17 DRAINAGE COURSE

A. Place drainage course on subgrades free of standing water, 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 6 inches (150 mm) or less in compacted thickness in a single layer, 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.

3.18 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform field quality-control testing and inspections, if required per project engineer.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving 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.

3.19 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 312000

SECTION 321216 - ASPHALT PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Asphaltic concrete paving and tack coat.
2. Pavement-marking paint (“Striping”)

1.2 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.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by authorities having jurisdiction or the California Department of Transportation, CalTrans.

B. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of the County of Humboldt for asphalt paving work as well as ADA where located on an accessible route.

C. Referenced Standards: Comply with the Standard Specifications for Public Works Construction (Green Book) Latest Edition.

D. Preinstallation Conference: Conduct conference at Project site.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.

B. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.5 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.

PART 2 - PRODUCTS

2.1 AUXILIARY MATERIALS

A. Pavement-Marking Paint: MPI #97 Latex Traffic Marking Paint for typical on-site striping. Colors per standard details.

B. Pavement-Marking Thermoplastic Striping: Provide thermoplastic striping at all public street striping, stop bar signs, crosswalks, fog lines, and other work within the public right of way or within access easements on private property as granted for public use. Comply with County approved materials.

C. Glass Beads: AASHTO M 247, Type 1.

D. Subgrade geotechnical fabric: Per engineering soils report recommendations.

E. Aggregates: Provide General, course, and fine aggregates in accordance with the engineering soils report recommendations and the Green Book standard specifications.

F. Wheel Stops: Precast, air-entrained concrete, 2500-psi (17.2-MPa) minimum compressive strength, [**4-1/2 inches (115 mm) high by 9 inches (225 mm) wide by 72 inches (1800 mm) long**] <**Insert dimensions**>. Provide chamfered corners, drainage slots on underside, and holes for anchoring to substrate.

1. Dowels: Galvanized steel, 3/4-inch (19-mm) diameter, 10-inch (254-mm) minimum length.

G. Wheel Stops: Solid, integrally colored, 96 percent recycled HDPE or commingled postconsumer and postindustrial recycled plastic; UV stabilized; [**4 inches (100 mm) high by 6 inches (150 mm) wide by 72 inches (1800 mm) long**] <**Insert dimensions**>. Provide chamfered corners, drainage slots on underside, and holes for anchoring to substrate.

1. Dowels: Galvanized steel, 3/4-inch (19-mm) diameter, 10-inch (254-mm) minimum length.
2. Adhesive: As recommended by wheel-stop manufacturer for application to asphalt pavement.

2.2 MIXES

A. Hot-Mix Asphalt: In accordance with the Humboldt County Standard Specifications.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare subgrades per recommendations of the engineering soils geotechnical report recommendations. Coordinate inspection by qualified engineer to verify satisfactory conditions have been met. Backfill with structural fill compacted as necessary to achieve compliance with the soils engineer recommendations.

B. Bring subgrade to line, grade, and elevations necessary to achieve final grades as indicated on the plans. The bottom of the cut shall be flat level, even if the finished surface is sloped. Fill and lightly regrade areas that are not correct.

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 4 feet outside of bed and take any steps necessary to prevent any runoff or sediment from entering the bed.

D. Install coarse aggregate not to exceed maximum lifts per engineering soils report. Compact each layer, as required. Provide observations and testing as recommended.

E. 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 to required grade, cross section, and thickness when compacted. Place in courses not to exceed 3" per lift. Spread at temperature of 250°F. Begin applying mix along centerline of crown and on high side of slopes. Regulate paver machine to obtain smooth, continuous surface free of pulls and tears.

3.2 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 (300 mm) 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.

3.3 HOT-MIX ASPHALT PLACING

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, but complete all compaction before it cools to 200°F. Compact areas inaccessible to rollers with hot hand tampers or vibratory plate compactors. Achieve 95% relative compaction.

C. Construction 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 ¾" 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. Use erosion and sediment control measures such as straw waddles to prevent movement of material from adjacent landscapes.

F. Erect barricades to protect paving from all traffic until cooled enough not to become marked.

3.4 INSTALLATION TOLERANCES

A. Pavement Thickness: 3" (one lift).

B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot (3-m) straightedge applied transversely or longitudinally to paved areas:

1. Base Course: 1/4 inch (6 mm).
2. Surface Course: 1/8 inch (3 mm).
3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch (6 mm).

3.5 SURFACE TREATMENTS

A. Fog Seals: Apply fog seal at a rate of 0.10 to 0.15 gal./sq. yd. (0.45 to 0.7 L/sq. m) to existing asphalt pavement and allow to cure. With fine sand, lightly dust areas receiving excess fog seal.

3.6 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.

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.

3.7 WHEEL STOPS

A. Install wheel stops in bed of adhesive as recommended by manufacturer.

B. Securely attach wheel stops to pavement with not less than two galvanized-steel dowels embedded at one-quarter to one-third points. Securely install dowels into pavement and bond to wheel stop. Recess head of dowel beneath top of wheel stop.

3.8 FIELD QUALITY CONTROL

A. Remove and replace or install additional hot-mix asphalt where it does not comply with specified requirements.

3.9 DISPOSAL

A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow milled materials to accumulate on-site.

END OF SECTION 321216

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SECTION 321313 - CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Driveways.
2. Parking lots.
3. Curbs and gutters.
4. Walks.

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. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

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, and smooth exposed surfaces.

1. Use flexible or uniformly curved forms for curves with a radius of 100 feet (30.5 m) or less.

2.2 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:

1. Portland Cement: ASTM C 150, gray Type I/II.

B. Normal-Weight Aggregates: ASTM C 33 uniformly graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 1 inch (25 mm) nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: Potable and complying with ASTM C 94/C 94M.

2.3 RELATED MATERIALS

A. Sub-Base: Recycled Class-2 Aggregate at depth required

B. Expansion- and Isolation-Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber in preformed strips.

C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion.

D. Reinforcement as required by Public Works of Engineer.

E. Color Additives: Mix in accordance with manufacturer's instructions. Mix until color additives are uniformly dispersed throughout the mixture and disintegrating bags, if used, have distintegrated.

2.4 WHEEL STOPS

A. Wheel Stops: Precast, air-entrained concrete, 2500-psi (17.2-MPa) minimum compressive strength, [**4-1/2 inches (115 mm) high by 9 inches (225 mm) wide by 72 inches (1820 mm) long**] <**Insert dimensions**>. Provide chamfered corners and drainage slots on underside and holes for anchoring to substrate.

1. Dowels: Galvanized steel, 3/4 inch (19 mm) in diameter, 10-inch (254-mm) minimum length.

B. Wheel Stops: Solid, integrally colored, 96 percent recycled HDPE, or commingled postconsumer and postindustrial recycled [**rubber**] [**or**] [**plastic**]; UV stabilized; [**4 inches (100 mm) high by 6 inches (150 mm) wide by 72 inches (1820 mm) long**] <**Insert dimensions**>. Provide chamfered corners and drainage slots on underside and holes for anchoring to substrate.

1. Color: [**Black**] [**Yellow**] [**Gray**] [**Green**] [**Blue**] <**Insert color**>.
2. Dowels: Galvanized steel, 3/4 inch (19 mm) in diameter, 10-inch (254-mm) minimum length.
3. Adhesive: As recommended by wheel stop manufacturer for application to concrete pavement.

2.5 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301 (ACI 301M), for each type and strength of normal-weight concrete.

B. Proportion mixtures to provide normal-weight concrete with the following properties:

1. Compressive Strength (28 Days): 3000 psi (20.7 MPa), 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: ¾ inch.

2.6 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

B. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides 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.

3.4 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edges 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 paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, 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 indicated otherwise. Repeat tooling of edges after applying surfaces finishes. Eliminate tool marks on concrete surface.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, inspect and complete formwork installation and items to be embedded or cast-in.

B. Do not place concrete on frozen surfaces.

C. Moisten subbase 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 (ACI 301M) requirements for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.

F. 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.

G. Screed paving surface with a straightedge and strike off.

H. 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.

I. Curbs and Gutters: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.

3.7 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.

3.8 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

C. Curing Methods: Cure concrete by moisture curing moisture-retaining-cover curing or a combination of these as methods.

3.9 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 and as follows:

1. Elevation: 1/4 inch (19 mm) (or less when required to meet ADA precision).
2. Thickness: Plus 3/8 inch (10 mm), minus 1/4 inch (6 mm).
3. Surface: Gap below 10-foot- (3-m-) long, unleveled straightedge not to exceed 1/4 inch (13 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.

3.10 WHEEL STOPS

A. Install wheel stops in bed of adhesive applied as recommended by manufacturer.

B. Securely attach wheel stops to paving with not less than two [**galvanized-**]steel dowels located at one-quarter to one-third points. Install dowels in drilled holes in the paving and bond dowels to wheel stop. Recess head of dowel beneath top of wheel stop.

3.11 CLEANING

A. Efflorescence: Remove efflorescence as part of final cleaning.

B. Use least aggressive cleaning technique possible

C. If proprietary cleaning agents are used, pre-wet surface, test cleaning agent on small, inconspicuous area, and check effects prior to proceeding. Thoroughly rinse surface afterwards with clean water. Follow manufacturer’s instructions.

D. Do not use muriatic or hydrochloric acid on integrally colored concrete.

3.12 REPAIRS AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.

B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.

C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 321313

SECTION 321373 - CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Cold-applied joint sealants.
2. Cold-applied, jet-fuel-resistant joint sealants.
3. Hot-applied joint sealants.
4. Hot-applied, jet-fuel-resistant joint sealants.

B. Related Sections:

1. Division 07 Section "Joint Sealants" for sealing nontraffic and traffic joints in locations not specified in this Section.
2. Division 32 Section "Asphalt Paving" for constructing joints between concrete and asphalt pavement.
3. Division 32 Section "Concrete Paving" for constructing joints in concrete pavement.

1.3 PRECONSTRUCTION TESTING

A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, Samples of materials that will contact or affect joint sealants.

1. Use [**ASTM C 1087**] [**manufacturer's standard test method**] to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
2. Submit no fewer than [**eight**] <**Insert number**> pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
5. Testing will not be required if joint-sealant manufacturers submit joint-preparation data that are based on previous testing, not older than 24 months, of sealant products for compatibility with and adhesion to joint substrates and other materials matching those submitted.

1.4 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

C. Pavement-Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

D. Qualification Data: For qualified [**Installer**] [**testing agency**].

E. Product Certificates: For each type of joint sealant and accessory, from manufacturer.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for joint sealants.

G. Preconstruction Compatibility and Adhesion Test Reports: From joint-sealant manufacturer, indicating the following:

1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility with and adhesion to joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Source Limitations: Obtain each type of joint sealant from single source from single manufacturer.

C. Product Testing: Test joint sealants using a qualified testing agency.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

D. Preinstallation Conference: Conduct conference at [**Project site**] <**Insert location**>.

1.6 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer[**or are below 40 deg F (5 deg C)**].
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer based on testing and field experience.

B. Colors of Exposed Joint Sealants: [**As indicated by manufacturer's designations**] [**Match Architect's samples**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

2.2 COLD-APPLIED JOINT SEALANTS

A. Single-Component, Nonsag, Silicone Joint Sealant for Concrete: ASTM D 5893, Type NS.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Crafco Inc., an ERGON company; RoadSaver Silicone.
b. Dow Corning Corporation; 888.
c. Pecora Corporation; 301 NS.
d. <**Insert manufacturer's name; product name or designation**>.

B. Single-Component, Self-Leveling, Silicone Joint Sealant for Concrete: ASTM D 5893, Type SL.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Crafco Inc., an ERGON company; RoadSaver Silicone SL.
b. Dow Corning Corporation; 890-SL.
c. Pecora Corporation; 300 SL.
d. <**Insert manufacturer's name; product name or designation**>.

C. Multicomponent, Pourable, Traffic-Grade, Urethane Joint Sealant for Concrete: ASTM C 920, Type M, Grade P, Class 25, for Use T.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Pecora Corporation; Urexpan NR-200.
b. <**Insert manufacturer's name; product name or designation**>.

2.3 COLD-APPLIED, JET-FUEL-RESISTANT JOINT SEALANTS

A. Jet-Fuel-Resistant, Single-Component, Pourable, Traffic-Grade, Modified-Urethane Joint Sealant for Concrete: ASTM C 920, Type S, Grade P, Class 25, for Use T.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. BASF Building Systems; Sonomeric 1.
    b. <**Insert manufacturer's name; product name or designation**>.

B. Jet-Fuel-Resistant, Multicomponent, Pourable, Traffic-Grade, Modified-Urethane Joint Sealant for Concrete: ASTM C 920, Type M, Grade P, Class 12-1/2, for Use T.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. Pecora Corporation; Urexpan NR-300.
    b. <**Insert manufacturer's name; product name or designation**>.

C. Jet-Fuel-Resistant, Multicomponent, Pourable, Traffic-Grade, Modified-Urethane Joint Sealant for Concrete: ASTM C 920, Type M, Grade P, Class 25, for Use T.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. Meadows, W. R., Inc.; Sealtight Gardox.
    b. <**Insert manufacturer's name; product name or designation**>.

2.4 HOT-APPLIED JOINT SEALANTS

A. Hot-Applied, Single-Component Joint Sealant for Concrete: ASTM D 3406.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. Crafco Inc., an ERGON company; Superseal 444/777.
    b. <**Insert manufacturer's name; product name or designation**>.

B. Hot-Applied, Single-Component Joint Sealant for Concrete and Asphalt: ASTM D 6690, Types I, II, and III.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

    a. Meadows, W. R., Inc.; [**Sealtight Hi-Spec**] [**Sealtight 3405**].
    b. Right Pointe; D-3405 Hot Applied Sealant.
    c. <**Insert manufacturer's name; product name or designation**>.

2.5 HOT-APPLIED, JET-FUEL-RESISTANT JOINT SEALANTS

A. Hot-Applied, Jet-Fuel-Resistant, Single-Component Joint Sealant for Concrete: ASTM D 7116, Type I.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Crafco Inc., an ERGON company; Superseal 444/777.
b. <**Insert manufacturer's name; product name or designation**>.

B. Hot-Applied, Jet-Fuel-Resistant, Single-Component Joint Sealant for Concrete and Tar Concrete: Single-component formulation complying with ASTM D 3581.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Crafco Inc., an ERGON company; Superseal 1614A.
b. <**Insert manufacturer's name; product name or designation**>.

2.6 JOINT-SEALANT BACKER MATERIALS

A. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.

B. Round Backer Rods for Cold- and Hot-Applied Joint Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

C. Round Backer Rods for Cold-Applied Joint Sealants: ASTM D 5249, Type 3, of diameter and density required to control joint-sealant depth and prevent bottom-side adhesion of sealant.

D. Backer Strips for Cold- and Hot-Applied Joint Sealants: ASTM D 5249; Type 2; of thickness and width required to control joint-sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

2.7 PRIMERS

A. Primers: Product 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.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.

B. Joint Priming: Prime joint substrates where indicated or where recommended in writing 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.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.

B. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install joint-sealant backings of kind indicated to support joint 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 joint-sealant backings.
2. Do not stretch, twist, puncture, or tear joint-sealant backings.
3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install joint sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place joint 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.

E. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants according to the following requirements 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 joint sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.

F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

3.4 CLEANING

A. Clean off excess joint 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.

3.5 PROTECTION

A. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

3.6 PAVEMENT-JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Joints within cement concrete pavement[<**PJS-#**>].

1. Joint Location:

    a. Expansion and isolation joints in cast-in-place concrete pavement.
    b. Contraction joints in cast-in-place concrete slabs.
    c. <**Insert joints**>.
    d. Other joints as indicated.

2. Silicone Joint Sealant for Concrete: [**Single component, nonsag**] [**Single component, self-leveling**] <**Insert joint sealant**>.
3. Urethane Joint Sealant for Concrete: [**Multicomponent, pourable, traffic-grade**] <**Insert joint sealant**>.
4. Hot-Applied Joint Sealant for Concrete: [**Single component**] <**Insert joint sealant**>.
5. Joint-Sealant Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

B. Joint-Sealant Application: Fuel-resistant joints within cement concrete pavement[<**PJS-#**>].

1. Joint Location:

    a. Expansion and isolation joints in cast-in-place concrete pavement.
    b. Contraction joints in cast-in-place concrete slabs.
    c. <**Insert joints**>.
    d. Other joints as indicated.

2. Jet-Fuel-Resistant, Modified-Urethane Joint Sealant for Concrete: [**Single-component, pourable, traffic-grade**] [**Multicomponent, pourable, traffic-grade, Class 12-1/2**] [**Multicomponent, pourable, traffic-grade, Class 25**] <**Insert joint sealant**>.
3. Hot-Applied, Jet-Fuel-Resistant, Joint Sealant for Concrete: [**Single component**] <**Insert joint sealant**>.
4. Joint-Sealant Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

C. Joint-Sealant Application: Joints between cement concrete and asphalt pavement[<**PJS-#**>].

1. Joint Location:

   a. Joints between concrete and asphalt pavement.
   b. Joints between concrete curbs and asphalt pavement.
   c. <**Insert joints**>.
   d. Other joints as indicated.

2. Hot-Applied Joint Sealant for Concrete and Asphalt: [**Single component**] <**Insert joint sealant**>.
3. Joint-Sealant Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

D. Joint-Sealant Application: Fuel-resistant joints between cement concrete and tar-concrete pavement[<**PJS-#**>].

1. Joint Location:

   a. Joints between concrete and tar-concrete pavement.
   b. Joints between concrete curbs and tar-concrete pavement.
   c. <**Insert joints**>.
   d. Other joints as indicated.

2. Hot-Applied, Jet-Fuel-Resistance Joint Sealant for Concrete and Tar Concrete: [**Single component**] <**Insert joint sealant**>.
3. Joint-Sealant Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

END OF SECTION 321373

SECTION 328400 - PLANTING IRRIGATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes: specification for all labor, materials, equipment and services necessary to complete the automatic irrigation system as shown on the drawings and herein specified.

1.3 DEFINITIONS

A. Circuit Piping: Downstream from control valves to sprinklers, specialties, and drain valves. Piping is under pressure during flow.

B. Drain Piping: Downstream from circuit-piping drain valves. Piping is not under pressure.

C. Main Piping: Downstream from point of connection to water distribution piping to, and including, control valves. Piping is under water-distribution-system pressure.

D. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

1.4 PERFORMANCE REQUIREMENTS

A. Irrigation zone control shall be [**automatic operation with controller and automatic control**] [**manual operation with manual**] valves.

B. Location of Sprinklers and Specialties: Design location is approximate. Make minor adjustments necessary to avoid plantings and obstructions such as signs and light standards. Maintain 100 percent irrigation coverage of areas indicated.

C. Delegated Design: Design 100 percent coverage irrigation system, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

1. Available land records indicate the following soil conditions:

a. Type: [**Coarse**] [**Medium**] [**Fine**] <**Insert type**>.
b. Texture:

1) Sand: <**Insert number**> percent.
2) Silt: <**Insert number**> percent.
3) Clay: <**Insert number**> percent.

c. Particle Size:

1) Sand: <**Insert number**> mm.
2) Silt: <**Insert number**> mm.
3) Clay: <**Insert number**> mm.

d. Structure: [**Single grained**] [**Granular**] [**Platy**] [**Blocky**] <**Insert structure**>.
e. Density: <**Insert lb/cu. ft. (kg./cu. m)**>.
f. Moisture Content: <**Insert number**> percent.
g. Infiltration Rate: <**Insert gph (L/s)**>.

D. Minimum Working Pressures: The following are minimum pressure requirements for piping, valves, and specialties unless otherwise indicated:

1. Irrigation Main Piping: [**200 psig (1380 kPa)**] <**Insert value**>.
2. Circuit Piping: [**150 psig (1035 kPa)**] <**Insert value**>.

1.5 SUBMITTALS

A. Materials List

1. Within fourteen (14) days after award of contract, submit to the Architect (3) copies of complete material list (partial list is not acceptable) of all materials to be used on the project, specifying the manufacturer, grade, trade name, catalog number, and size. This shall in no way be construed as allowing the substitution of any items specified herein.
2. Materials other than those that meet the specification, provide complete manufacturer's descriptive literature, brochures or cut sheets.

a. It is the Contractor's responsibility to provide sufficient information on the substitute materials in order to allow for any objective comparison with the specified materials.

1.6 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

C. Use all means necessary to protect the materials in this section before, during, and after installation and to protect the installed work of other trades. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1.8 PROJECT CONDITIONS

A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:

1. Notify Architect two days in advance of proposed interruption of water service.
2. Do not proceed with interruption of water service without Architect's written permission.

B. Documents

1. Thoroughly examine all Contract Documents. Discrepancies, omissions or conflicts in the Contract Documents, or doubt as to the meaning thereof, shall be brought to the attention of the Architect prior to the bid opening. Addenda will be issued to clarify the discrepancies, omissions, conflicts or meaning and shall become part of the contract. Oral instructions are not valid under this section of the specifications.

C. Visiting the Premises

1. Before submitting the bid, Contractor shall visit the premises and become familiar with existing conditions pertaining to the execution of the work contemplated under this section. Not request for additional payment due to the Contractor’s failure to allow for working conditions will be valid.

D. Water

1. Water will be provided at the job site by the Contractor and at no cost to the subcontractor. Make and remove temporary lines and connections as necessary for the proper execution of the work.

1.9 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. Impact Sprinklers: Equal to <**Insert number**> percent of amount installed for each type and size indicated, but no fewer than <**Insert number**> units.
2. Spray Sprinklers: Equal to <**Insert number**> percent of amount installed for each type and size indicated, but no fewer than <**Insert number**> units.
3. Bubblers: Equal to <**Insert number**> percent of amount installed for each type indicated, but no fewer than <**Insert number**> units.
4. Emitters: Equal to <**Insert number**> percent of amount installed for each type indicated, but no fewer than <**Insert number**> units.
5. Drip-Tube System Tubing: Equal to <**Insert number**> percent of total length installed for each type and size indicated, but not less than [**100 feet (30 m)**] [**500 feet (152 m)**] <**Insert value**>.
6. Soaker Tubes: Equal to <**Insert number**> percent of total length installed for each type and size indicated, but not less than [**50 feet (15.2 m)**] [**100 feet (30 m)**] <**Insert value**>.

PART 2 - PRODUCTS

2.1 PIPING

A. Main lines, lateral lines, fittings and risers shall be schedule 40 PVC plastic pipe, NSF approved Type 1, Grade 1.

2.2 CONTROLLERS

A. Provide and install commercial grade automatic irrigation controllers in approximate locations shown on the drawings. Provide and place controllers in strong box. The exact location will be determined on the site by the Architect and the Owner.

2.3 Boxes

A. Boxes for control valves

2.4 DRIP IRRIGATION

A. Drip tubing shall be ½" Polyethylene.

2.5 BACKFLOR PREVENTER

A. Backflow valve assembly provided as noted on the drawings.

2.6 MISCHELLANEOUS EQUIPMENT

A. Provide all equipment called for by the drawings.

PART 3 - EXECUTION

3.1 EXISTING SITE UTILITIES

A. Verify the location of existing utilities in all areas where excavation is to be performed. Extreme caution shall be exercised during all excavation to prevent interruption or severance of existing utilities. Do not break into any pipe, conduit or concrete encasement except as shown. Notify the Architect when such obstructions prevent installation of this work.

3.2 COOPERATION WITH OTHER TRADES

A. Plans and specifications for the entire project are available at the job site. Examine thoroughly these plans and specifications prior to the installation of the work. Arrange and coordinate the work of this section with the work of the other trades to the extent that the installation is

accomplished without undue delay. Notify the Architect of any conflict between the work of this section and that of other trades.

3.3 PREPARATION

A. Set stakes to identify locations of proposed irrigation system. Obtain Architect's approval before excavation.

3.4 HANDLING AND STORAGE

A. Protect work and materials from damage during construction and storage.

B. Handle plastic pipe carefully; especially protect from prolonged exposure to the sunlight.

3.5 LAYOUT

A. Run mainline pipe lines and automatic control wiring in common trenches wherever practical.

3.6 EXCAVATING AND TRENCHING

A. Excavation shall be open vertical construction ample in size to permit the pipes to be laid at the elevations intended and to permit ample space for joining.

B. Trenches for pipe shall be cut to required grade lines and compacted to provide an accurate grade and uniform bearing for the full length of the line.

C. Provide minimum cover over top of underground piping according to the following:

1. 18-inch minimum cover over main lines to control valves and backflow prevention devices.
2. 18-inch minimum cover over control wires from controller to valves
3. Control Circuit Piping: 12 inches (300 mm).
4. Drain Piping: 12 inches (300 mm).

D. Cap or plug openings as pipeline is assembled to prevent entrance of dirt or obstruction. Remove caps or plugs only when necessary to continue assembly.

E. Where pipes or control wires pass through sleeves, provide removable non-decaying plug at ends of sleeve to prevent entrance of earth.

3.7 PIPING INSTALLATION

A. Location and Arrangement: Drawings indicate location and arrangement of piping systems. Install piping as indicated unless deviations are approved on Coordination Drawings.

B. Install piping at minimum uniform slope of 0.5 percent down toward drain valves.

C. Install piping free of sags and bends.

D. Install groups of pipes parallel to each other, spaced to permit valve servicing.

E. Install fittings for changes in direction and branch connections.

F. Install unions adjacent to valves and to final connections to other components with NPS 2 (DN 50) or smaller pipe connection.

G. Install flanges adjacent to valves and to final connections to other components with NPS 2-1/2 (DN 65) or larger pipe connection.

H. Install underground thermoplastic piping according to ASTM D 2774[**and ASTM F 690**].

I. Install expansion loops in control-valve boxes for plastic piping.

J. Lay piping on solid subbase, uniformly sloped without humps or depressions.

K. Install ductile-iron piping according to AWWA C600.

L. Install PVC piping in dry weather when temperature is above 40 deg F (5 deg C). Allow joints to cure at least 24 hours at temperatures above 40 deg F (5 deg C) before testing.

M. Install water regulators with shutoff valve and strainer on inlet and pressure gage on outlet. Install shutoff valve on outlet. Install aboveground or in control-valve boxes.

N. Water Hammer Arresters: Install between connection to building main and circuit valves aboveground or in control-valve boxes.

O. Install piping in sleeves under parking lots, roadways, and sidewalks.

P. Install sleeves made of [**Schedule 40**] [**Schedule 80**] PVC pipe and socket fittings, and solvent-cemented joints.

Q. Install transition fittings for plastic-to-metal pipe connections according to the following:

1. Underground Piping:

   a. NPS 1-1/2 (DN 40) and Smaller: Plastic-to-metal transition fittings.
   b. NPS 2 (DN 50) and Larger: AWWA transition couplings.

2. Aboveground Piping:

   a. NPS 2 (DN 50) and Smaller: Plastic-to-metal transition [**fittings**] [**unions**].
   b. NPS 2 (DN 50) and Larger: Use dielectric flange kits with one plastic flange.

R. Install dielectric fittings for dissimilar-metal pipe connections according to the following:

1. Underground Piping:

   a. NPS 2 (DN 50) and Smaller: Dielectric coupling or dielectric nipple.
   b. NPS 2-1/2 (DN 65) and Larger: Prohibited except in control-valve box.

2. Aboveground Piping:

   a. NPS 2 (DN 50) and Smaller: Dielectric union.

b. NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Dielectric flange.
c. NPS 5 (DN 125) and Larger: Dielectric flange kit.

3. Piping in Control-Valve Boxes:

a. NPS 2 (DN 50) and Smaller: Dielectric union.
b. NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Dielectric flange.
c. NPS 5 (DN 125) and Larger: Dielectric flange kit.

3.8 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

D. Flanged Joints: Select rubber gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

E. Ductile-Iron Piping Gasketed Joints: Comply with AWWA C600 and AWWA M41.

F. Copper-Tubing Brazed Joints: Construct joints according to CDA's "Copper Tube Handbook," using copper-phosphorus brazing filler metal.

G. Copper-Tubing Soldered Joints: Apply ASTM B 813 water-flushable flux to tube end unless otherwise indicated. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy (0.20 percent maximum lead content) complying with ASTM B 32.

H. PE Piping Fastener Joints: Join with insert fittings and bands or fasteners according to piping manufacturer's written instructions.

I. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.

1. Plain-End PE Pipe and Fittings: Use butt fusion.
2. Plain-End PE Pipe and Socket Fittings: Use socket fusion.

J. PVC Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.

2. PVC Pressure Piping: Join schedule number, ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
3. PVC Nonpressure Piping: Join according to ASTM D 2855.

3.9 VALVE INSTALLATION

A. Underground Curb Valves: Install in curb-valve casings with tops flush with grade.

B. Underground Iron Gate Valves, Resilient Seat: Comply with AWWA C600 and AWWA M44. Install in valve casing with top flush with grade.

1. Install valves and PVC pipe with restrained, gasketed joints.

C. Aboveground Valves: Install as components of connected piping system.

D. Pressure-Reducing Valves: Install in boxes for automatic control valves or aboveground between shutoff valves.[**Install full-size valved bypass.**]

E. Throttling Valves: Install in underground piping in boxes for automatic control valves.

F. Drain Valves: Install in underground piping in boxes for automatic control valves.

3.10 SPRINKLER INSTALLATION

A. Install sprinklers after hydrostatic test is completed.

B. Install sprinklers at manufacturer's recommended heights.

C. Locate part-circle sprinklers to maintain a minimum distance of 4 inches (100 mm) from walls and 2 inches (50 mm) from other boundaries unless otherwise indicated.

3.11 DRIP IRRIGATION SPECIALTY INSTALLATION

A. Install freestanding emitters on pipe riser to mounting height indicated.

B. Install manifold emitter systems with tubing to emitters. Plug unused manifold outlets. Install emitters on off-ground supports at height indicated.

C. Install multiple-outlet emitter systems with tubing to outlets. Plug unused emitter outlets. Install outlets on off-ground supports at height indicated.

D. Install drip tubes with direct-attached emitters on ground.

E. Install drip tubes with remote-discharge on ground with outlets on off-ground supports at height indicated.

F. Install off-ground supports of length required for indicated mounted height of device.

G. Install [**application pressure regulators**] [**and**] [**filter units**] in piping near device being protected, and [**aboveground**] [**in control-valve boxes**].

H. Install [**air relief valves**] [**and**] [**vacuum relief valves**] in piping, and [**aboveground**] [**in control-valve boxes**].

3.12 AUTOMATIC IRRIGATION-CONTROL SYSTEM INSTALLATION

A. Equipment Mounting: Install interior controllers on [**floor**] [**concrete bases**] [**wall**].

1. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.

B. Equipment Mounting: Install exterior freestanding controllers on precast concrete bases.

1. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.

C. Install control cable in same trench as irrigation piping and at least 2 inches (51 mm) below[**or beside**] piping. Provide conductors of size not smaller than recommended by controller manufacturer. Install cable in separate sleeve under paved areas.

3.13 CONNECTIONS

A. Comply with requirements for piping specified in Division 22 Section "Facility Water Distribution Piping" for water supply from exterior water service piping, water meters, protective enclosures, and backflow preventers. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment, valves, and devices to allow service and maintenance.

C. Connect wiring between controllers and automatic control valves.

3.14 IDENTIFICATION

A. Identify system components. Comply with requirements for identification specified in Division 22 Section "Identification for Plumbing Piping and Equipment."

B. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplates and signs on each automatic controller.

1. Text: In addition to identifying unit, distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.

C. Warning Tapes: Arrange for installation of continuous, underground, detectable warning tapes over underground piping during backfilling of trenches. See Division 31 Section "Earth Moving" for warning tapes.

3.15 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, operate controllers and automatic control valves to confirm proper system operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Any irrigation product will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.16 STARTUP SERVICE

A. [**Engage a factory-authorized service representative to perform**] [**Perform**] startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.
2. Verify that controllers are installed and connected according to the Contract Documents.
3. Verify that electrical wiring installation complies with manufacturer's submittal.

3.17 ADJUSTING

A. Adjust settings of controllers.

B. Adjust automatic control valves to provide flow rate at rated operating pressure required for each sprinkler circuit.

C. Adjust sprinklers and devices, except those intended to be mounted aboveground, so they will be flush with, or not more than [**1/2 inch (13 mm)**] <**Insert value**> above, finish grade.

3.18 CLEANING

A. Flush dirt and debris from piping before installing sprinklers and other devices.

3.19 DEMONSTRATION

A. [**Engage a factory-authorized service representative to train**] [**Train**] Owner's maintenance personnel to adjust, operate, and maintain [**automatic control valves**] [**and**] [**controllers**].

3.20 PIPING SCHEDULE

A. Install components having pressure rating equal to or greater than system operating pressure.

B. Piping in control-valve boxes and aboveground may be joined with flanges or unions instead of joints indicated.

C. Aboveground irrigation main piping, [**NPS 4 (DN 100) and smaller**] <**Insert pipe size range**>, shall be[**one of**] the following:

1. Galvanized-steel pipe and galvanized-steel pipe nipples; galvanized, gray-iron threaded fittings; and threaded joints.
2. [**Type L (Type B)**] [**Type M (Type C)**] hard copper tube, wrought- or cast-copper fittings, and [**brazed**] [**soldered**] joints.
3. [**Schedule 40**] [**Schedule 80**], PVC pipe; socket-type PVC fittings; and solvent-cemented joints.
4. Schedule 80, PVC pipe; Schedule 80, threaded PVC fittings; and threaded joints.

D. Aboveground irrigation main piping, [**NPS 5 (DN 125) and larger**] <**Insert pipe size range**>, shall be[**one of**] the following:

1. Galvanized-steel pipe and galvanized-steel pipe nipples; galvanized, gray-iron threaded fittings; and threaded joints.
2. [**Schedule 40**] [**Schedule 80**], PVC pipe and socket fittings; and solvent-cemented joints.
3. Schedule 80, PVC pipe; Schedule 80, threaded PVC fittings; and threaded joints.

E. Underground irrigation main piping, [**NPS 4 (DN 100) and smaller**] <**Insert pipe size range**>, shall be[**one of**] the following:

1. NPS 3 and NPS 4 (DN 80 and DN 100) ductile-iron, mechanical-joint pipe; ductile-iron, mechanical-joint fittings, glands, bolts, and nuts; and gasketed joints.
2. NPS 3 and NPS 4 (DN 80 and DN 100) ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings and gaskets; and gasketed joints.
3. Type L (Type B) soft copper tube, wrought-copper fittings, and brazed joints.
4. NPS 4 (DN 100) PE pressure pipe; PE butt, heat-fusion or socket-type fittings; and heat-fusion joints.
5. [**Schedule 40**] [**Schedule 80**], PVC pipe and socket fittings, and solvent-cemented joints.
6. Schedule 80, PVC pipe; Schedule 80, threaded PVC fittings; and threaded joints.
7. SDR 21, PVC, pressure-rated pipe; Schedule 80, PVC socket fittings; and solvent-cemented joints.

F. Underground irrigation main piping, [**NPS 5 (DN 125) and larger**] <**Insert pipe size range**>, shall be[**one of**] the following:

1. NPS 6 (DN 150) and larger ductile-iron, mechanical-joint pipe; ductile-iron, mechanical-joint fittings, glands, bolts, and nuts; and gasketed joints.
2. NPS 6 (DN 150) and larger ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings and gaskets; and gasketed joints.
3. PE pressure pipe; PE butt, heat-fusion fittings; and heat-fusion joints.
4. [**Schedule 40**] [**Schedule 80**], PVC pipe and socket fittings; and solvent-cemented joints.
5. SDR 21, PVC, pressure-rated pipe; Schedule 80, PVC socket fittings; and solvent-cemented joints.

G. Circuit piping, [**NPS 2 (DN 50) and smaller**] <**Insert pipe size range**>, shall be[**one of**] the following:

1. [**SIDR 7**] [**SIDR 9**], PE, controlled ID pipe; insert fittings for PE pipe; and fastener joints.
2. [**DR 9**] [**DR 11**], PE, controlled OD pipe; PE butt, heat-fusion, or PE socket-type fittings; and heat-fusion joints.
3. Schedule 40, PVC pipe and socket fittings; and solvent-cemented joints.
4. SDR 26, PVC, pressure-rated pipe; Schedule 40, PVC socket fittings; and solvent-cemented joints.

H. Circuit piping, [**NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**] <**Insert pipe size range**>, shall be[**one of**] the following:

1. [**SIDR 7**] [**SIDR 9**], PE, controlled ID pipe; insert fittings for PE pipe; and banded or fastener joints.
2. [**DR 9**] [**DR 11**], PE, controlled OD pipe; PE socket or butt-fusion fittings; and heat-fusion joints. NPS 3 (DN 80) pipe and fittings if NPS 2-1/2 (DN 65) pipe and fittings are not available.
3. Schedule 40, PVC pipe and socket fittings; and solvent-cemented joints.
4. SDR 26, PVC, pressure-rated pipe; Schedule 40, PVC socket fittings; and solvent-cemented joints.

I. Underground Branches and Offsets at Sprinklers and Devices: Schedule 80, PVC pipe; threaded PVC fittings; and threaded joints.

1. Option: Plastic swing-joint assemblies, with offsets for flexible joints, manufactured for this application.

J. Risers to Aboveground Sprinklers and Specialties: [**Type L (Type B)**] [**Type M (Type C)**] hard copper tube, wrought-copper fittings, and [**brazed**] [**soldered**] joints.

K. Risers to Aboveground Sprinklers and Specialties: Schedule 80, PVC pipe and socket fittings; and solvent-cemented joints.

L. Drain piping shall be[**one of**] the following:

1. SIDR 9, 11.5, or 15, PE, controlled ID pipe; insert fittings for PE pipe; and banded or fastener joints.
2. Schedule 40, PVC pipe and socket fittings; and solvent-cemented joints.
3. SDR 21, 26, or 32.5, PVC, pressure-rated pipe; Schedule 40, PVC socket fittings; and solvent-cemented joints.

3.21 VALVE SCHEDULE

A. Underground, Shutoff-Duty Valves: Use the following:

1. NPS 2 (DN 50) and Smaller: Curb valve, curb-valve casing, and shutoff rod.
2. NPS 3 (DN 80) and Larger: Iron gate valve, resilient seated; iron gate valve casing; and operating wrench(es).

B. Aboveground, Shutoff-Duty Valves:

1. NPS 2 (DN 50) and Smaller: [**Brass**] [**Brass or bronze**] [**Bronze**] [**Plastic**] ball valve.

2. NPS 2 (DN 50) and Smaller: Bronze gate valve.
3. NPS 2-1/2 (DN 65) and Larger: Iron ball valve.
4. NPS 2-1/2 (DN 65) and Larger: Iron gate valve, [**NRS**] [**OS&Y**].

C. Throttling-Duty Valves:

1. NPS 2 (DN 50) and Smaller: [**Bronze**] [**Plastic**] automatic control valve.
2. NPS 2 (DN 50) and Smaller: [**Brass**] [**Brass or bronze**] [**Bronze**] [**Plastic**] ball valve.
3. NPS 2-1/2 and NPS 3 (DN 65 and DN 80): [**Bronze**] [**Plastic**] automatic control valve.
4. NPS 2-1/2 and NPS 3 (DN 65 and DN 80): Iron ball valve.

D. Drain Valves:

1. NPS 1/2 and NPS 3/4 (DN 15 and DN 20): Automatic drain valve.
2. NPS 1/2 and NPS 3/4 (DN 15 and DN 20): [**Brass**] [**Brass or bronze**] [**Bronze**] [**Plastic**] ball valve.
3. NPS 1/2 and NPS 3/4 (DN 15 and DN 20): Bronze gate valve.
4. NPS 1 to NPS 2 (DN 25 to DN 50): [**Brass**] [**Brass or bronze**] [**Bronze**] [**Plastic**] ball valve.
5. NPS 1 to NPS 2 (DN 25 to DN 50): Bronze gate valve.

END OF SECTION 328400

SECTION 329200 - TURF AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Hydroseeding.
2. Sodding.

B. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before start of required maintenance periods.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.

B. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod in time for planting within 24 hours of harvesting. Protect sod from breakage and drying.

C. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

1.4 MAINTENANCE SERVICE

A. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable turf is established but for not less than the following periods:

1. Seeded Turf: 60 days from date of planting completion.

2. Sodded Turf: 30 days from date of planting completion.

PART 2 - PRODUCTS

2.1 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.

2.2 TURFGRASS SOD

A. Turfgrass Sod: Complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture, strongly rooted, and capable of vigorous growth and development when planted.

2.3 SOIL AMENDMENTS

A. Compost: Amend soil with well-composted, stable, and weed-free organic matter.

B. As applicable to the type of species, add fertilizers to each plant. May include bone meal, superphosphate, slow release and/or planting tablets.

2.4 PLANTING SOILS

A. Planting Soil: Import clean, approved planting soil. Mix soil with amendments.

2.5 PESTICIDES

A. Do not use pesticides.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

1. Protect adjacent and adjoining areas from hydroseeding overspray.
2. Protect grade stakes set by others until directed to remove them.

3.3 HYDROSEEDING

A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.

1. Mix slurry with fiber-mulch manufacturer's recommended tackifier.
2. Apply slurry uniformly to all areas to be seeded per manufacture’s recommendations.

3.4 SODDING

A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.

B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

1. Lay sod across angle of slopes exceeding 1:3.
2. Anchor sod on slopes exceeding 1:6 with wood pegs spaced as recommended by sod manufacturer but not less than 2 anchors per sod strip to prevent slippage.

C. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches (38 mm) below sod.

3.5 TURF MAINTENANCE

A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

B. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet.

3.6 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by Architect:

1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities.
2. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.

B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

3.7 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

C. Remove nondegradable erosion-control measures after grass establishment period.

END OF SECTION 329200

SECTION 329300 - PLANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plants.
2. Planting soils.
3. Tree stabilization.

B. Samples for Verification: For each of the following:
1. Mulch: 1-pint (0.5-liter) volume of each specified; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch.

C. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before start of required maintenance periods.

1.2 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

C. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

1. Delivery: Do not delivery to the site any disease-infected plan materials
2. Handling: Do not lift or handle plans by tops, stems or trunks at any time. Do not bind or handle plants with wire or rope at any time.

1.3 PROJECT CONDITIONS

A. Interruption of Existing Services or Utilities: Do not interrupt services or utilities to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary services or utilities according to requirements indicated:

1. Notify Architect no fewer than two days in advance of proposed interruption of each service or utility.
2. Do not proceed with interruption of services or utilities without Architect's written permission.

B. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.

1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.4 WARRANTY

A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner, or incidents that are beyond Contractor's control.
b. Structural failures including plantings falling or blowing over.

2. Warranty Periods from Date of Planting Completion:

a. Trees, Shrubs, Vines, and Ornamental Grasses: **12** months.
b. Ground Covers, Biennials, Perennials, and Other Plants: **12** months.

3. Include the following remedial actions as a minimum:

a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
c. A limit of one replacement of each plant will be required except for losses or replacements due to failure to comply with requirements.
d. Provide extended warranty for period equal to original warranty period, for replaced plant material.

4. Exclusions: Contractor shall not be held responsible for failures due to neglect by the Owner, vandalism and Acts of God during warranty period. Report such conditions in writing.

1.5 MAINTENANCE SERVICE

A. Initial Maintenance Service: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.

1. Maintenance Period: Three months from date of planting completion.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant Schedule or Plant Legend shown on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch (19 mm) in diameter; or with stem girdling roots will be rejected.
2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.

B. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

C. Provide healthy, disease-free plants of species and variety shown or listed, with well-established root systems reaching to sides of the container to maintain a firm ball, but not with excessive root growth encircling the container. Provide only plants that are acclimated to outdoor conditions before delivery.

2.2 SOIL AMENDMENTS

A. Compost: Amend soil with well-composted, stable, and weed-free organic matter.

B. As applicable to the type of species, add fertilizers to each plant. May include bone meal, superphosphate, slow release and/or planting tablets.

2.3 PLANTING SOILS

A. Planting Soil: Import clean, approved planting soil. Mix soil with amendments.

2.4 MULCHES

A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:

1. Type: Medium pine bark mulch.
2. Color: Natural.

2.5 WEED-CONTROL BARRIERS

A. Do not use “weed mat” products.

2.6 PESTICIDES

A. Do not use pesticides.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PLANTING AREA ESTABLISHMENT

A. Loosen subgrade of planting areas to a minimum depth of 6 inches (150 mm). Remove stones larger than 1 inch (25 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Thoroughly blend planting soil off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.
2. Spread planting soil to a depth of 18 inches but not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

B. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.3 EXCAVATION FOR TREES AND SHRUBS

A. Planting Pits and Trenches: Excavate circular planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are not acceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.

1. Excavate approximately three times as wide as ball diameter.
2. Excavate at least 12 inches (300 mm) wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
3. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.

3.4 TREE, SHRUB, AND VINE PLANTING

A. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

B. Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

C. Set balled and burlapped stock plumb and in center of planting pit or trench with root flare 1 inch (25 mm) above adjacent finish grades.

1. Use planting soil for backfill.
2. Balled and Burlapped: After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and 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.
3. Fabric Bag-Grown Stock: 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.
4. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
5. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch (25 mm) from root tips; do not place tablets in bottom of the hole.
6. Continue backfilling process. Water again after placing and tamping final layer of soil.

D. Bare-Root Stock: Set and support bare-root stock in center of planting pit or trench with root flare 1 inch (25 mm) above adjacent finish grade.

1. Use planting soil for backfill.
2. 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.
3. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside soil-covered roots about 1 inch (25 mm) from root tips; do not place tablets in bottom of the hole or touching the roots.
4. Continue backfilling process. Water again after placing and tamping final layer of soil.

E. When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

3.5 TREE, SHRUB, AND VINE PRUNING

A. Remove only dead, dying, or broken branches. Do not prune for shape.

B. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.

3.6 TREE STABILIZATION

A. General: Trees shall be able to stand upright without support, and shall return to the vertical after their tops have been deflected horizontally and released. Stake or guy trees which do not meet this qualification. Trees shall remain plumb and straight from installation through the warranty period. Tree support, if required, shall be done as outlined below.

B. Staking

1. Stake all trees under 3-1/4 inch caliper in accordance with the following:

   a. To 1 ¾" tree caliper at 12" above grade: 2" diameter X 8' height stake.
   b. To 3" tree caliper at 12" above grade: 3-1/2" diameter X 10' height stake.

2. Locate stakes in a line with trunk of tree, perpendicular to prevailing wind and as close to the main trunk as is practical, avoiding root injury. Drive stakes at least 36 inches into firm ground.
3. Remove tree from nursery-supplied stake and tie to new stakes using tree ties. Find proper height for point of tree ties and attach as follows:

   a. Attach tree ties to trunk eight to 12 inches below lowest lateral branch. Two tie locations shall be necessary only on trees with light caliper.
   b. Nail rubber ties to stakes using two galvanized roofing nails at each end of tie. After total securement, cut off remaining stakes to within two inches of tree tie. Tie shall provide as much movement in the trunk as possible without allowing the trunk to rub against tree stakes.

3.7 GROUND COVER AND PLANT PLANTING

A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated in even rows with triangular spacing.

B. Use planting soil for backfill.

C. Dig holes large enough to allow spreading of roots.

D. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

E. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

F. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.8 PLANTING AREA MULCHING

A. Mulch backfilled surfaces of planting areas and other areas indicated.

1. Trees and Tree-like Shrubs in Turf Areas: Apply organic mulch ring of 2-inch average thickness, with 24-inch radius around trunks or stems. Do not place mulch within 3 inches (75 mm) of trunks or stems.
2. Organic Mulch in Planting Areas: Apply 2-inch average thickness of organic mulch over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches (75 mm) of trunks or stems.

3.9 PLANT MAINTENANCE

A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.

B. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated past management practices whenever possible to minimize the use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

D. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

3.10 CLEANUP AND PROTECTION

A. Daily Clean Up: Clean all planting operations debris at the end of each workday.

END OF SECTION 329300

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SECTION 330500 - COMMON WORK RESULTS FOR UTILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Piping joining materials.
2. Transition fittings.
3. Dielectric fittings.
4. Sleeves.
5. Identification devices.
6. Grout.
7. Flowable fill.
8. Piped utility demolition.
9. Piping system common requirements.
10. Equipment installation common requirements.
11. Painting.
12. Concrete bases.
13. Metal supports and anchorages.

1.3 DEFINITIONS

A. Exposed Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions.

B. Concealed Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

C. ABS: Acrylonitrile-butadiene-styrene plastic.

D. CPVC: Chlorinated polyvinyl chloride plastic.

E. PE: Polyethylene plastic.

F. PVC: Polyvinyl chloride plastic.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Dielectric fittings.
2. Identification devices.

B. Welding certificates.

1.5 QUALITY ASSURANCE

A. Steel Support Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Steel Piping Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.7 COORDINATION

A. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

B. Coordinate installation of identifying devices after completing covering and painting if devices are applied to surfaces.

C. Coordinate size and location of concrete bases. Formwork, reinforcement, and concrete requirements are specified in Division 03.

PART 2 - PRODUCTS

2.1 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch maximum thickness, unless otherwise indicated.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

E. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

F. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

G. Solvent Cements for Joining Plastic Piping:

1. ABS Piping: ASTM D 2235.
2. CPVC Piping: ASTM F 493.
3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
4. PVC to ABS Piping Transition: ASTM D 3138.

H. Fiberglass Pipe Adhesive: As furnished or recommended by pipe manufacturer.

2.2 TRANSITION FITTINGS

A. Transition Fittings, General: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.

B. Transition Couplings NPS 1-1/2 and Smaller:

1. Underground Piping: Manufactured piping coupling or specified piping system fitting.
2. Aboveground Piping: Specified piping system fitting.

C. AWWA Transition Couplings NPS 2 and Larger:

1. Description: AWWA C219, metal sleeve-type coupling for underground pressure piping.

D. Plastic-to-Metal Transition Fittings:

1. Description: [**CPVC**] [**CPVC and PVC**] [**PVC**] one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint[**or threaded**] end.

E. Plastic-to-Metal Transition Unions:

1. Description: MSS SP-107, [**CPVC**] [**CPVC and PVC**] [**PVC**] four-part union. Include brass[**or stainless-steel**] threaded end, solvent-cement-joint[**or threaded**] plastic end, rubber O-ring, and union nut.

F. Flexible Transition Couplings for Underground Nonpressure Drainage Piping:

1. Description: ASTM C 1173 with elastomeric sleeve, ends same size as piping to be joined, and corrosion-resistant metal band on each end.

2.3 DIELECTRIC FITTINGS

A. Dielectric Fittings, General: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature.

B. Dielectric Unions:

1. Description: Factory fabricated, union, NPS 2 (DN 50) and smaller.

a. Pressure Rating: [**150 psig (1035 kPa) minimum**] [**250 psig (1725 kPa)**] at 180 deg F (82 deg C).
b. End Connections: Solder-joint copper alloy and threaded ferrous; threaded ferrous.

C. Dielectric Flanges:

1. Description: Factory-fabricated, bolted, companion-flange assembly, NPS 2-1/2 to NPS 4 (DN 65 to DN 100) and larger.

a. Pressure Rating: [**150 psig (1035 kPa) minimum**] [**175 psig (1200 kPa) minimum**] [**300 psig (2070 kPa)**].
b. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

D. Dielectric-Flange Kits:

1. Description: Nonconducting materials for field assembly of companion flanges, NPS 2-1/2 (DN 65) and larger.

a. Pressure Rating: [**150 psig (1035 kPa) minimum**] <**Insert pressure**>.
b. Gasket: Neoprene or phenolic.
c. Bolt Sleeves: Phenolic or polyethylene.
d. Washers: Phenolic with steel backing washers.

E. Dielectric Couplings:

1. Description: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining, NPS 3 (DN 80) and smaller.

a. Pressure Rating: 300 psig (2070 kPa) at 225 deg F (107 deg C).
b. End Connections: Threaded.

F. Dielectric Nipples:

1. Description: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining.

    a. Pressure Rating: [**300 psig (2070 kPa) at 225 deg F (107 deg C)**] <**Insert pressure and temperature**>.
    b. End Connections: Threaded or grooved.

2.4 SLEEVES

A. Mechanical sleeve seals for pipe penetrations are specified in Division 22 Section "Common Work Results for Plumbing."

B. Galvanized-Steel Sheet Sleeves: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.

C. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized, plain ends.

D. Cast-Iron Sleeves: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

E. Molded PVC Sleeves: Permanent, with nailing flange for attaching to wooden forms.

F. PVC Pipe Sleeves: ASTM D 1785, Schedule 40.

G. Molded PE Sleeves: Reusable, PE, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

2.5 IDENTIFICATION DEVICES

A. General: Products specified are for applications referenced in other Division 33 Sections. If more than single type is specified for listed applications, selection is Installer's option.

B. Equipment Nameplates: Metal permanently fastened to equipment with data engraved or stamped.

1. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and essential data.
2. Location: Accessible and visible.

C. Stencils: Standard stencils prepared with letter sizes complying with recommendations in ASME A13.1. Minimum letter height is 1-1/4 inches (30 mm) for ducts, and 3/4 inch (20 mm) for access door signs and similar operational instructions.

1. Material: [**Fiberboard**] [**Brass**].
2. Stencil Paint: Exterior, oil-based, alkyd-gloss black enamel, unless otherwise indicated. Paint may be in pressurized spray-can form.
3. Identification Paint: Exterior, oil-based, alkyd enamel in colors according to ASME A13.1, unless otherwise indicated.

D. Snap-on Plastic Pipe Markers: Manufacturer's standard preprinted, semirigid, snap-on type. Include color-coding according to ASME A13.1, unless otherwise indicated.

E. Pressure-Sensitive Pipe Markers: Manufacturer's standard preprinted, color-coded, pressure-sensitive-vinyl type with permanent adhesive.

F. Pipes with OD, Including Insulation, Less Than 6 Inches (150 mm): Full-band pipe markers, extending 360 degrees around pipe at each location.

G. Pipes with OD, Including Insulation, 6 Inches (150 mm) and Larger: Either full-band or strip-type pipe markers, at least three times letter height and of length required for label.

H. Lettering: Manufacturer's standard preprinted captions as selected by Architect.

I. Lettering: Use piping system terms indicated and abbreviate only as necessary for each application length.

1. Arrows: Either integrally with piping system service lettering to accommodate both directions of flow, or as separate unit on each pipe marker to indicate direction of flow.

J. Plastic Tape: Manufacturer's standard color-coded, pressure-sensitive, self-adhesive vinyl tape, at least 3 mils (0.08 mm) thick.

1. Width: 1-1/2 inches (40 mm) on pipes with OD, including insulation, less than 6 inches (150 mm); 2-1/2 inches (65 mm) for larger pipes.
2. Color: Comply with ASME A13.1, unless otherwise indicated.

K. Valve Tags: Stamped or engraved with 1/4-inch (6.4-mm) letters for piping system abbreviation and 1/2-inch (13-mm) sequenced numbers. Include 5/32-inch (4-mm) hole for fastener.

1. Material: 0.032-inch- (0.8-mm-) thick, [**polished brass**] [**or**] [**aluminum**].
2. Material: 0.0375-inch- (1-mm-) thick stainless steel.
3. Material: 3/32-inch- (2.4-mm-) thick plastic laminate with 2 black surfaces and a white inner layer.
4. Material: Valve manufacturer's standard solid plastic.
5. Size: 1-1/2 inches (40 mm) in diameter, unless otherwise indicated.
6. Shape: As indicated for each piping system.

L. Valve Tag Fasteners: Brass, wire-link or beaded chain; or brass S-hooks.

M. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.

1. Engraving: Engraver's standard letter style, of sizes and with terms to match equipment identification.
2. Thickness: [**1/16 inch (1.6 mm)**] [**1/8 inch (3 mm)**], unless otherwise indicated.
3. Thickness: 1/16 inch (1.6 mm), for units up to 20 sq. in. (130 sq. cm) or 8 inches (200 mm) in length, and 1/8 inch (3 mm) for larger units.
4. Fasteners: Self-tapping, stainless-steel screws or contact-type permanent adhesive.

N. Plastic Equipment Markers: Manufacturer's standard laminated plastic, in the following color codes:

1. Green: Cooling equipment and components.
2. Yellow: Heating equipment and components.

3. Brown: Energy reclamation equipment and components.
4. Blue: Equipment and components that do not meet criteria above.
5. Hazardous Equipment: Use colors and designs recommended by ASME A13.1.
6. Terminology: Match schedules as closely as possible. Include the following:

    a. Name and plan number.
    b. Equipment service.
    c. Design capacity.
    d. Other design parameters such as pressure drop, entering and leaving conditions, and speed.

7. Size: 2-1/2 by 4 inches (65 by 100 mm) for control devices, dampers, and valves; 4-1/2 by 6 inches (115 by 150 mm) for equipment.

O. Plasticized Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with mat finish suitable for writing.

1. Size: 3-1/4 by 5-5/8 inches (83 by 143 mm).
2. Fasteners: Brass grommets and wire.
3. Nomenclature: Large-size primary caption such as DANGER, CAUTION, or DO NOT OPERATE.

P. Lettering and Graphics: Coordinate names, abbreviations, and other designations used in piped utility identification with corresponding designations indicated. Use numbers, letters, and terms indicated for proper identification, operation, and maintenance of piped utility systems and equipment.

1. Multiple Systems: Identify individual system number and service if multiple systems of same name are indicated.

2.6 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post hardening, volume adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

2.7 FLOWABLE FILL

A. Description: Low-strength-concrete, flowable-slurry mix.

1. Cement: ASTM C 150, Type I, portland.
2. Density: [**115- to 145-lb/cu. ft. (1840- to 2325-kg/cu. m)**] <**Insert value**>.
3. Aggregates: ASTM C 33, natural sand, fine and crushed gravel or stone, coarse.
4. Aggregates: ASTM C 33, natural sand, fine.
5. Admixture: ASTM C 618, fly-ash mineral.
6. Water: Comply with ASTM C 94/C 94M.
7. Strength: [**100 to 200 psig (690 to 1380 kPa)**] <**Insert value**> at 28 days.

PART 3 - EXECUTION

3.1 PIPED UTILITY DEMOLITION

A. Refer to Division 01 Section "Cutting and Patching" and Division 02 Section "Selective Structure Demolition" for general demolition requirements and procedures.

B. Disconnect, demolish, and remove piped utility systems, equipment, and components indicated to be removed.

1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
2. Piping to Be Abandoned in Place: Drain piping. Fill abandoned piping with flowable fill, and cap or plug piping with same or compatible piping material.
3. Equipment to Be Removed: Disconnect and cap services and remove equipment.
4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make operational.
5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 DIELECTRIC FITTING APPLICATIONS

A. Dry Piping Systems: Connect piping of dissimilar metals with the following:

1. NPS 2 (DN 50) and Smaller: Dielectric unions.
2. NPS 2-1/2 to NPS 12 (DN 65 to DN 300): Dielectric flanges[**or dielectric flange kits**].

B. Wet Piping Systems: Connect piping of dissimilar metals with the following:

1. NPS 2 (DN 50) and Smaller: Dielectric [**couplings**] [**couplings or dielectric nipples**] [**nipples**].
2. NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Dielectric nipples.
3. NPS 2-1/2 to NPS 8 (DN 65 to DN 200): Dielectric nipples[**or dielectric flange kits**].
4. NPS 10 and NPS 12 (DN 250 and DN 300): Dielectric flange kits.

3.3 PIPING INSTALLATION

A. Install piping according to the following requirements and Division 33 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on the Coordination Drawings.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping to permit valve servicing.

E. Install piping at indicated slopes.

F. Install piping free of sags and bends.

G. Install fittings for changes in direction and branch connections.

H. Select system components with pressure rating equal to or greater than system operating pressure.

I. Sleeves are not required for core-drilled holes.

J. Permanent sleeves are not required for holes formed by removable PE sleeves.

K. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of equipment areas or other wet areas [**2 inches (50 mm)**] <**Insert dimension**> above finished floor level.

2. Install sleeves in new walls and slabs as new walls and slabs are constructed.

a. [**PVC**] [**Steel**] Pipe Sleeves: For pipes smaller than NPS 6 (DN 150).
b. Steel Sheet Sleeves: For pipes NPS 6 (DN 150) and larger, penetrating gypsum-board partitions.

L. Verify final equipment locations for roughing-in.

M. Refer to equipment specifications in other Sections for roughing-in requirements.

3.4 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 33 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.

2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

E. Welded Joints: Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

F. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

G. Grooved Joints: Assemble joints with grooved-end pipe coupling with coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.

H. Soldered Joints: Apply ASTM B 813 water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy (0.20 percent maximum lead content) complying with ASTM B 32.

I. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

J. Pressure-Sealed Joints: Assemble joints for plain-end copper tube and mechanical pressure seal fitting with proprietary crimping tool to according to fitting manufacturer's written instructions.

K. Plastic Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 appendixes.
3. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
4. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
5. PVC Nonpressure Piping: Join according to ASTM D 2855.
6. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.

L. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

M. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.

N. Plastic Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.

1. Plain-End PE Pipe and Fittings: Use butt fusion.
2. Plain-End PE Pipe and Socket Fittings: Use socket fusion.

O. Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

3.5 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.
3. Install dielectric fittings at connections of dissimilar metal pipes.

3.6 EQUIPMENT INSTALLATION

A. Install equipment level and plumb, unless otherwise indicated.

B. Install equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference with other installations. Extend grease fittings to an accessible location.

C. Install equipment to allow right of way to piping systems installed at required slope.

3.7 PAINTING

A. Painting of piped utility systems, equipment, and components is specified in Division 09 painting Sections.

B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.8 IDENTIFICATION

A. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.

1. Stenciled Markers: According to ASME A13.1.
2. Plastic markers, with application systems. Install on insulation segment if required for hot noninsulated piping.
3. Locate pipe markers on exposed piping according to the following:

    a. Near each valve and control device.
    b. Near each branch, excluding short takeoffs for equipment and terminal units. Mark each pipe at branch if flow pattern is not obvious.
    c. Near locations where pipes pass through walls or floors or enter inaccessible enclosures.
    d. At manholes and similar access points that permit view of concealed piping.
    e. Near major equipment items and other points of origination and termination.

B. Equipment: Install engraved plastic-laminate sign or equipment marker on or near each major item of equipment.

1. Lettering Size: Minimum 1/4 inch (6.4 mm) high for name of unit if viewing distance is less than 24 inches (610 mm), 1/2 inch (13 mm) high for distances up to 72 inches (1800 mm), and proportionately larger lettering for greater distances. Provide secondary lettering two-thirds to three-fourths of size of principal lettering.

2. Text of Signs: Provide name of identified unit. Include text to distinguish among multiple units, inform user of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.

C. Adjusting: Relocate identifying devices that become visually blocked by work of this or other Divisions.

3.9 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
7. Use [**3000-psi (20.7-MPa)**] <**Insert strength**>, 28-day compressive-strength concrete and reinforcement as specified in Division 03 Section "[**Cast-in-Place Concrete**] [**Miscellaneous Cast-in-Place Concrete**]"

3.10 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 05 Section "Metal Fabrications" for structural steel.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor piped utility materials and equipment.

C. Field Welding: Comply with AWS D1.1/D1.1M.

3.11 GROUTING

A. Mix and install grout for equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

END OF SECTION 330500

SECTION 334600 - SUBDRAINAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Perforated-wall pipe and fittings.
2. Drainage conduits.
3. Drainage panels.
4. Geotextile filter fabrics.

1.3 SUBMITTALS

A. Product Data:

1. Drainage conduits, including rated capacities.
2. Drainage panels, including rated capacities.
3. Geotextile filter fabrics.

PART 2 - PRODUCTS

2.1 PERFORATED-WALL PIPES AND FITTINGS

A. Perforated PE Pipe and Fittings:

1. NPS 6 and Smaller: ASTM F 405 or AASHTO M 252, Type CP; corrugated, for coupled joints.
2. NPS 8 and Larger: ASTM F 667; AASHTO M 252, Type CP; or AASHTO M 294, Type CP; corrugated; for coupled joints.
3. Couplings: Manufacturer's standard, band type.

B. Perforated PVC Sewer Pipe and Fittings: ASTM D 2729, bell-and-spigot ends, for loose joints.

2.2 DRAINAGE CONDUITS

A. Molded-Sheet Drainage Conduits: Prefabricated geocomposite with cuspated, molded-plastic drainage core wrapped in geotextile filter fabric.

1. Nominal Size: 18 inches high by approximately 1 inch thick.

a. Minimum In-Plane Flow: 45 gpm at hydraulic gradient of 1.0 when tested according to ASTM D 4716.

2. Filter Fabric: PP geotextile.
3. Fittings: HDPE with combination NPS 4 and NPS 6 outlet connection.

B. Multipipe Drainage Conduits: Prefabricated geocomposite with interconnected, corrugated, perforated-pipe core molded from HDPE complying with ASTM D 1248 and wrapped in geotextile filter fabric.

1. Nominal Size: 6 inches (152 mm) high by approximately 1-1/4 inches (31 mm) thick.

a. Minimum In-Plane Flow: [**15 gpm (57 L/min.)**] <**Insert value**> at hydraulic gradient of [**1.0**] <**Insert value**> when tested according to ASTM D 4716.

2. Nominal Size: 12 inches (305 mm) high by approximately 1-1/4 inches (31 mm) thick.

a. Minimum In-Plane Flow: [**30 gpm (114 L/min.)**] <**Insert value**> at hydraulic gradient of [**1.0**] <**Insert value**> when tested according to ASTM D 4716.

3. Nominal Size: 18 inches (457 mm) high by approximately 1-1/4 inches (31 mm) thick.

a. Minimum In-Plane Flow: [**45 gpm (170 L/min.)**] <**Insert value**> at hydraulic gradient of [**1.0**] <**Insert value**> when tested according to ASTM D 4716.

4. Filter Fabric: Nonwoven, needle-punched geotextile.
5. Fittings: HDPE with combination NPS 4 and NPS 6 (DN 100 and DN 150) outlet connection.
6. Couplings: HDPE.

C. Single-Pipe Drainage Conduits: Prefabricated geocomposite with perforated corrugated core molded from HDPE complying with ASTM D 3350 and wrapped in geotextile filter fabric.

1. Nominal Size: 12 inches (305 mm) high by approximately 1 inch (25 mm) thick.

a. Minimum In-Plane Flow: [**30 gpm (114 L/min.)**] <**Insert value**> at hydraulic gradient of [**1.0**] <**Insert value**> when tested according to ASTM D 4716.

2. Nominal Size: 18 inches (457 mm) high by approximately 1 inch (25 mm) thick.

a. Minimum In-Plane Flow: [**45 gpm (170 L/min.)**] <**Insert value**> at hydraulic gradient of [**1.0**] <**Insert value**> when tested according to ASTM D 4716.

3. Filter Fabric: PP geotextile.
4. Fittings: HDPE with combination NPS 4 and NPS 6 (DN 100 and DN 150) outlet connection.
5. Couplings: Corrugated HDPE band.

D. Mesh Fabric Drainage Conduits: Prefabricated geocomposite with plastic-filament drainage core wrapped in geotextile filter fabric. Include fittings for bends and connection to drainage piping.

1. Nominal Size: 6 inches (150-mm) high by approximately 0.9 inch (23 mm) thick.

a. Minimum In-Plane Flow: [**2.4 gpm (9.1 L/min.)**] <**Insert value**> at hydraulic gradient of [**1.0**] <**Insert value**> when tested according to ASTM D 4716.

2. Filter Fabric: Nonwoven geotextile made of PP or polyester fibers or combination of both. Flow rates range from 120 to 200 gpm/sq. ft. (81 to 136 L/s per sq. m) when tested according to ASTM D 4491.

E. Ring Fabric Drainage Conduits: Drainage conduit with HDPE rings-in-grid pattern drainage core, for field-applied geotextile filter fabric. Include fittings for bends and connection to drainage piping.

1. Nominal Size: 18 inches (0.5 m) high by 1 inch (25 mm) thick.

a. Minimum In-Plane Flow: [**82 gpm (310 L/min.)**] <**Insert value**> at hydraulic gradient of [**1.0**] <**Insert value**> when tested according to ASTM D 4716.

2. Nominal Size: 36 inches (1 m) high by 1 inch (25 mm) thick.

a. Minimum In-Plane Flow: [**164 gpm (621 L/min.)**] <**Insert value**> at hydraulic gradient of [**1.0**] <**Insert value**> when tested according to ASTM D 4716.

3. Filter Fabric: Comply with requirements for flat geotextile filter fabric specified in Part 2 "Geotextile Filter Fabrics" Article.

2.3 DRAINAGE PANELS

A. Molded-Sheet Drainage Panels: Prefabricated geocomposite, [**36 to 60 inches (915 to 1525 mm)**] <**Insert dimension**> wide with drainage core faced with geotextile filter fabric.

1. Drainage Core: Three-dimensional, nonbiodegradable, molded PP.

a. Minimum Compressive Strength: [**10,000 lbf/sq. ft. (479 kPa)**] [**15,000 lbf/sq. ft. (718 kPa)**] [**18,000 lbf/sq. ft. (862 kPa)**] [**21,000 lbf/sq. ft. (1005 kPa)**] <**Insert value**> when tested according to ASTM D 1621.
b. Minimum In-Plane Flow Rate: [**2.8 gpm/ft. (35 L/min. per m)**] [**7 gpm/ft. (87 L/min. per m)**] [**15 gpm/ft. (186 L/min. per m)**] <**Insert value**> of unit width at hydraulic gradient of [**1.0**] <**Insert value**> and compressive stress of [**25 psig (172 kPa)**] <**Insert value**> when tested according to ASTM D 4716.

2. Filter Fabric: Nonwoven needle-punched geotextile, manufactured for subsurface drainage, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with the following properties determined according to AASHTO M 288:

a. Survivability: [**Class 1**] [**Class 2**] [**Class 3**].
b. Apparent Opening Size: [**No. 40 (0.425-mm)**] [**No. 60 (0.25-mm)**] [**No. 70 (0.212-mm)**] sieve, maximum.
c. Permittivity: [**0.5**] [**0.2**] [**0.1**] per second, minimum.

3. Filter Fabric: Woven geotextile fabric, manufactured for subsurface drainage, made from polyolefins or polyesters; with elongation less than 50 percent; complying with the following properties determined according to AASHTO M 288:

a. Survivability: [**Class 1**] [**Class 2**] [**Class 3**].

b. Apparent Opening Size: [**No. 40 (0.425-mm)**] [**No. 60 (0.25-mm)**] [**No. 70 (0.212-mm)**] [**No. 30 (0.6-mm)**] sieve, maximum.
c. Permittivity: [**0.5**] [**0.2**] [**0.1**] [**0.02**] per second, minimum.

4. Film Backing: Polymeric film bonded to drainage core surface.

B. Mesh Fabric Drainage Panels: Prefabricated geocomposite with drainage core faced with geotextile filter fabric.

1. Drainage Core: Open-construction, resilient, plastic-filament mesh, approximately 0.4 inches (10.2 mm) thick.

a. Minimum In-Plane Flow Rate: [**2.4 gpm/ft. (30 L/min. per m)**] <**Insert value**> of unit width at hydraulic gradient of [**1.0**] <**Insert value**> and normal pressure of 25 psig (172 kPa) when tested according to ASTM D 4716.

2. Filter Fabric: Nonwoven geotextile of PP or polyester fibers or combination of both. Flow rates range from 120 to 200 gpm/sq. ft. (81 to 136 L/s per sq. m) when tested according to ASTM D 4491.

C. Net Fabric Drainage Panels: Prefabricated geocomposite with drainage core faced with geotextile filter fabric.

1. Drainage Core: Three-dimensional, PE nonwoven-strand geonet, approximately 0.25 inches (6 mm) thick.

a. Minimum In-Plane Flow Rate: [**2.4 gpm/ft. (30 L/min. per m)**] [**5 gpm/ft. (62 L/min. per m)**] <**Insert value**> of unit width at hydraulic gradient of [**1.0**] <**Insert value**> and normal pressure of 25 psig (172 kPa) when tested according to ASTM D 4716.

2. Filter Fabric: Nonwoven geotextile of PP or polyester fibers or combination of both. Flow rates range from 120 to 200 gpm/sq. ft. (81 to 136 L/s per sq. m) when tested according to ASTM D 4491.

D. Ring Fabric Drainage Panels: Drainage-core panel for field application of geotextile filter fabric.

1. Drainage Core: Three-dimensional, HDPE rings-in-grid pattern, approximately 1 inch (25 mm) thick.

a. Minimum In-Plane Flow Rate: [**40 gpm/ft. (500 L/min. per m)**] <**Insert value**> of unit width at hydraulic gradient of [**1.0**] <**Insert value**> and normal pressure of 25 psig (172 kPa) when tested according to ASTM D 4716.

2.4 SOIL MATERIALS

A. Soil materials are specified in Division 31 Section "Earth Moving."

2.5 WATERPROOFING FELTS

A. Material: Comply with [**ASTM D 226, Type I, asphalt**] [**or**] [**ASTM D 227, coal-tar**]-saturated organic felt.

2.6 GEOTEXTILE FILTER FABRICS

A. Description: Fabric of PP or polyester fibers or combination of both, with flow rate range from 110 to 330 gpm/sq. ft. (4480 to 13 440 L/min. per sq. m) when tested according to ASTM D 4491.

B. Structure Type: Nonwoven, needle-punched continuous filament.

1. Survivability: AASHTO [**M 288 Class 2**] <**Insert class**>.
2. Styles: Flat and sock.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces and areas for suitable conditions where subdrainage systems are to be installed.

B. If subdrainage is required for landscaping, locate and mark existing utilities, underground structures, and aboveground obstructions before beginning installation and avoid disruption and damage of services.

C. Verify that drainage panels installed as part of foundation wall waterproofing is properly positioned to drain into subdrainage system.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

3.3 FOUNDATION DRAINAGE INSTALLATION

A. Place impervious fill material on subgrade adjacent to bottom of footing after concrete footing forms have been removed. Place and compact impervious fill to dimensions indicated, but not less than 6 inches (150 mm) deep and 12 inches (300 mm) wide.

B. Lay flat-style geotextile filter fabric in trench and overlap trench sides.

C. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than 4 inches (100 mm).

D. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with [**adhesive**] [**or**] [**tape**].

E. Install drainage piping as indicated in Part 3 "Piping Installation" Article for foundation subdrainage.

F. Add drainage course to width of at least 6 inches (150 mm) on side away from wall and to top of pipe to perform tests.

G. After satisfactory testing, cover drainage piping to width of at least 6 inches (150 mm) on side away from footing and above top of pipe to within 12 inches (300 mm) of finish grade.

H. Install drainage course and wrap top of drainage course with flat-style geotextile filter fabric.

I. Place layer of [**flat-style geotextile filter fabric**] [**waterproofing felt**] over top of drainage course, overlapping edges at least 4 inches (100 mm).

J. Install drainage panels on foundation walls as follows:

1. Coordinate placement with other drainage materials.
2. Lay perforated drainage pipe at base of footing. Install as indicated in Part 3 "Piping Installation" Article.
3. Separate 4 inches (100 mm) of fabric at beginning of roll and cut away 4 inches (100 mm) of core. Wrap fabric around end of remaining core.
4. Attach panels to wall beginning at subdrainage pipe. Place and secure molded-sheet drainage panels, with geotextile facing away from wall.

K. Place backfill material over compacted drainage course. Place material in loose-depth layers not exceeding 6 inches (150 mm). Thoroughly compact each layer. Final backfill to finish elevations and slope away from building.

3.4 UNDERSLAB DRAINAGE INSTALLATION

A. Excavate for underslab drainage system after subgrade material has been compacted but before drainage course has been placed. Include horizontal distance of at least 6 inches (150 mm) between drainage pipe and trench walls. Grade bottom of trench excavations to required slope, and compact to firm, solid bed for drainage system.

B. Lay flat-style geotextile filter fabric in trench and overlap trench sides.

C. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than 4 inches (100 mm).

D. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with [**adhesive**] [**or**] [**tape**].

E. Install drainage piping as indicated in Part 3 "Piping Installation" Article for underslab subdrainage.

F. Add drainage course to width of at least 6 inches (150 mm) on side away from wall and to top of pipe to perform tests.

G. After satisfactory testing, cover drainage piping with drainage course to elevation of bottom of slab, and compact and wrap top of drainage course with flat-style geotextile filter fabric.

H. Install horizontal drainage panels as follows:

1. Coordinate placement with other drainage materials.
2. Lay perforated drainage pipe at inside edge of footing.
3. Place drainage panel over drainage pipe with core side up. Peel back fabric and wrap fabric around pipe. Locate top of core at bottom elevation of floor slab.

4. Butt additional panels against other installed panels. If panels have plastic flanges, overlap installed panel with flange.

3.5 RETAINING-WALL DRAINAGE INSTALLATION

A. Lay flat-style geotextile filter fabric in trench and overlap trench sides.

B. Place supporting layer of drainage course over compacted subgrade to compacted depth of not less than 4 inches (100 mm).

C. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with [**adhesive**] [**or**] [**tape**].

D. Install drainage piping as indicated in Part 3 "Piping Installation" Article for retaining-wall subdrainage.

E. Add drainage course to width of at least 6 inches (150 mm) on side away from wall and to top of pipe to perform tests.

F. After satisfactory testing, cover drainage piping to width of at least 6 inches (150 mm) on side away from footing and above top of pipe to within 12 inches (300 mm) of finish grade.

G. Place drainage course in layers not exceeding 3 inches (75 mm) in loose depth; compact each layer placed and wrap top of drainage course with flat-style geotextile filter fabric.

H. Place layer of [**flat-style geotextile filter fabric**] [**waterproofing felt**] over top of drainage course, overlapping edges at least 4 inches (100 mm).

I. Install drainage panels on wall as follows:

1. Coordinate placement with other drainage materials.
2. Lay perforated drainage pipe at base of footing as described elsewhere in this Specification. Do not install aggregate.
3. If weep holes are used instead of drainage pipe, cut 1/2-inch- (13-mm-) diameter holes on core side at weep-hole locations. Do not cut fabric.
4. Mark horizontal calk line on wall at a point 6 inches (150 mm) less than panel width above footing bottom. Before marking wall, subtract footing width.
5. Separate 4 inches (100 mm) of fabric at beginning of roll and cut away 4 inches (100 mm) of core. Wrap fabric around end of remaining core.
6. Attach panel to wall at horizontal mark and at beginning of wall corner. Place core side of panel against wall. Use concrete nails with washers through product. Place nails from 2 to 6 inches (50 to 150 mm) below top of panel, approximately 48 inches (1200 mm) apart.[**Construction adhesives, metal stick pins, or double-sided tape may be used instead of nails.**] Do not penetrate waterproofing. Before using adhesives, discuss with waterproofing manufacturer.
7. If another panel is required on same row, cut away 4 inches (100 mm) of installed panel core and wrap fabric over new panel.
8. If additional rows of panel are required, overlap lower panel with 4 inches (100 mm) of fabric.
9. Cut panel as necessary to keep top 12 inches (300 mm) below finish grade.
10. For inside corners, bend panel. For outside corners, cut core to provide 3 inches (75 mm) for overlap.

J. Fill to Grade: Place satisfactory soil fill material over compacted drainage course. Place material in loose-depth layers not exceeding 6 inches (150 mm). Thoroughly compact each layer. Fill to finish grade.

3.6 LANDSCAPING DRAINAGE INSTALLATION

A. Provide trench width to allow installation of drainage conduit. Grade bottom of trench excavations to required slope, and compact to firm, solid bed for drainage system.

B. Lay flat-style geotextile filter fabric in trench and overlap trench sides.

C. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than 4 inches (100 mm).

D. Install drainage conduits as indicated in Part 3 "Piping Installation" Article for landscaping subdrainage with horizontal distance of at least 6 inches (150 mm) between conduit and trench walls. Wrap drainage conduits without integral geotextile filter fabric with flat-style geotextile filter fabric before installation. Connect fabric sections with [**adhesive**] [**or**] [**tape**].

E. Add drainage course to top of drainage conduits.

F. After satisfactory testing, cover drainage conduit to within 12 inches (300 mm) of finish grade.

G. Install drainage course and wrap top of drainage course with flat-style geotextile filter fabric.

H. Place layer of [**flat-style geotextile filter fabric**] [**waterproofing felt**] over top of drainage course, overlapping edges at least 4 inches (100 mm).

I. Fill to Grade: Place satisfactory soil fill material over drainage course. Place material in loose-depth layers not exceeding 6 inches (150 mm). Thoroughly compact each layer. Fill to finish grade.

3.7 PIPING INSTALLATION

A. Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering material. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions and other requirements indicated.

1. Foundation Subdrainage: Install piping level and with a minimum cover of [**36 inches (915 mm)**] <**Insert dimension**> unless otherwise indicated.
2. Underslab Subdrainage: Install piping level.
3. Plaza Deck Subdrainage: Install piping level.
4. Retaining-Wall Subdrainage: When water discharges at end of wall into stormwater piping system, install piping level and with a minimum cover of [**36 inches (915 mm)**] <**Insert dimension**> unless otherwise indicated.
5. Landscaping Subdrainage: Install piping pitched down in direction of flow, at a minimum slope of [**0.5**] <**Insert value**> percent and with a minimum cover of [**36 inches (915 mm)**] <**Insert dimension**> unless otherwise indicated.
6. Lay perforated pipe with perforations down.
7. Excavate recesses in trench bottom for bell ends of pipe. Lay pipe with bells facing upslope and with spigot end entered fully into adjacent bell.

B. Use increasers, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.

C. Install thermoplastic piping according to ASTM D 2321.

3.8 PIPE JOINT CONSTRUCTION

A. Join perforated PE pipe and fittings with couplings according to ASTM D 3212 with loose banded, coupled, or push-on joints.

B. Join perforated PVC sewer pipe and fittings according to ASTM D 3212 with loose bell-and-spigot, push-on joints.

C. Special Pipe Couplings: Join piping made of different materials and dimensions with special couplings made for this application. Use couplings that are compatible with and fit materials and dimensions of both pipes.

3.9 BACKWATER VALVE INSTALLATION

A. Comply with requirements for backwater valves specified in Division 33 Section "Storm Utility Drainage Piping."

B. Install horizontal backwater valves in header piping downstream from perforated subdrainage piping.

C. Install horizontal backwater valves in piping[**in manholes or pits**] where indicated.

3.10 CLEANOUT INSTALLATION

A. Comply with requirements for cleanouts specified in Division 33 Section "Storm Utility Drainage Piping."

B. Cleanouts for [**Foundation**] [**Retaining-Wall**] [**and**] [**Landscaping**] Subdrainage:

1. Install cleanouts from piping to grade. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.
2. In vehicular-traffic areas, use NPS 4 (DN 100) cast-iron soil pipe and fittings for piping branch fittings and riser extensions to cleanout. Set cleanout frames and covers in a cast-in-place concrete anchor, [**18 by 18 by 12 inches (450 by 450 by 300 mm)**] <**Insert dimensions**> deep. Set top of cleanout flush with grade.
3. In nonvehicular-traffic areas, use NPS 4 (DN 100) [**cast-iron**] [**PVC**] pipe and fittings for piping branch fittings and riser extensions to cleanout. Set cleanout frames and covers in a cast-in-place concrete anchor, [**12 by 12 by 4 inches (300 by 300 by 100 mm)**] <**Insert dimensions**> deep. Set top of cleanout [**1 inch (25 mm)**] [**2 inches (50 mm)**] <**Insert dimension**> above grade.
4. Comply with requirements for concrete specified in [**Division 03 Section "Cast-in-Place Concrete."**] [**Division 03 Section "Miscellaneous Cast-in-Place Concrete."**]

C. Cleanouts for Underslab Subdrainage:

1. Install cleanouts and riser extensions from piping to top of slab. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.
2. Use NPS 4 (DN 100) cast-iron soil pipe and fittings for piping branch fittings and riser extensions to cleanout flush with top of slab.

3.11 CONNECTIONS

A. Comply with requirements for piping specified in Division 33 Section "Storm Utility Drainage Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect low elevations of subdrainage system to[**building's**] solid-wall-piping storm drainage system.

C. Where required, connect low elevations of [**foundation**] [**underslab**] subdrainage to stormwater sump pumps. Comply with requirements for sump pumps specified in Division 22 Section "Sump Pumps."

3.12 IDENTIFICATION

A. Arrange for installation of green warning tapes directly over piping. Comply with requirements for underground warning tapes specified in specified in Division 31 Section "Earth Moving."

1. Install PE warning tape or detectable warning tape over ferrous piping.
2. Install detectable warning tape over nonferrous piping and over edges of underground structures.

3.13 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. After installing drainage course to top of piping, test drain piping with water to ensure free flow before backfilling.
2. Remove obstructions, replace damaged components, and repeat test until results are satisfactory.

B. Drain piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.14 CLEANING

A. Clear interior of installed piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of each day or when work stops.

END OF SECTION 334600

APPENDIX A

HAZARDOUS MATERIALS REPORT AND ABATEMENT SPECIFICATIONS

TERRY CLARK CONSULTING, LLC

ASBESTOS SURVEY
&
PAINT SAMPLING
EUREKA VETERANS BUILDING
1018 "H" STREET
EUREKA, CALIFORNIA



December 31, 2014

Project # 1400303

Prepared For:
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Public Works Department
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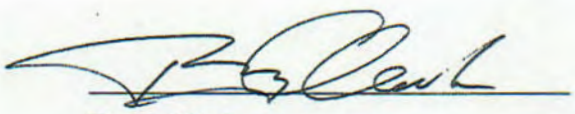
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ASBESTOS SURVEY
& PAINT SAMPLING
EUREKA VETERANS BUILDING
1018 "H" STREET
EUREKA, CALIFORNIA

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December 31, 2014

ASBESTOS SURVEY
&
PAINT SAMPLING
EUREKA VETERANS BUILDING
1018 "H" STREET
EUREKA, CALIFORNIA

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ASBESTOS SURVEY
&
PAINT SAMPLING
EUREKA VETERANS BUILDING
1018 "H" STREET
EUREKA, CALIFORNIA

1.0 PURPOSE

Between September 19 and December 4, 2014, an asbestos sampling survey was conducted on interior and exterior materials of the above-referenced building that may be disturbed for the repair of seismic damage. See Figures, Appendix A.

This survey was conducted pursuant to the requirements of the California Health & Safety Code for renovation work, for compliance with the EPA National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations concerning renovation and/or demolition activities (40 CFR, Part 61, Subpart M) and for compliance with Cal/OSHA regulations (8 CCR 1529) for worker protection. As a "public" building, this site is subject to the EPA NESHAP regulations for renovation and/or demolition work. Compliance with the Cal/OSHA Lead in Construction Standard Title 8 CCR Section 1532.1 concerning the disturbance of painted materials for this project has also been evaluated herein.

The persons completing this survey and report are certified by the California Division of Occupational Safety & Health (DOSH) as Asbestos Building Inspectors and as a DOSH Certified Site Surveillance Technician and/or a Certified Asbestos Consultant (CAC), and a California Department of Public Health certified Lead Inspector/Assessor.

2.0 EXECUTIVE SUMMARY

This structure was built in 1930. The exterior shell of the building is of concrete construction, with three levels; a basement level, a main (ground) floor, and a "mezzanine" (2^{nd} level). The roof has several levels, which are finished with built-up roof membranes over concrete.

Interior walls, with a few exceptions, are plaster, as are many ceilings. The plaster is usually over lath, with some over expanded metal mesh. Several rooms are finished with gypsum drywall. The floor substrates for the main level and the mezzanine are typically wood. The basement floor substrate is concrete. Floor finishes include wood, sheet floorings, synthetic terrazzo, and vinyl floor tile (VFT).The windows in the building are metal framed.

There is a significant amount of asbestos containing Thermal Insulation System (TSI) on piping, which is well exposed in basement rooms, and likely is present, but not readily visible, in the walls of the main level, especially in the kitchen and restroom areas. Much of the TSI is brown card-board-like "air-cell" wrapping, under white jacketing. Typically, the elbows on pipe TSI are insulated with asbestos containing compounds.

During the survey, a total of 240 bulk samples were collected from suspect materials. All sample locations are indicated on attached Figures 1-5, Appendix A. The materials sampled and analyzed for asbestos content are summarized below

10	Gypsum drywall/joint compound.
1	Gypsum drywall only
17	Plaster, skim coat & rough coat.
2	Plaster, top/middle/rough coat.
29	Plaster, single coat.
1	Plaster of Paris, decorative.
2	Mortar on brickwork, chimney.
2	Mortar on brickwork, chimney.
1	Tile grout.
1	Tile mortar bed.
1	Synthetic terrazzo baseboard
1	Synthetic terrazzo flooring
8	Baseboard mastics.
7	Sheet floorings (linoleums).
16	Vinyl floor tile (VFT)/mastics.
3	Carpet glue.
4	Carpet glue with floor mastics.
1	Floor sizing.
1	Floor sizing & glue.
1	Floor sealant.
2	Tar waterproof coatings.
1	Panel glue.
1	Wall paper.
1	Surfacing, white, on attic HVAC duct.
1	Felt, HVAC register gasket.
2	Cardboard, door fill & wall sheet.
1	Transite pipe.
3	Ceiling tile.
2	Ceiling tile mastic.
12	Concrete.
1	Decorative concrete.
1	Asphalt paving.
16	Window putty.
4	Roofing membrane, built-up.
2	Fiberboard.
22	Roof patching compound.
3	Silver roof paint.
4	Silver paint & black tar.
1	Roof caulking.
4	Roof tar.
2	Roof mastics.

19 TSI elbows.
16 TSI pipe insulation.
240 samples

The bulk samples were submitted to an NVLAP accredited laboratory, AmeriSci LA (Carson, CA) for the analysis of asbestos content by Polarized Light Microscopy (PLM). Sample locations are shown on Figures 1-5, Appendix A. All sample/analytic data is summarized in Table 2, located in Appendix B. The sample Chains of Custody and Laboratory Reports are also included in Appendix B.

Two materials that tested positive for asbestos under initial PLM analyses were re-submitted to the same laboratory for more accurate Point Count analyses. Since the initial PLM analyses are based upon a visual estimation of percentage content, a more accurate determination of asbestos content, by percentage, is often required for some agency determinations and for waste characterization. The Point Count analyses are listed below.

Point Count Asbestos Analyses

Sample ID#	Material	Initial PLM Result (visually estimated)	400 Point Count Analysis	1,000 Point Count Analysis
1018-85	Joint cmpd/gypsum drywall	2% CH	<0.25% CH	--
1018-178	Plaster, rough coat	<1% CH	--	<0.1% CH

-- = Not analyzed
CH = Chrysotile asbestos

The two following definitions are referred to in this report: *Asbestos Containing Construction Materials (ACCM)* contain asbestos in amounts between 0.1% and 1.0%. *Asbestos Containing Materials (ACM)* are materials that contain >1% asbestos.

Two materials in this building are categorized herein as ACCM, as summarized below.

ACCM:

- Gypsum drywall/joint compound.
- Plaster surfacing on one basement room concrete wall (see photo in Fig. 9).

This site does contain some materials defined as ACM; some of which are categorized as RACM and some which are not. Some site ACM are categorized as "non-friable" types of asbestos that will remain "non-friable" if properly abated and therefore are not deemed to be "regulated" ACM (RACM) under the EPA NESHAP regulations. These are summarized below:

ACM, but not defined as RACM:

- 9X9 VFT/mastic.
- 12x12 VFT/mastic.

- Roof patching compounds (see photos in Fig. 10).
- Transite piping.
- Window putty.

Three other types of ACM found in this building are categorized as RACM, as summarized below. A NESHAP Notification must be filed with the NCUAQMD at least 10 working days prior to the abatement of RACM. The abatement contractor will typically file that notification.

ACM that are categorized as RACM:

- Ceiling plaster, several main floor rooms (see photo in Fig. 9).
- Linoleums, several rooms.
- TSI pipe insulation.

The ACM and ACCM found at this site are listed in Table 1 below, including the agency and waste categorizations of each. Locations of ACM and ACCM are shown on Figures 6-8, Appendix A.

Abatement of ACM or ACCM is not necessarily required by any agency, except to the extent that those materials would be disturbed for repair, renovation, or demolition work, or if deterioration of ACM or ACCM presents a liability hazard. The disturbance of all ACM and ACCM is always subject to regulation under Cal/OSHA, and any disturbance and/or abatement of ACM and ACCM must be performed by a licensed asbestos abatement contractor, and properly disposed. In addition to Cal/OSHA regulations, some types of ACM are subject to EPA NESHAP regulations and some types are not, as explained further below.

There are two major sets of regulations governing the abatement and handling of asbestos; OSHA (Cal/OSHA) regulations that are designed to protect all workers (employees) from adverse exposure to asbestos and the EPA NESHAP regulations, which protect air quality. All employees are covered by OSHA regulations. Commercial and public buildings are subject to NESHAP regulations concerning the disturbance of asbestos by renovation and/or demolition activities. This building is subject to the EPA NESHAP regulations, as enforced by the North Coast Unified Air Quality Management District (NCUAQMD) located in Eureka, California.

As a public building, this site is subject to the EPA NESHAP asbestos regulations concerning renovation and/or demolition work. NESHAP requires an asbestos survey to identify the possible presence of any *regulated asbestos containing materials* (RACM), as defined under NESHAP, prior to any renovation and/or demolition work at "subject" sites. That requirement has been met with this report. Further, NESHAP regulations require that a NESHAP Notification be filed with the local NESHAP enforcement agency, the North Coast Unified Air Quality Management District (NCUAQMD), at least 10 working days prior to any demolition work, and prior to the abatement of any RACM above certain threshold quantities. The NESHAP Notifications need to include a copy of this report and a $200 filing fee for demolition and another $200 for abatement of RACM. The NCUAQMD is located in Eureka, California. A copy of the NESHAP Notification package is attached in Appendix C.

If suspect materials that were not covered by this survey are encountered by the contractor during this project, the disturbance of such materials should cease until such materials are surveyed and/or sampled for asbestos.

TABLE 1
ASBESTOS IDENTIFICATIONS & CLASSIFICATIONS
Eureka Veteran's Building, 1018 "H" Street, Eureka, CA

MATERIALS Containing Asbestos	LOCATION	QUANTITY	ASBESTOS CONTENT & TYPE	OSHA CLASSIFICATION	NESHAP CATEGORY	Waste Disposal Classification
Drywall/Joint Compound	Bsmt Room 2 Main Floor Rm. 39;	1,130 SF & 225 SF	2% CH by initial PLM. <0.25% *on* composite GB/JC by 400 Point Count .	ACCM, Class II abatement required where disturbed	ACCM Not RACM*	Non-Friable asbestos waste or general construction debris
Plaster surfacing	Bsmt., on north wall Rm. 13 (on concrete wall)	856 SF	<1% CH by initial PLM. <0.25% *on* composite GB/JC by 400 Point	ACCM, Class II abatement required where disturbed	Category II Non-Friable cementitous Not RACM*	As above
Plaster, top coat, "punky" light gray	Ceilings, Main Floor Rm. 44 & under 1x1 ceiling tiles in Rm. 30	3,050 SF	8% CH	ACM, Class I abatement required where disturbed	Category II Cementitous ACM, will become "friable" RACM	"Friable" asbestos waste
9" x9" VFT green & brown, and black mastic	Bsmt, Rm. 2	480 SF	VFT=4% CH Mastic=5% CH	ACM, Class II abatement required where disturbed	Category I Non-Friable. Not RACM*	Non-friable asbestos waste
12" x 12" VFT, two types, & black mastic	Main Floor Rm. 42 Bsmt. Rms. 4, 18	120 SF & 345 SF	VFT = 3% CH Mastic = 5% CH	ACM, Class II abatement required where disturbed	Category I Non-Friable. Not RACM*	Non-friable asbestos waste

TABLE 1
ASBESTOS IDENTIFICATIONS & CLASSIFICATIONS
Eureka Veteran's Building, 1018 "H" Street, Eureka, CA

MATERIALS Containing Asbestos	LOCATION	QUANTITY	ASBESTOS CONTENT & TYPE	OSHA CLASSIFICATION	NESHAP CATEGORY	Waste Disposal Classification
2 sheet floorings (linoleum) dark gray mosaic & beige/white	Bsmt. Rm. 19 & top layer in Main floor hall, Rm. 23	47 SF & 600 SF	Dk gray mosaic=20% CH Beige/white = 3% CH	ACM, Class II abatement required where disturbed	Friable, RACM	"Friable" asbestos waste
Tar roof patching (some have silver surface paint and/or green paint)	All roofs	1,100 SF	2%-3% CH	ACM, Class II abatement required where disturbed	Category I Non-Friable. Not RACM*	Non-friable asbestos waste
Window Putty	Bsmt. Rm. 11	13.5 SF	2% CH	ACM, Class II abatement required where disturbed	Category II Non-friable Not RACM*	Non-friable asbestos waste
Transite piping	Bsmt. Rm. 12, 8" dia. & Bsmt Rm. 7 Main Flr. Rm. 39, thru Mezz. Rm. 47 to roof vent. 8" dia.	50 LF-	35% CH/5% CR & PACM	ACM, Class II abatement required where disturbed	Category II Non-Friable. Not RACM*	Non-friable asbestos waste

TABLE 1
ASBESTOS IDENTIFICATIONS & CLASSIFICATIONS
Eureka Veteran's Building, 1018 "H" Street, Eureka, CA

MATERIALS Containing Asbestos	LOCATION	QUANTITY	ASBESTOS CONTENT & TYPE	OSHA CLASSIFICATION	NESHAP CATEGORY	Waste Disposal Classification
TSI, "air-cell" wrap on pipe runs & white powdery compound on elbows	Bsmt. Rooms 8,13,14,15	3" dia. = 4 elbows (runs are fiberglass) 4" dia. air-cell= 225 LF & 28 elbows 5" dia. air-cell =150 LF & 20 elbows 6" dia. air-cell = 60 LF & 5 elbows 5" dia. white cmpd TSI = 14 LF	Air-cell TSI 35% - 40% CH TSI elbows are 10% - 20% CH with Some AM at 10% and CR at 3%	ACM, Class I abatement required where disturbed	"Friable" RACM	"Friable" asbestos waste

SF = Square Feet. LF = Lineal Feet
CH = Chrysotile asbestos CR = Crocidolite Asbestos AM = Amosite asbestos
ACM = Asbestos Containing Materials, containing >1% asbestos.
PACM = Presumed ACM.
ACCM = Asbestos Containing Construction Materials, asbestos content of 0.1% to 1.0%.
RACM =Regulated ACM under NESHAP regulations.
RACM* = Not considered as RACM if asbestos content is 1% or less, or if not made friable by disturbance.
TBD = Abatement quantity to be determined for actual remediation work.

2.1 EVALUATION/DISTURBANCE OF PAINTED MATERIALS

Twenty representative samples of paint and/or stain were collected from the site and submitted for the laboratory analysis of lead content by a laboratory that complies with and is certified under the Environmental Laboratory Accreditation Program (ELAP) of the California Department of Health Services. The results are summarized in Table 3, Appendix B.

The paint samples included paint and/or stain from thirteen interior components and seven exterior components. The interior component substrates included wood, plaster, and concrete. The exterior component substrates included wood, concrete and metal

The reliability of paint samples collected from concrete or plaster surfaces is sometimes questionable due to the possible inclusion of such substrate materials in the paint samples, which are analyzed for possible lead content "by weight percentage". Paint samples collected from metal or wood substrates are generally deemed to be more reliable. However, field sampling personnel were relatively confident that sampling from the concrete and plaster substrates was fairly accurate.

The thirteen interior components sampled included the following:

- Walls (3)
- Attic hatch trim.
- Doors (3)
- Door jamb.
- Door trim.
- Window sill.
- Window trim.
- Baseboard.
- Cabinet.

For the thirteen interior samples, the lead content in one sample was found to be "less than detectable" (<100 ppm lead), essentially characterized as "lead free". Nine other samples ranged between 720 ppm and 4,700 ppm. These nine paints are categorized as *Lead Containing Surface Coatings* (LCSC), defined as paints ranging between "detectable" amounts of lead (>100 ppm) and 4,999 ppm lead. Three paint samples were found to be *Lead Based Paint* (LBP), which are paints with lead contents above 5,000 parts per million (ppm). These three paints ranged from 5,700 ppm to 29,000 ppm lead.

The seven exterior components sampled included the following:

- Wall (2)
- Ceiling (concrete)
- Door
- Handrail
- Window sill (2)

Of the seven exterior paint coatings, one was found to be lead free (<100 ppm lead), three were found to be LCSC, ranging between 520 ppm and 2,900 ppm lead, and three were found to be LBP, ranging between 5,800 ppm to 26,000 ppm lead.

The disturbance of LCSC and/or LBP by Cal/OSHA defined "trigger tasks" require compliance with the provisions of the Cal/OSHA Lead in Construction Standard Title 8, CCR Section 1532.1 for worker protection. The Cal/OSHA "trigger tasks" include, among other actions, sanding, cutting, scraping, and hand demolition; actions that might create potentially harmful lead containing dust. Paints that are found to be "lead free" (<100 ppm) are not subject to restrictions for disturbance under Cal/OSHA regulations.

The disposal of painted materials to landfills is subject to State and Federal regulations. Typically, any waste stream containing painted materials must be sampled and submitted for laboratory characterization of lead content and possibly for leaching potential prior to disposal. Typically, any painted metal components, regardless of lead content, can be diverted for recycling without testing.

3.0 ASBESTOS SURVEY METHODOLOGY

Representative suspect asbestos-containing materials were bulk sampled in general accordance with sampling guidelines established by the Environmental Protection Agency and 29 CFR 1926.1101. The following summarizes the sampling procedures utilized.

- The general location of each sample was marked on a corresponding sketch.
- These materials were then categorized into homogeneous materials. A homogeneous material is defined as being uniform in texture, color, and date of application.
- A sampling scheme was developed based upon the location and quantity of the various homogeneous materials. Sample numbers were recorded on data sheets and each sample was categorized as a miscellaneous material (MM), surfacing material (SM), or thermal system insulation (TSI).
- Bulk samples were collected by a State of California, Division of Occupational Health & Safety certified Asbestos Building Inspector.
- Appropriate sampling tools and leak tight sample containers were used. Bulk sampling tools were decontaminated to prevent the spread of secondary contamination to subsequent bulk samples.
- Each bulk sample was individually numbered and recorded on a Bulk Sample Log and sent to a laboratory for analysis by Polarized Light Microscopy (PLM) following 40 CFR 763 procedures and/or other analysis if needed. The laboratory used for asbestos analyses is NVLAP and CA ELAP accredited.

4.0 CONCLUSIONS & RECOMMENDATIONS FOR ASBESTOS

4.1 Site Specific Information

ACCM Drywall/Joint Compound: The drywall in parts of the building contains ACM joint compound, estimated at <1% and 2% chrysotile asbestos by initial PLM analyses. Two composite samples of drywall/joint compound were re-submitted for a more accurate determination of actual asbestos content by 400 Point Count analyses, and was found to contain <1% asbestos. Being less than 1%, this is then not considered to be a regulated ACM (RACM) under NESHAP. While the ACCM designation excludes this material from regulation under NESHAP, Cal/OSHA regulations do not accept "composite" test results and still regards the joint compound to be ACM. In either case, it requires Class II abatement of the ACM joint compound by a licensed asbestos abatement contractor. In addition to all other Class II measures for drywall/joint compound abatement, it is recommended herein to require the use of negative air containment.

While the composite drywall/joint compound materials that have been determined to be ACCM (<1% asbestos) by Point Count analysis are often characterized as "general construction debris", due to the joint compound component (as ACM under Cal/OSHA), many asbestos abatement contractors will choose to dispose of the abated drywall materials as "non-friable" asbestos waste to avoid possible liabilities insofar as worker protection on the site, during transport, and disposal. If disposed of as "general construction debris", the drywall materials should still be handled/contained at the jobsite and transported as ACM up to the point of actual disposal at an accepting waste facility. Waste facilities typically must be informed when waste is ACCM.

ACCM Plaster Surfacing on Concrete Wall: A plaster surfacing layer on one concrete wall was found to contain <1% asbestos by Point Count analysis. Any disturbance of this ACCM must be done by a licensed asbestos abatement contractor. It is recommended to use Class II abatement methods and negative air containment. The abated material can be disposed of as "general construction debris" however, it should still be handled/contained at the jobsite and transported as ACM up to the point of actual disposal at an accepting waste facility. Waste facilities typically must be informed when waste is ACCM.

ACM Plaster, Ceiling: Several ceilings in main level rooms were found to contain plaster with 8% chrysotile asbestos. Where required for disturbance, this plaster must be abated by a licensed asbestos abatement contractor using Class I measures. Among other measures, this requires the use of full negative air containment and a portable shower for abatement workers. The abated waste must be disposed of as "friable" asbestos waste. This will require the use of a licensed "hazardous" waste hauler. In addition, a temporary hazardous waste generator number from the EPA for this site will need to be obtained for the site. An abatement contractor will typically handle these issues.

ACM Linoleum: The linoleum in several rooms is ACM. The asbestos is present in the papery backing layer of the linoleum. Thus that papery backing layer is considered to be "friable", and

the linoleum is categorized as "friable" RACM under NESHAP regulations. Prior to disturbance, ACM linoleum must be abated by a licensed asbestos abatement contractor using Class II asbestos abatement methods. It is recommended herein to augment the standard Class II abatement with negative air containment of the abatement area. The abated ACM linoleum must be disposed of as "friable" asbestos waste. This will require the use of a licensed "hazardous" waste hauler. In addition, a temporary hazardous waste generator number from the EPA for this site will need to be obtained for the site. An abatement contractor will typically handle these issues.

ACM Vinyl Floor Tile (VFT) with ACM Mastic: There are both 9 x 9 and 12x12 ACM VFT in this building, each with black mastic that was positive for asbestos. The VFTs contain 2%-3% asbestos, with 5% asbestos in the mastic on concrete substrates. Any disturbance or abatement of the ACM VFT/mastic must be done by a licensed asbestos abatement contractor prior to demolition. Class II asbestos abatement methods are required to remove the VFT where needed. The abated materials must, at a minimum, be disposed of as "non-friable" asbestos waste.

ACM Vinyl Floor Tile (VFT) & Mastics: There is some 12x12 ACM VFT in this building includes some 9x9 and some 12x12, with mastics that are also positive for asbestos. Any disturbance or abatement of the ACM VFT must be done by a licensed asbestos abatement contractor prior to demolition. Class II asbestos abatement methods are required to remove the VFT where needed. The abated materials must, at a minimum, be disposed of as "non-friable" asbestos waste.

ACM Transite Pipe: Abatement of transite piping must be by a licensed asbestos abatement contractor using Class II methods, with disposal as "non-friable" asbestos

ACM Window Putty: One of the window putty sample, from a basement restroom, was found to contain 2% chrysotile asbestos. All other fifteen samples of window putty from other locations were found to be non-detect for asbestos. It is presumed herein that the two windows in that one restroom only are ACM. Abatement must be done by a licensed asbestos abatement contractor.

ACM Roof Patching: Several types of ACM asphaltic roof patching are found on roofing components; some is black, some is black which weathered to gray, and some is painted with either silver or green paint. All ACM roof patch contains 2% - 3% chrysotile asbestos. The ACM patch is as sealants around various components, several surface patches, and/or roof to wall flashings. A abatement must be done prior to demolition. Disturbance of the ACM is subject to Cal/OSHA, requiring Class II abatement methods by a licensed asbestos abatement contractor prior to disturbance by demolition or renovation. Abated ACM roof patching must be disposed of as "non-friable" asbestos waste.

ACM TSI: Much of the TSI wrap on piping is brown cardboard-like ACM "air-cell" insulation; a small amount is white ACM compound, and a very small amount has fiberglass wrapping on runs. The TSI elbows on all piping is ACM compound. All abatement must be done by a licensed asbestos abatement contractor as Class I work and/or using glovebag methods. The abated waste must be disposed of as "friable" asbestos waste. This will require the use of a

licensed "hazardous" waste hauler. In addition, a temporary hazardous waste generator number from the EPA will need to be obtained for the site. An abatement contractor will typically handle these issues.

4.2 General Information

There are two major sets of regulations governing the possible abatement and handling of asbestos; the NESHAP regulations, which protect air quality, and the OSHA (Cal/OSHA) regulations that are designed to protect workers from adverse exposure to asbestos.

NESHAP: The Environmental Protection Agency (EPA) promulgated the NESHAP regulations specifically for the protection of air quality arising from the possible disturbance of asbestos by renovation and demolition activities. For the Counties of Humboldt, Del Norte, and Trinity, the enforcing agency is the *North Coast Unified Air Quality Management District (NCUAQMD)* located in Eureka, California.

The NESHAP regulations are most often concerned with the "friability" of asbestos, either by the inherent nature/form of the material, or, inasmuch as some materials may be "non-friable" in form, if it may become friable during disturbance. NESHAP often then requires the abatement of RACM from buildings prior to renovation and/or demolition. Under NESHAP, materials that contain 1% or less asbestos are not regulated, not considered as RACM, and are exempt from NESHAP regulations. NESHAP regulations are enforced either by local air quality agencies or by the regional EPA office.

Commercial properties and apartments containing five or more units on one parcel are subject to NESHAP requirements. Single family residences are generally exempt from NESHAP regulations, unless if ever used for commercial purposes or if two or more structures on a parcel are involved. A NESHAP Notification will be required for agency review prior to applicable renovations and for all demolition at this site. When applicable, the NESHAP Notification Form (Appendix C) must be filed with the enforcing agency at least 10 working days in advance of applicable renovations, any regulated asbestos abatement, and any demolition at this site. For compliance with NESHAP, an asbestos survey is required prior to these activities. This report, and any other subsequent asbestos report should be submitted along with the Notification Form. A $200 fee is generally required for the file/notification review, and an additional $200 fee is generally required if asbestos abatement is to be performed.

Cal/OSHA: The other major set of asbestos regulations was promulgated by OSHA, and in California, generally enforced by Cal/OSHA. Cal/OSHA regulations exist to protect workers from asbestos exposure, and are applicable to the any disturbance of ACM. Cal/OSHA does not require abatement of ACM, but regulates the abatement (or disturbance) of asbestos, requiring that employed workers be properly trained, equipped, and protected by special control measures during asbestos disturbance. Further, contractors conducting abatement work must be properly trained and licensed for asbestos abatement. Worker protection measures are not only required for disturbing ACM (>1% asbestos content), but for any amount of asbestos content at or above 0.1% (see ACCM definition, Section 5.0). Thus, some materials containing less than 1% asbestos

may not be regulated ACM (RACM) under NESHAP, but will still require compliance with OSHA regulations for the protection of workers disturbing any materials containing 0.1% asbestos or greater.

Class I Abatement: For abatement of "friable" ACM as listed in Table 1, Class I abatement methods are required by Cal/OSHA, at a minimum, for the protection of workers. Class I abatement requires all Class II measures plus full negative air containment of the work area, with a three stage decontamination unit, including a shower, or, for some applications, the use of glovebags, or other small negative pressure enclosures. All friable waste must be disposed of as very restrictive "friable" asbestos waste, using a licensed hazardous waste transporter, and a hazardous waste manifest. An EPA waste generator ID number must be obtained for the (abatement) site.

Class II Abatement: For abatement of all ACM listed in Table 1, Class II abatement methods are required, at a minimum, by Cal/OSHA for the protection of workers. Among other measures, Class II abatement procedures requires the use of a licensed asbestos contractor, trained asbestos abatement personnel, respiratory protection, the use of "wet methods" for effective dust suppression, and the use of "critical barriers", and other measures for the effective isolation of indoor work areas. "Visible" dust emissions must not be allowed to escape the work area. Bagged ACM roofing materials must be carefully lowered to the ground and must not be thrown from roofs.

Project Specifications: This report does not provide or constitute project specific "specifications" for any abatement or repair work on this site or for this project. This report provides data, and recommendations as based upon that available data, upon Federal, State and local regulations, and upon general industry practices and standards. To more fully protect their interests, some clients may wish to obtain detailed specifications for asbestos abatement projects, and may also wish to retain consultant oversight services for those projects.

Worker Exposure Testing: Under Cal/OSHA regulations, the abatement contractor is required to collect one or more personal air samples on their workers during the abatement work to monitor potential worker exposure to (asbestos) fibers, which are not to exceed the Permissible Exposure Limit (PEL). Those samples are submitted for lab analysis by Polarized Contrast Microscopy (PCM) and calculated to a time weighted eight-hour average. This testing is not to be confused with "clearance testing" as described below, but nonetheless, the results of the abatement contractor's exposure monitoring samples should be available to the client.

Clearances and Monitor Testing: With the exception of school sites, post-remedial "clearance" testing for air-borne asbestos in indoor work areas is not mandated by law, but is an option of the owner, as is a visual observation of post-abatement work by a third party. Post remedial air clearance testing by a qualified asbestos consultant is recommended for this site to verify adequate and safe completion of abatement work prior to re-occupation.

Disposal of Lead Containing Materials: Note that both State and Federal laws regulate the disposal of lead containing materials in landfills. However, the disposal of lead containing

materials is regulated by the Department of Toxic Substance Control (DTSC), not NESHAP. If the demolition debris contains painted components, it is typically required that the waste stream be tested for lead content in order to complete a waste disposal profile for an accepting landfill. Completion of a 'waste profile" typically requires that at least one representative bulk sample of the waste stream be collected and submitted for laboratory analysis of the lead content for waste characterization.

5.0 SUMMARY OF ASBESTOS REGULATIONS

Note that several definitions apply to materials containing asbestos.

Asbestos Containing Materials (ACM) contain >1% asbestos. Regulated ACM (RACM) is defined under NESHAP as being ACM which is "friable" or "non-friable" ACM which will be rendered friable by renovation and/or demolition activities.

Asbestos Containing Construction Materials (ACCM) contain asbestos in amounts between 0.1% and 1.0%. The disturbance of these materials are subject to Cal/OSHA regulations for the protection of workers. Asbestos content below 0.1% is considered to be "unclassified" and is not subject to any regulations.

There are six regulations that either require or imply that an asbestos inspection must be performed prior to work that will disturb ACM (disrupt the matrix, crumble, pulverize or generate visible debris). The first is the NESHAP regulation which requires an inspection prior to a demolition or a renovation project over the notification amounts. The second is the OSHA Asbestos Standard for the construction Industry which requires TSI, surfacing, and flooring to be treated as ACM if they are present in buildings constructed before 1981. The third stems from the Cal/OSHA Illness Injury Protection Program (IIPP) requirements for hazard determination and inspection. The fourth is the California Asbestos Notification Act. The fifth is the Hazard Substances Removal Contract requirements in California, while the sixth is California Labor Code 6501.9 which indicates the building owner must determine if asbestos containing construction material (ACCM) is present prior to contracted work.

According to the National Emission Standard for Hazardous Air Pollutants (NESHAP), ACM (>1% asbestos) must be removed prior to demolition or renovation if the material is considered to be a Regulated Asbestos Containing Material (RACM), and if it will be disturbed (made friable). RACM is generally defined as all "friable" ACM and "non-friable" ACM, which, by definition, contain >1% asbestos, that will become friable during renovation. The North Coast Unified Air Quality District must be notified for all demolitions and must be notified for any renovations that disturb RACM (friable asbestos, or non friable asbestos that will become friable) above the notification amounts. The EPA notification amounts are 160 square feet and 260 linear feet.

Building owners must notify employees and contractors working inside a building that the building contains asbestos. A Report of Use form must be filed with CAL/OSHA when a carcinogen is disturbed during renovation or demolition.

Building owners also have responsibilities to provide a safe work environment and must notify employees and contractors working inside a building known to contain asbestos. Two of these specific laws are the Asbestos Notification Act (California Health and Safety Code, Section 25915 et. seq.) and Proposition 65. Asbestos regulations are complicated and are subject to change. The intent of the following information is to advise you of some of the regulations that may affect you, but is not intended to be an all-encompassing discussion of asbestos regulations.

The California Business and Professions Code, Section 7058.5 et. al. seq. requires asbestos abatement contractors to be certified with the Contractor State Licensing Board (in addition to being registered annually with CAL/OSHA). They must be certified if, at one job site, at one time, they ever engage in asbestos-related work involving 100 square feet or more of asbestos containing construction materials (ACCM, >0.1% asbestos). There are exceptions to this certification process for roofing and flooring materials. Work practices for asbestos removal are regulated by Cal/OSHA. In addition, when a carcinogen (asbestos) is to be disturbed, a Report of Use form must be filed with Cal/OSHA by the abatement contractor.

Building owners have responsibilities to provide a safe work environment and must notify employees and contractors working inside a building known to contain asbestos. Two of these specific laws are the Asbestos Notification Act (California Health and Safety Code, Section 25915 et. seq.) and Proposition 65. Prop 65 requires the posting of warning signage.

The Asbestos Notification Act applies to building owners, professional property managers of and tenants in non-residential buildings built before 1979 who know of ACCM in their buildings. They must provide a specific written notification to employees and contractors in the building. Results of inspections, sampling, etc. must be shared, warning signs posted, and various other actions taken. This notification must be done each year. In addition, a supplemental notification must be done within 90 days of a change in the material or the receipt of additional sampling results. A copy of this notice must be given to every co-owner or tenant. Tenants who receive this notice are required to notify their employees.

Under Section 25359.7 of the Health and Safety Code, owners of real estate property who know of or have reasonable cause to believe that ACM is present must disclose that prior to sale.

The Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65), regulates chemicals in California that cause cancer or reproductive toxicity. The list of chemicals involved is published in Division 2 of Title 22, beginning with Section 12000.

Proposition 65 involves the public notification and warning required by the regulation. There is controversy on how to appropriately comply. In general, unless the ACM in a building is damaged and thus the owner believes it is contaminating air in the building, the owner does not have to specifically post the Proposition 65 warning sign (just for the asbestos). On the other hand, these warning signs should be displayed whenever and wherever asbestos work is being done. Many building owners routinely add the Proposition 65 warning as part of their

compliance with the Asbestos Notification Act (see Sections 25249.5 & 25249.6 of the Health & Safety Code).

In addition to the above-mentioned regulations, the following regulations will most likely apply:

- ✓ Section 25914.1-3 Health and Safety Code
- ✓ Section 25359.7 Health and Safety Code
- ✓ Section 19827.5 Health and Safety Code
- ✓ 29 CFR 1910.1001
- ✓ 29 CFR 1926.1101
- ✓ 40 CFR Part 61, Subpart M (NESHAP)
- ✓ 8 CCR Article 4, 1529
- ✓ 8 CCR Article 110, 5208
- ✓ Labor Code Section 9000 et. seq.
- ✓ Labor Code section 6501.9
- ✓ 8 CCR Article 2.5. Section 341.6 et. seq.
- ✓ 8 CCR Article 2.5, Section 341.9
- ✓ Asbestos Hazard Emergency Response Act (AHERA)

Asbestos regulations are complicated and are subject to change. The intent of the above information is to advise you of some of the regulations that may affect you, but is not intended to be an all-encompassing discussion of asbestos regulations.

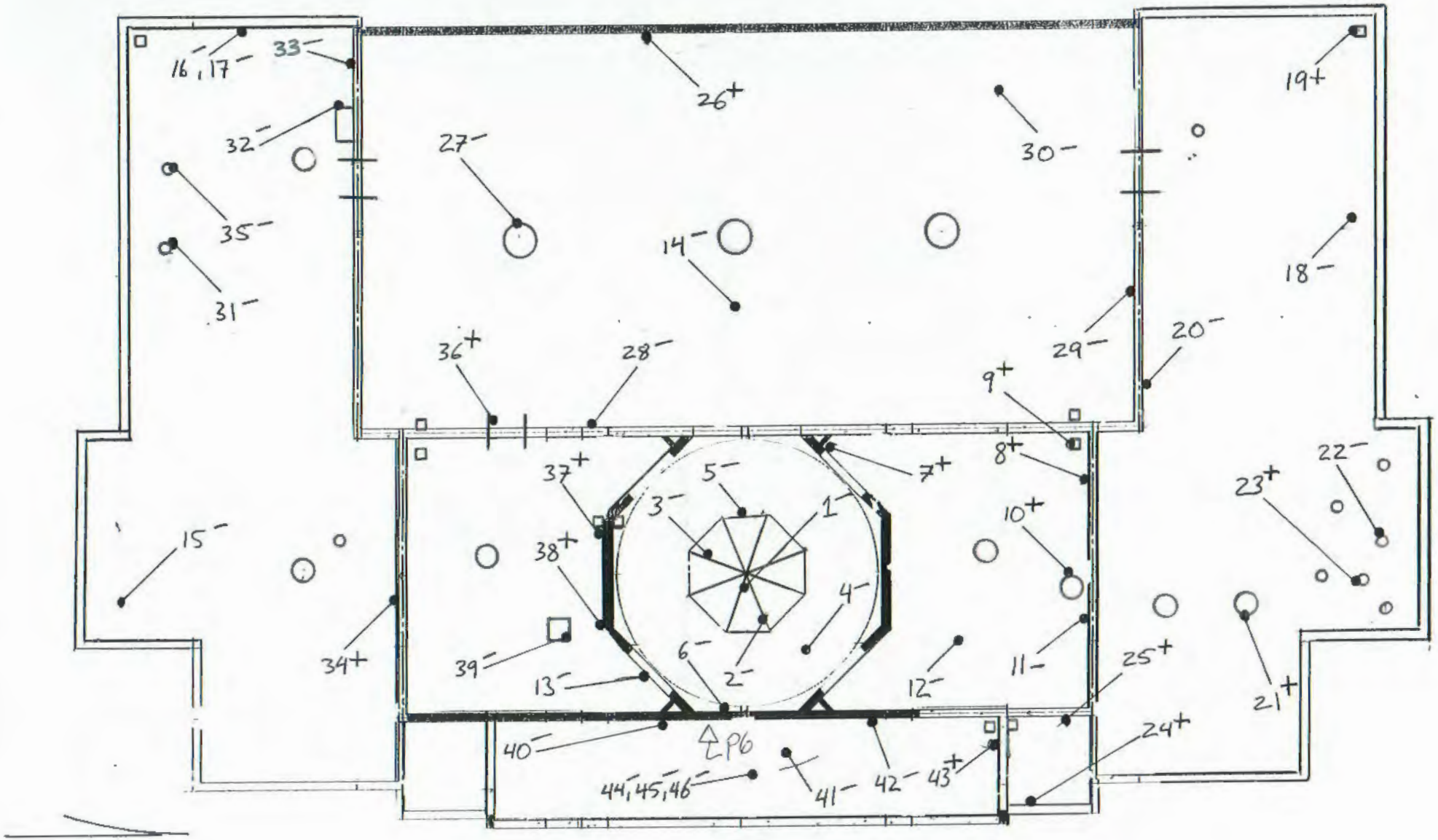
6.0 DISCLAIMER

The sole purpose of this investigation and of this report is to assess the site with respect to asbestos materials as defined by the scope of work. Terry Clark Consulting, LLC, is not responsible for locating asbestos containing building material in inaccessible areas such as behind walls, above hard ceilings, beneath flooring or underground. The passage of time, manifestation of latent conditions, or occurrence of future events may require further exploration at the site, analysis of data, and reevaluation of the findings, observations, conclusions, and recommendations expressed in the report. This report has been prepared on behalf of and for the exclusive use of the client, and is subject to and issued in connection with the agreement and the provisions thereof. All findings, conclusions, and analytical data presented in this report are based on the information obtained by Terry Clark Consulting, LLC's survey and by the laboratory analysis.

While the owner/operator was responsible for describing the extent and limits of site work, materials to be sampled were determined by the certified (asbestos) building inspector who performed this survey and were not otherwise subject to limitations by the owner/operator.

-end of text-

APPENDIX A
Figures



ROOF

1018 "H" STREET
EUREKA, CA

LEGEND

●← # Asbestos Sample Locations
(Prefixed 1018- #)
(-) is negative for asbestos, (+) is positive.

◁— # Paint Samples

BRUNELLE & CLARK CONSULTING
1636 Old Arcata Road
Bayside: California 95524

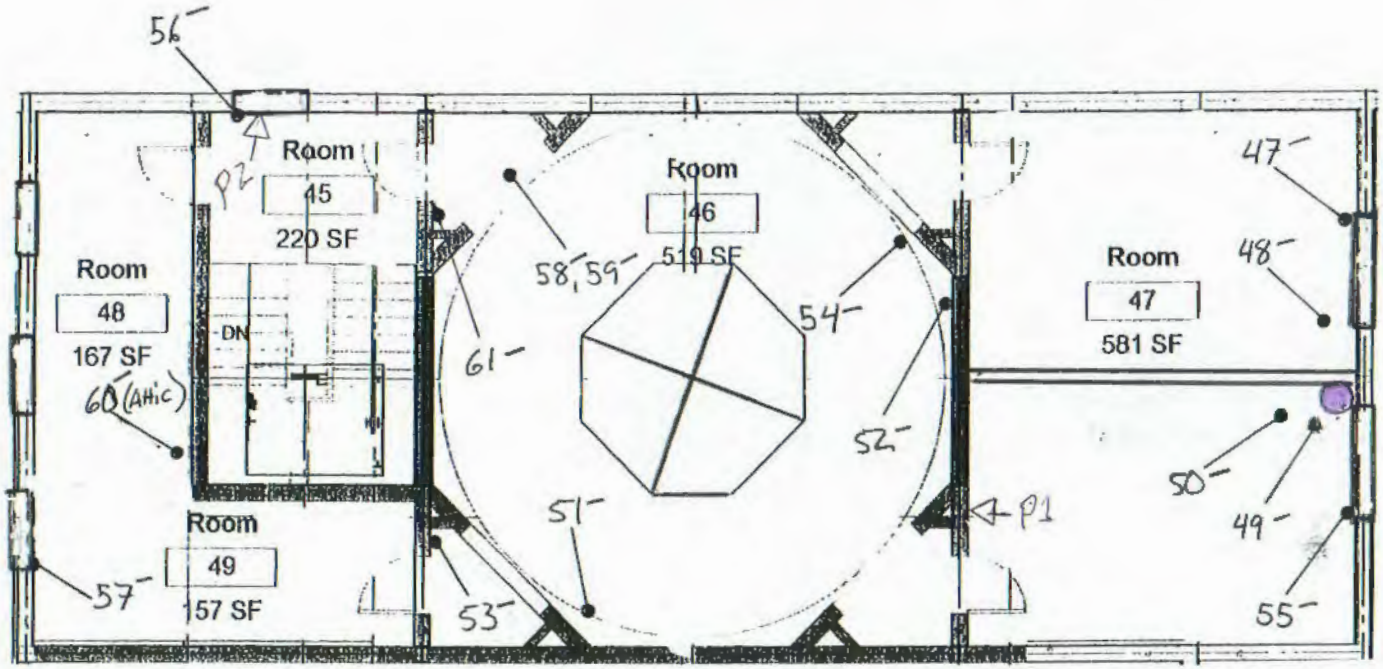
1400303 12/30/14

FIG 1

BRUNELLE & CLARK CONSULTING
1636 Old Arcata Road
Bayside, California 95524

1400303 12/30/14

N



LEGEND

●— # Asbestos Sample Locations
(Prefixed 1018- #)
(-) is negative for asbestos, (+) is positive.

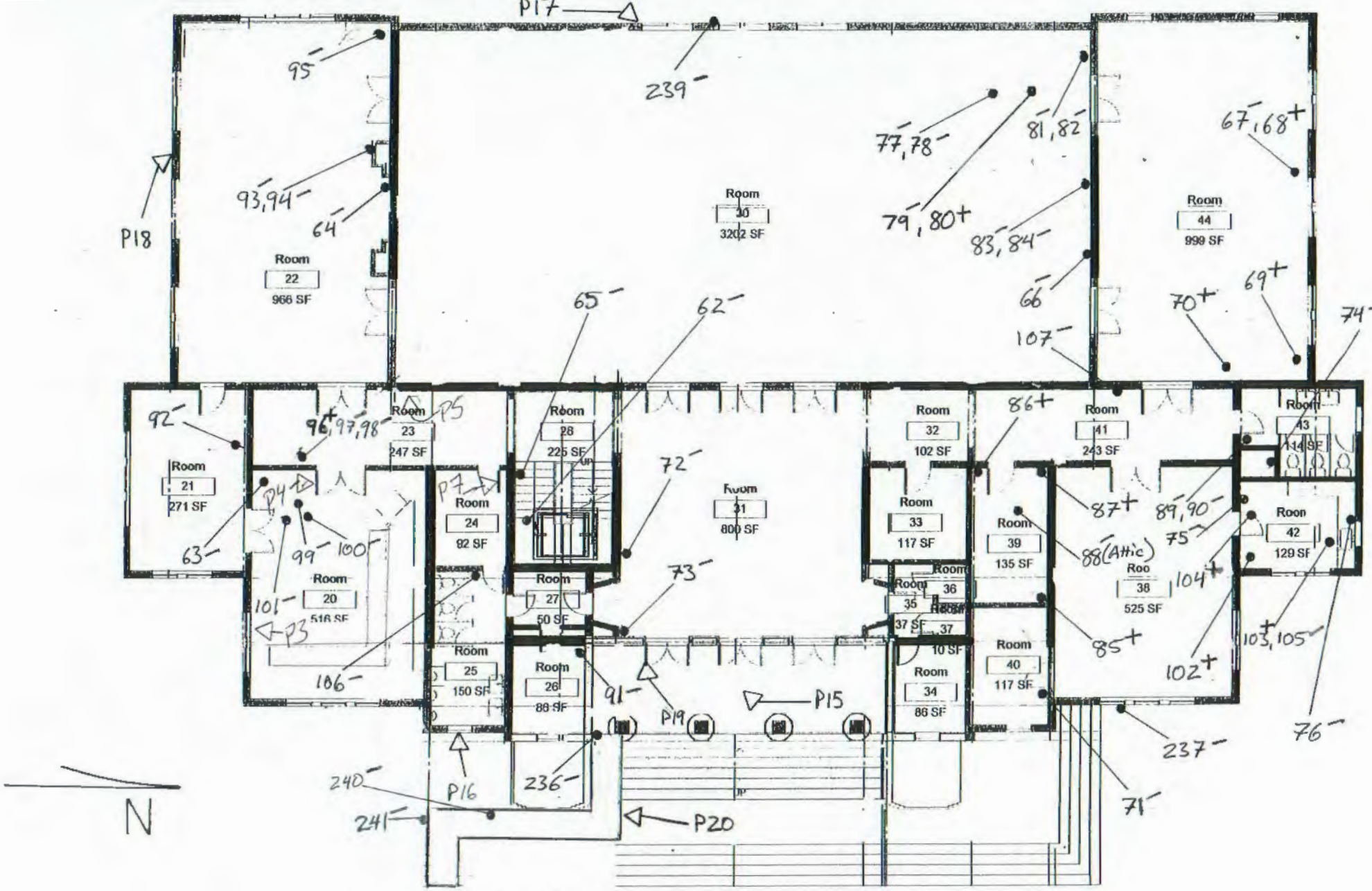
◁— # Paint Samples

■ ACM Transite pipe (8in.).

MEZZANINE LEVEL

1018 "H" STREET
EUREKA, CA

FIG 2



BRUNELLE & CLARK CONSULTING
1636 Old Arcata Road
Bayside, California 95524

1400303 12/30/14

LEGEND

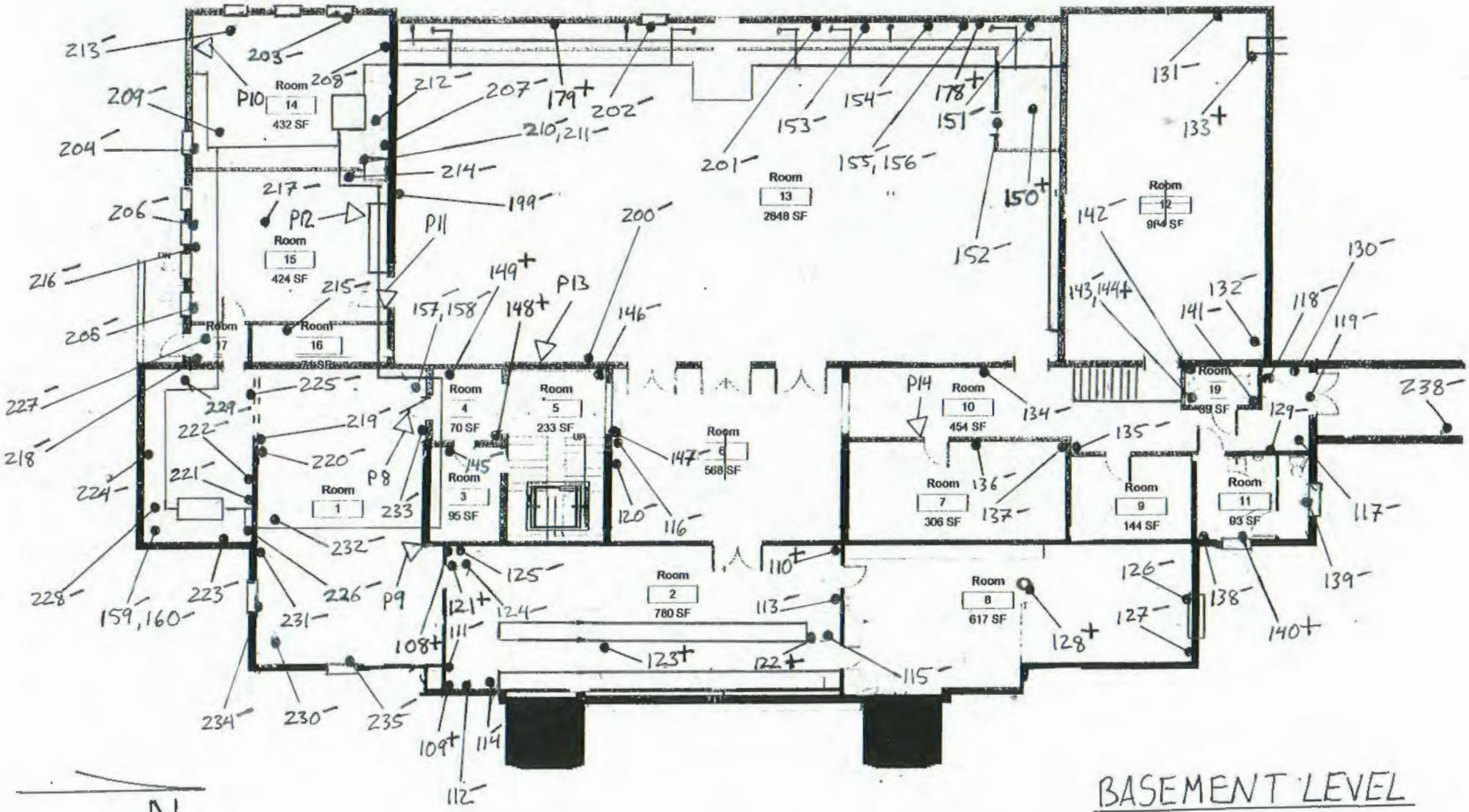
●—# Asbestos Sample Locations
(Prefixed 1018- #)
(-) is negative for asbestos, (+) is positive.

⇦ # Paint Samples

MAIN LEVEL

1018 "H" STREET
EUREKA, CA

FIG 3



BASEMENT LEVEL

1018 "H" STREET
EUREKA, CA

LEGEND

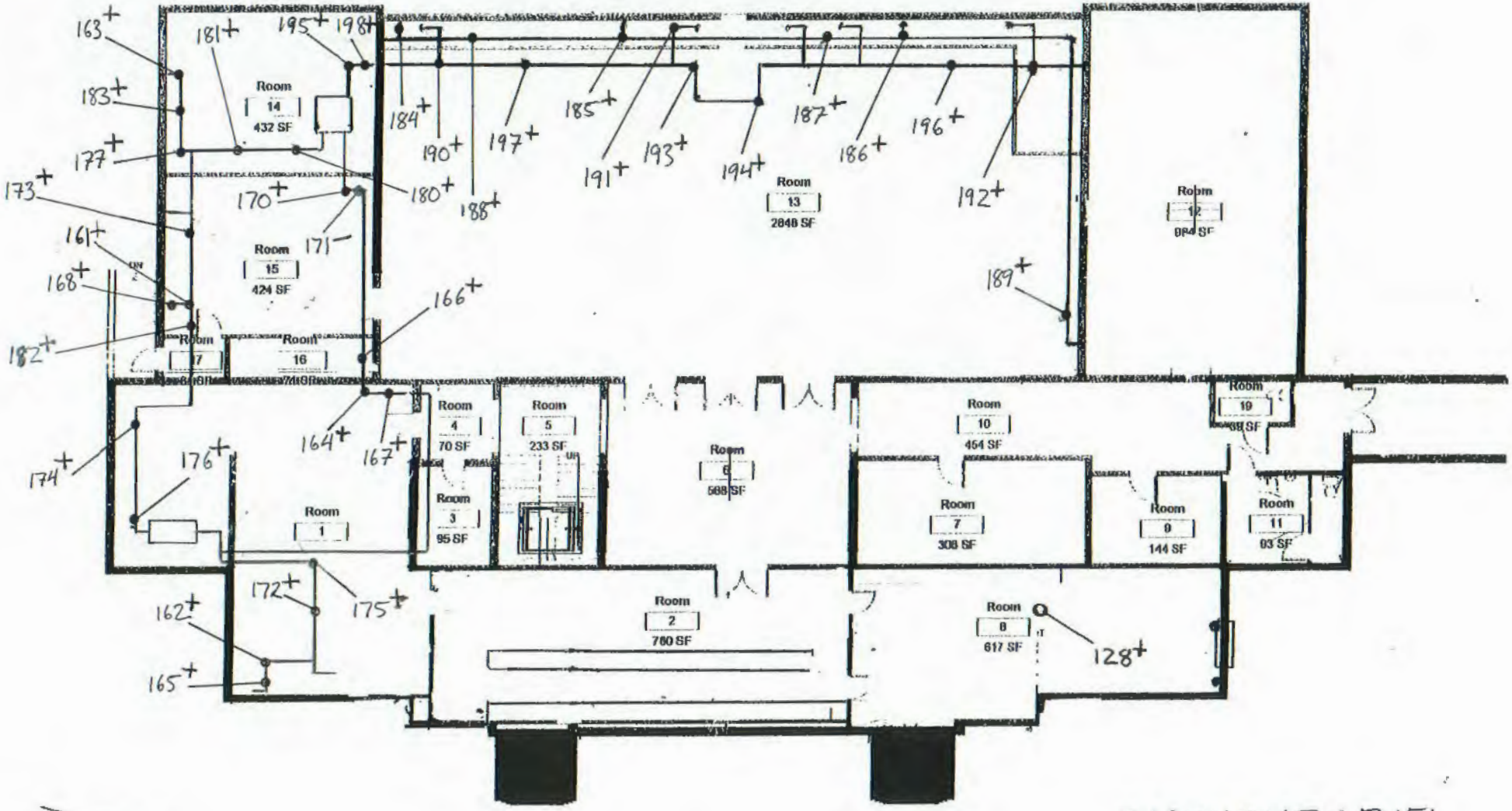
●—# Asbestos Sample Locations
(Prefixed 1018- #)
(-) is negative for asbestos, (+) is positive.

◁—# Paint Samples

BRUNELLE & CLARK CONSULTING
1636 Old Arcata Road
Bayside, California 95524

1400303 12/30/14

FIG 4



BASEMENT LEVEL

1018 "H" STREET
EUREKA, CA

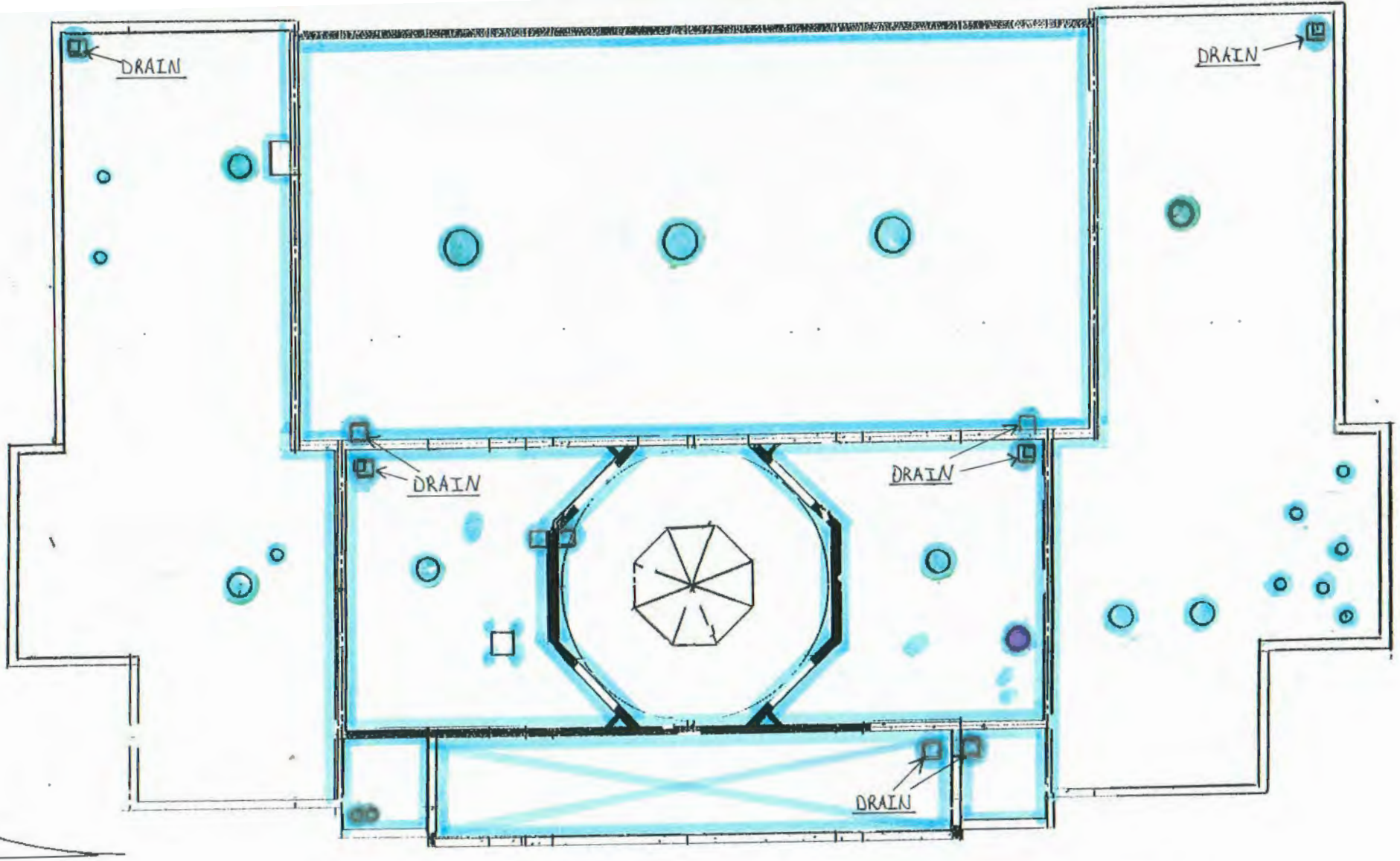
LEGEND

●—# Asbestos Sample Locations
(Prefixed 1018- #)
(-) is negative for asbestos, (+) is positive.

BRUNELLE & CLARK CONSULTING
1636 Old Arcata Road
Bayside, California 95524

1400303 12/30/14

FIG 5



ROOF

1018 "H" STREET
EUREKA, CA

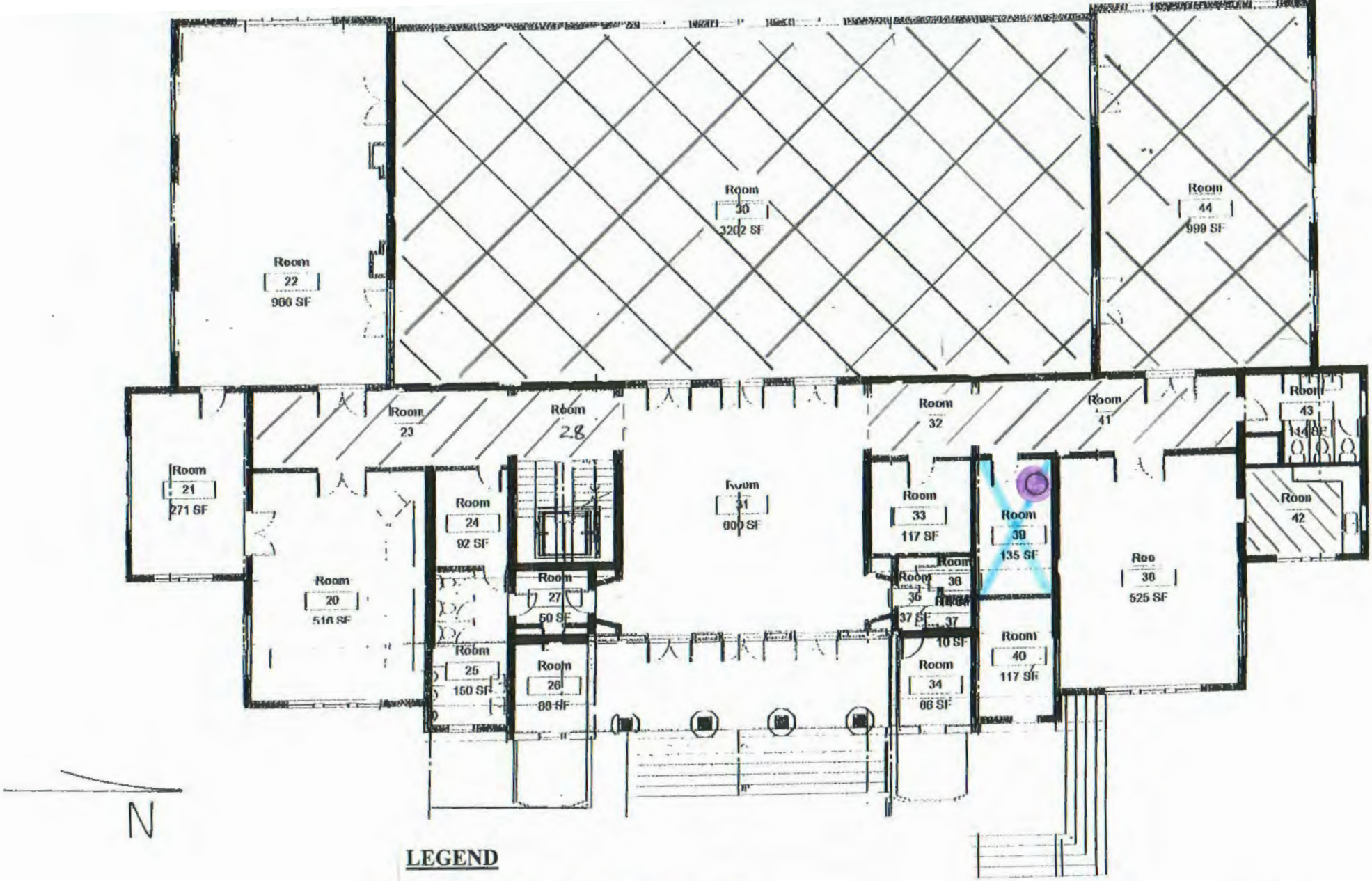
LEGEND

- ACM roof patching. (All roof patch is either ACM or contaminated by ACM roof patch.)
- ACM Transite pipe (8in.).

BRUNELLE & CLARK CONSULTING
1636 Old Arcata Road
Bayside: California 95524

1400303 12/30/14

FIG 6



LEGEND

- ACCM drywall/joint compound
- ACM VFT (12 x12), tan/ ACM black mastic
- ACM Sheet flooring, beige & white (Glue negative)
- ACM Plaster Top Coat, light gray and "punky" (Note: in Rm.30 plaster is under ceiling tile)
- ACM Transite pipe (8in.)

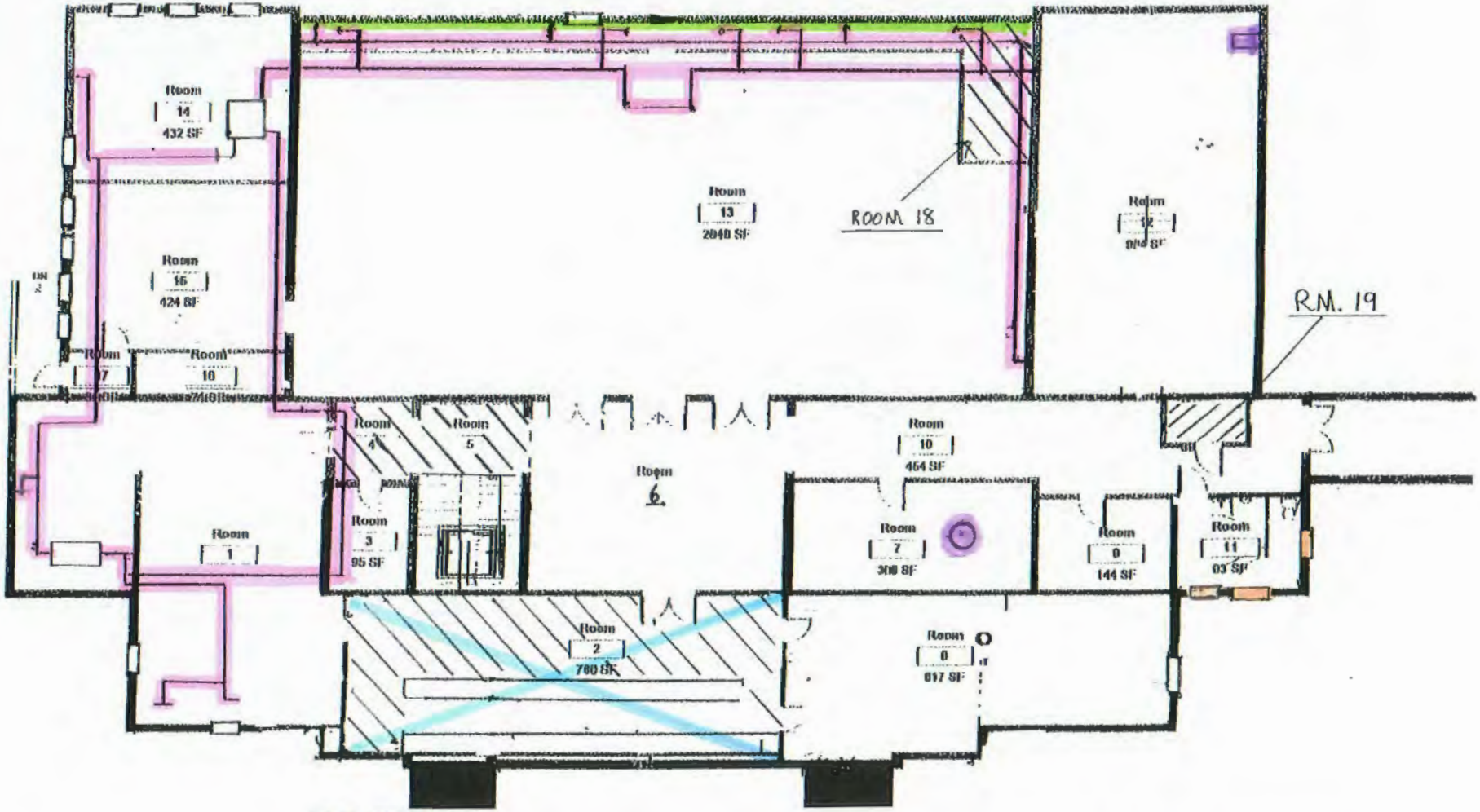
BRUNELLE & CLARK CONSULTING
1636 Old Arcata Road
Bayside, California 95524

1400303 12/30/14

MAIN LEVEL

1018 "H" STREET
EUREKA, CA

FIG 7



N

LEGEND

- ACCM drywall/joint compound
- ACM VFT (9X9), green & brown/ACM black mastic
- ACM VFT (12 x12), tan w-streaks/ ACM black mastic
- ACM Sheet flooring, dark gray mosaic (Glue negative)
- ACCM Plaster surfacing on concrete wall
- ACM Window putty
- ACM Transite pipe (8in.)
- ACM TSI, Air-cell wrap & ACM TSI compound elbows

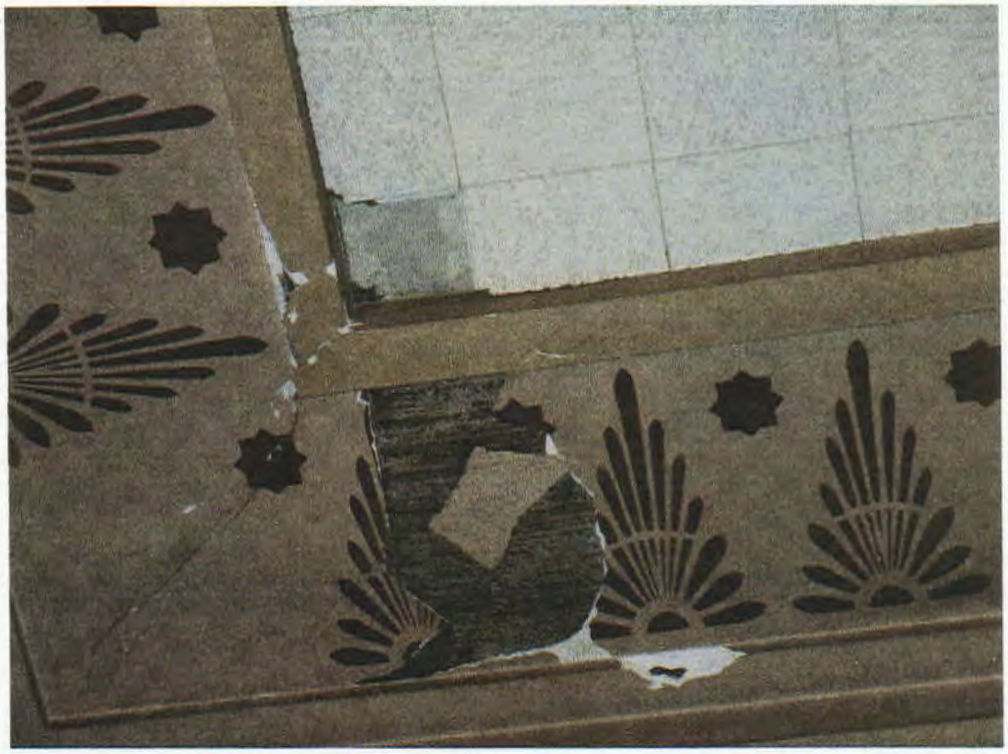
BASEMENT LEVEL

1018 "H" STREET
EUREKA, CA

BRUNELLE & CLARK CONSULTING
1636 Old Arcata Road
Bayside, California 95524

1400303 12/30/14

FIG 8



TOP -- Room 30, ACM plaster ceiling material, gray & punky, under ceiling tiles. The painted plaster border is not ACM. Will also find same ACM ceiling plaster in Rm. 44.

BOTTOM— ACCM plaster surfacing, thick, on north concrete wall of Bsmt. Rm. 13, behind the closets along that wall. Note TSI pipe hidden just to left of closet front, and to the right (higher) as well. Also note plaster surfacing spalling from wall in both photos.

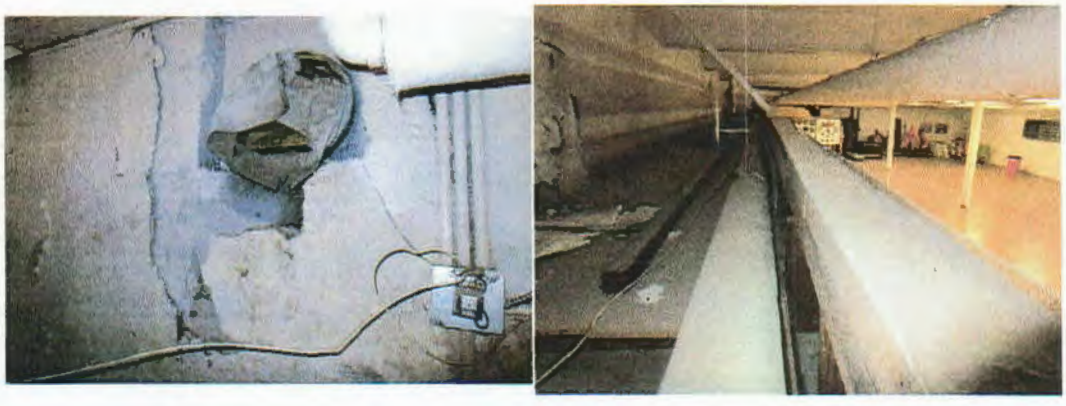


FIG. 9



LEFT—Lower east roof (front of bldg), abate entire membrane due to extensive ACM surface patching & flashing, the extent of which cannot be determined under silver paint.

RIGHT— ACM roof patching & flashing, grayed.





LEFT—ACM, grayed roof patching & flashing..

FIG. 10

PART 2 OF 4

↓

APPENDIX B

Tables & Lab Reports

TABLE 2
SUMMARY OF ANALYTIC DATA
Eureka Veterans Building
1018 "H" Street, Eureka, CA

BOLD TYPE used to highlight asbestos. Note: Some samples had multiple layers, as analyzed

Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
1018-1	Window glazing, brown	Exterior roof dome	None Detected	Non-Friable	
1018-2	Window glazing, white	Exterior roof dome	None Detected	Non-Friable	
1018-3	Window glazing, white	Exterior roof dome	None Detected	Non-Friable	
1018-4	Silver Paint	Exterior roof dome	None Detected	Non-Friable	
1018-5	Roof patch, black faded to gray	Exterior roof dome	None Detected	Non-Friable	
1018-6	Roof patch, black faded to gray	Exterior roof dome	None Detected	Non-Friable	
1018-7	**Roof patch, black faded to gray**	**Top roof, north**	**5%CH**	**Non-Friable**	
1018-8	**Surfacing, silver**	**Top roof, north**	**5%CH**	**Non-Friable**	
1018-9	**Roof patch, blk to gray**	**Top roof, north**	**5%CH**	**Non-Friable**	**Black to gray**
1018-10	**Caulking, green (see comment)**	**Top roof, north**	**2%CH**	**Non-Friable**	**Green paint on black roof patching**
1018-11	Concrete, gray	Top roof, north	None Detected	Non-Friable	
1018-12	Roofing, built-up, gray comp.	Top roof, north	None Detected	Non-Friable	
1018-13	Concrete, decorative	Top roof, south	None Detected	Non-Friable	
1018-14	Roofing, built-up, gray comp.	Middle roof	None Detected	Non-Friable	
1018-15	Roofing, built-up, gray comp.	Lower south roof	None Detected	Non-Friable	
1018-16	Fiberboard	Lower south roof	None Detected	Non-Friable	
1018-17	Tar, black	Lower south roof	None Detected	Non-Friable	
1018-18	Roofing, built-up, gray comp.	Lower north roof	None Detected	Non-Friable	

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Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
1018-19	**Roof patch, black**	**Lower north roof**	**5% CH**	**Non-Friable**	
1018-20	Roof patch, gray	Lower north roof	None Detected	Non-Friable	
1018-21	**Roof patch, black and gray**	**Lower north roof**	**5% CH**	**Non-Friable**	
1018-22	Roof patch, brown	Lower north roof	None Detected	Non-Friable	
1018-23	**Tar, black**	**Lower north roof**	**3% CH**	**Non-Friable**	
1018-24	**Surfacing, silver-black tar**	**Lower north roof**	**5% CH**	**Non-Friable**	
1018-25	**Roof patch, dark gray**	**Lower north roof**	**5% CH**	**Non-Friable**	
1018-26	**Surfacing, silver-black tar**	**Middle roof**	**5% CH**	**Non-Friable**	
1018-27	Roof patch, brown	Middle roof	None Detected	Non-Friable	
1018-28	Roof patch, light gray	Middle roof	None Detected	Non-Friable	
1018-29	Roof patch, light gray	Middle roof	None Detected	Non-Friable	
1018-30	Silver paint	Middle roof	None Detected	Non-Friable	
1018-31	Roof patch, brown	Lower roof, south	None Detected	Non-Friable	
1018-32	Roof patch, light gray	Lower roof, south	None Detected	Non-Friable	
1018-33	Roof patch, gray	Lower roof, south	None Detected	Non-Friable	
1018-34	**Silver paint & black tar (see comment)**	**Lower roof, south**	**2% CH**	**Non-Friable**	**Black tar is positive, The silver paint is negative.**
1018-35	Tar, black	Lower roof, south	None Detected	Non-Friable	
1018-36	**Roof patch, black and gray**	**Lower roof, south**	**5% CH**	**Non-Friable**	
1018-37	**Roof patch, silver- gray**	**Top roof**	**5% CH**	**Non-Friable**	

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Eureka Veterans Building
1018 "H" Street, Eureka, CA

BOLD TYPE used to highlight asbestos. Note: Some samples had multiple layers, as analyzed

Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
1018-38	**Roof patch, silver-gray with cloth mesh**	**Top roof**	**5% CH**	**Non-Friable**	
1018-39	Roof patch, black	Top roof	None Detected	Non-Friable	
1018-40	Roof patch, black	Lower roof, east	None Detected	Non-Friable	
1018-41	Roof patch, black	Lower roof, east	None Detected	Non-Friable	
1018-42	Roof patch, light gray	Lower roof, east	None Detected	Non-Friable	
1018-43	**Roof patch, silver- gray**	**Lower roof, east**	**3% CH**	**Non-Friable**	
1018-44	Silver paint	Lower roof, east	None Detected	Non-Friable	
2nd layer	Roofing, built-up, gray comp.	""	None Detected	Non-Friable	
1018-45	Fiberboard, brown	Lower roof, east	None Detected	Non-Friable	
1018-46	Tar, black	Lower roof, east	None Detected	Non-Friable	
1018-47	Ceiling tile Mastic, dark brown	Mezzanine, Rm.47	None Detected	Non-Friable	
1018-48	Ceiling tile Mastic, dark brown	Mezzanine, Rm.47	None Detected	Non-Friable	
1018-49	Ceiling tile, brown painted white	Mezzanine, Rm.47	None Detected	Non-Friable	
1018-50	Plaster; Top Coat, brown	Mezzanine, Rm.47	None Detected	Non-Friable	
2nd layer	Rough Coat, gray	""	None Detected	Non-Friable	
1018-51	Plaster; Top Coat, brown	Mezzanine, Rm.46	None Detected	Non-Friable	
2nd layer	Rough Coat, gray	""	None Detected	Non-Friable	
1018-52	Plaster; Top Coat, white	Mezzanine, Rm.46	None Detected	Non-Friable	
2nd layer	Middle Coat, brown	""	None Detected	Non-Friable	
3rd layer	Rough Coat, gray	""	None Detected	Non-Friable	
1018-53	Plaster; Top Coat, white	Mezzanine, Rm.46	None Detected	Non-Friable	

TABLE 2
SUMMARY OF ANALYTIC DATA
Eureka Veterans Building
1018 "H" Street, Eureka, CA

BOLD TYPE used to highlight asbestos. Note: Some samples had multiple layers, as analyzed

Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
2nd layer	Middle Coat, brown	""	None Detected	Non-Friable	
3rd layer	Rough Coat, gray	""	None Detected	Non-Friable	
1018-54	Plaster; Top Coat, white	Mezzanine, Rm.46	None Detected	Non-Friable	
2nd layer	Rough Coat, gray	""	None Detected	Non-Friable	
1018-55	Window glazing, gray	Mezzanine, Rm.47	None Detected	Non-Friable	
1018-56	Window glazing, gray	Mezzanine, Rm.45	None Detected	Non-Friable	
1018-57	Window glazing, gray	Mezzanine, Rm.48	None Detected	Non-Friable	
1018-58	"Battleship" linoleum, black marbled	Mezzanine, Rm.46	None Detected	Non-Friable	
1018-59	"Battleship" linoleum, red-brown	Mezzanine, Rm.46	None Detected	Non-Friable	
1018-60	Concrete	Mid-level (1-2) attic space, structural beam	None Detected	Non-Friable	
1018-61	Terrazzo tile baseboard	Mezzanine, Rm.46	None Detected	Non-Friable	
1018-62	"Battleship" linoleum, wood pattern	Stairway,1-2, treads	None Detected	Non-Friable	
1018-63	Plaster, white	Main floor, Rm.20, ceiling.	None Detected	Non-Friable	
1018-64	Plaster, single coat, gray	Main floor, Rm. 22, ceiling	None Detected	Non-Friable	
1018-65	Plaster, top coat, white	Stairway, between 1-2	None Detected	Non-Friable	
2nd layer	....rough coat, grey	""	None Detected	Non-Friable	
1018-66	Plaster, top coat, white	Main floor, Rm. 30	None Detected	Non-Friable	
2nd layer	....rough coat, grey	""	None Detected	Non-Friable	
1018-67	Plaster, single rough coat, gray	Main floor, Rm. 44	None Detected	Non-Friable	

TABLE 2
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Eureka Veterans Building
1018 "H" Street, Eureka, CA

BOLD TYPE used to highlight asbestos. Note: Some samples had multiple layers, as analyzed

Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
1018-68	**Plaster, top coat, "punky" light gray**	**Main floor, Rm. 44**	**8% CH**	**Non-Friable**	
1018-69	**Plaster, top coat, "punky" light gray**	**Main floor, Rm. 44**	**8% CH**	**Non-Friable**	
1018-70	**Plaster, top coat, "punky" light gray**	**Main floor, Rm. 44**	**8% CH**	**Non-Friable**	
1018-71	Plaster, top coat, brown	Main floor, Rm. 40	None Detected	Non-Friable	
2nd layer	....rough coat, grey	""	None Detected	Non-Friable	
1018-72	Plaster, top coat, brown	Main floor, Rm. 31	None Detected	Non-Friable	
2nd layer	....rough coat, grey	""	None Detected	Non-Friable	
1018-73	Plaster of Paris, w/stringy backing, decorative	Main floor, Rm. 31, frieze block	None Detected	Non-Friable	
1018-74	Plaster, top coat, white	Main floor, Rm. 43, closet	None Detected	Non-Friable	
2nd layer	....rough coat, grey	""	None Detected	Non-Friable	
1018-75	Plaster, top coat, white	Main floor, Rm. 42	None Detected	Non-Friable	
2nd layer	....rough coat, grey	""	None Detected	Non-Friable	
1018-76	Plaster, top coat, white	Main floor, Rm. 42	None Detected	Non-Friable	
2nd layer	....rough coat, grey	""	None Detected	Non-Friable	
1018-77	Ceiling tile, 1x1, white	Main floor, Rm. 30, ceiling	None Detected	Non-Friable	
1018-78	Mastic, brown	Main floor, Rm. 30, ceiling	None Detected	Non-Friable	
1018-79	Plaster, rough coat, gray	Main floor, Rm. 30, ceiling	None Detected	Non-Friable	

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Eureka Veterans Building
1018 "H" Street, Eureka, CA

BOLD TYPE used to highlight asbestos. Note: Some samples had multiple layers, as analyzed

Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
1018-80	**Plaster, "punky" lt. gray**	**Main floor, Rm. 30, ceiling, above ceiling tile**	**8% CH**	**Non-Friable**	
1018-81	Plaster, white	Main floor, Rm. 30, frieze block	None Detected	Non-Friable	
1018-82	Plaster, white	Main floor, Rm. 30, frieze block	None Detected	Non-Friable	
1018-83	Ceiling tile, 1x1, white	Main floor, Rm. 30,wall	None Detected	Non-Friable	
1018-84	Mastic, brown	Main floor, Rm. 30, wall	None Detected	Non-Friable	
1018-85	**Gypsum board drywall**	**Main floor, Rm. 39**	**None Detected**	**Non-Friable**	
2nd layer	**....joint compound**	**""**	**2% CH**	**Non-Friable**	
400 Point Count	**On composite of GB/JC above**	**""**	**<0.25% CH**	**Non-Friable**	**By 400Point Count analysis**
1018-86	**Gypsum board drywall**	**Main floor, Rm. 39**	**None Detected**	**Non-Friable**	
2nd layer	**....joint compound**	**""**	**2% CH**	**Non-Friable**	
1018-87	**Gypsum board drywall**	**Main floor, Rm. 39**	**None Detected**	**Non-Friable**	
2nd layer	**....joint compound**	**""**	**2% CH**	**Non-Friable**	
1018-88	Surfacing, white	Attic space above Main floor, access from Rm. 39	None Detected	Non-Friable	
1018-89	Tile grout, white	Main floor, Rm. 43 (Women's RR)	None Detected	Non-Friable	
1018-90	Tile mortar, gray	Main floor, Main floor, Rm. 43 (Women's RR)	None Detected	Non-Friable	
1018-91	"Battleship" linoleum, wood pattern	Main floor, Rm. 26	None Detected	Non-Friable	

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Eureka Veterans Building
1018 "H" Street, Eureka, CA

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Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
1018-92	"Battleship" linoleum, green	Main floor, Rm. 21	None Detected	Non-Friable	
1018-93	Mortar, gray	Main floor, Rm. 22, chimney	None Detected	Non-Friable	
1018-94	Brick, red	Main floor, Rm. 22, chimney	None Detected	Non-Friable	
1018-95	Carpet glue, clear	Main floor, Rm. 22	None Detected	Non-Friable	
1018-96	**Sheet flooring, beige & white**	**Main floor, Rm. 23 (hall) top layer**	**3% CH**	**Non-Friable**	
2nd layer	.... Glue, tan	Main floor, Rm. 23 (hall) bottom layer	None Detected	Non-Friable	
1018-97	Floor sizing, white	Main floor, 23 (hall) below above SF	None Detected	Non-Friable	
1018-98	Sheet flooring, black w/ paper backing	Main floor, 23 (hall) bottom layer	None Detected	Non-Friable	
1018-99	VFT, 12x12, black & white	Main floor, Rm. 20	None Detected	Non-Friable	
2nd layer	....yellow mastic	""	None Detected	Non-Friable	
1018-100	VFT, 12x12, black & white	Main floor, Rm.20	None Detected	Non-Friable	
2nd layer	....yellow mastic	""	None Detected	Non-Friable	
1018-101	VFT, 12x12, beige w/ white streaks	Main floor, Rm. 20	None Detected	Non-Friable	
2nd layer	....yellow mastic	""	None Detected	Non-Friable	
1018-102	**VFT, 12x12, tan**	**Main floor, Rm. 42, top layer**	**3% CH**	**Non-Friable**	

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Eureka Veterans Building
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BOLD TYPE used to highlight asbestos. Note: Some samples had multiple layers, as analyzed

Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
2nd layer	**....black mastic**	**""**	**5% CH**	**Non-Friable**	
1018-103	**VFT, 12x12, tan**	**Main floor, Rm. 42, top layer**	**PACM**	**Non-Friable**	**NA/PS**
2nd layer	**....black mastic**	**""**	**PACM**	**Non-Friable**	**NA/PS**
1018-104	**VFT, 12x12, tan**	**Main floor, Rm. 42, top layer**	**PACM**	**Non-Friable**	**NA/PS**
2nd layer	**....black mastic**	**""**	**PACM**	**Non-Friable**	**NA/PS**
1018-105	"Battleship" linoleum, green	Main floor, under particle board.	None Detected	Non-Friable	
1018-106	Terrazzo, gray multicolor	Main floor, Rm. 25	None Detected	Non-Friable	
1018-107	Felt gasket, green	Main floor, Rm. 41 (hall) heat register vent	None Detected	Non-Friable	
1018-108	**Gypsum board drywall**	**Bsmt level, Rm. 2**	**None Detected**	**Non-Friable**	
2nd layer	**....joint compound**	**""**	**2% CH**	**Non-Friable**	
1018-109	**Gypsum board drywall**	**Bsmt level, Rm. 2**	**None Detected**	**Non-Friable**	
2nd layer	**....joint compound**	**""**	**2% CH**	**Non-Friable**	
1018-110	**Gypsum board drywall**	**Bsmt level, Rm. 2**	**None Detected**	**Non-Friable**	
2nd layer	**....joint compound**	**""**	**2% CH**	**Non-Friable**	
1018-111	Wall paper, red velvet	Bsmt level, Rm. 2	None Detected	Non-Friable	
1018-112	Panel glue, cream	Bsmt, level, Rm. 2	None Detected	Non-Friable	
1018-113	Cardboard sheet, brown & corrugated	Bsmt, level, Rm. 8	None Detected	Non-Friable	
1018-114	VFT, 12x12, beige w/ dk gray streaks	Bsmt, level, Rm. 2	None Detected	Non-Friable	
2nd layer	....yellow mastic	""	None Detected	Non-Friable	

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Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
1018-115	VFT, 12x12, beige w/ dk gray streaks	Bsmt, level, Rm. 2	None Detected	Non-Friable	
2nd layer	….yellow mastic	""	None Detected	Non-Friable	
1018-116	VFT, 12x12, beige w/ brown streaks	Bsmt, level, Rm. 6 (central lobby)	None Detected	Non-Friable	
2nd layer	….yellow mastic	""	None Detected	Non-Friable	
1018-117	VFT, 12x12, beige w/ brown streaks	Bsmt, level, Rm. 10 (hall)	None Detected	Non-Friable	
2nd layer	….yellow mastic	""	None Detected	Non-Friable	
1018-118	Baseboard mastic, cream	Bsmt, level, Rm. 10 (west hall)	None Detected	Non-Friable	
1018-119	Floor sizing & glue	Bsmt, level, Rm. 10 (west hall)	None Detected	Non-Friable	
1018-120	Baseboard mastic, cream	Bsmt, level, Rm. 6, (central lobby)	None Detected	Non-Friable	
1018-121	**VFT, 9x9,green & brown checks**	**Bsmt, level, Rm. 2, bottom layer**	**4% CH**	**Non-Friable**	
2nd layer	**….black mastic**	""	**5% CH**	**Non-Friable**	
1018-122	**VFT, 9x9,green & brown checks**	**Bsmt, level, Rm. 2, bottom layer**	**PACM**	**Non-Friable**	**NA/PS**
2nd layer	**….black mastic**	""	**PACM**	**Non-Friable**	**NA/PS**
1018-123	**VFT, 9x9,green & brown checks**	**Bsmt, level, Rm. 2, bottom layer**	**PACM**	**Non-Friable**	**NA/PS**
2nd layer	**….black mastic**	""	**PACM**	**Non-Friable**	**NA/PS**
1018-124	Carpet glue, yellow	Bsmt, level, Rm. 2	None Detected	Non-Friable	
1018-125	Baseboard mastic, cream	Bsmt, level, Rm. 2	None Detected	Non-Friable	

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BOLD TYPE used to highlight asbestos. Note: Some samples had multiple layers, as analyzed

Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
1018-126	Window putty	Bsmt, level, Rm. 8	None Detected	Non-Friable	
1018-127	Concrete	Bsmt, level, Rm. 8	None Detected	Non-Friable	
1018-128	**TSI, papery brown under white jacket**	**Bsmt, level, Rm.8, pipe at ceiling**	**35% CH**	**Non-Friable**	
1018-129	Plaster, top coat, white	Bsmt, level, Rm. 10,ceiling	None Detected	Non-Friable	
2nd layer	....rough coat, grey	""	None Detected	Non-Friable	
1018-130	Plaster, top coat, white	Bsmt, level, Rm. 10, wall	None Detected	Non-Friable	
2nd layer	....rough coat, gray	""	None Detected	Non-Friable	
1018-131	Concrete	Bsmt, level, Rm. 12, wall	None Detected	Non-Friable	
1018-132	Black tar coating (water proofing)	Bsmt, level, Rm. 12, concrete floor beneath platform floor	None Detected	Non-Friable	
1018-133	**Transite, pipe**	**Bsmt, level, Rm. 12, short pipe, thru Exterior wall**	**35% CH 5% CR**	**Non-Friable**	**Appears to extent through wall to exterior, likely underground**
1018-134	Plaster, top coat, white	Bsmt, level, Rm. 10	None Detected	Non-Friable	
	....rough coat, grey0	""	None Detected	Non-Friable	
1018-135	Gypsum board drywall	Bsmt, level, Rm. 10	None Detected	Non-Friable	
2nd layer	....joint compound	""	None Detected	Non-Friable	
1018-136	Gypsum board drywall	Bsmt, level, Rm. 7	None Detected	Non-Friable	
2nd layer	....joint compound	""	None Detected	Non-Friable	
1018-137	Gypsum board drywall	Bsmt, level, Rm. 7	None Detected	Non-Friable	
2nd layer	....joint compound	""	None Detected	Non-Friable	

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BOLD TYPE used to highlight asbestos. Note: Some samples had multiple layers, as analyzed

Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
1018-138	Plaster, gray, single coat	Bsmt, level, Rm. 11	None Detected	Non-Friable	
1018-139	Window caulking, white	Bsmt, level, Rm. 11	None Detected	Non-Friable	
1018-140	**Window putty**	**Bsmt, level, Rm. 11**	**2% CH**	**Non-Friable**	
1018-141	Gypsum board drywall	Bsmt, level, Rm. 19	None Detected	Non-Friable	
2nd layer	….joint compound	""	None Detected	Non-Friable	
1018-142	Plaster surfacing	Bsmt, level, Rm. 19,on concrete	None Detected	Non-Friable	
1018-143	Baseboard mastic, brown	Bsmt, level, Rm. 19	None Detected	Non-Friable	
1018-144	**Linoleum, dk. gray mosaic**	**Bsmt, level, Rm. 19**	**20% CH**	**Non-Friable**	
2nd layer	**….yellow mastic**	""	**None Detected (see comment)**	**Non-Friable**	**Likely contaminated by contact with above**
1018-145	Plaster, single coat, gray	Bsmt, level, Rm. 3	None Detected	Non-Friable	
1018-146	Plaster, top coat, brown	Bsmt, level, Rm. 6	None Detected	Non-Friable	
2nd layer	….gray rough coat	""	None Detected	Non-Friable	
1018-147	Plaster, gray rough coat	Bsmt, level, Rm. 5	None Detected	Non-Friable	
1018-148	**VFT,12x12, tan w/white streaks**	**Bsmt, level, Rm. 4**	**3% CH**	**Non-Friable**	
2nd layer	**…. black mastic**	""	**5% CH**	**Non-Friable**	
1018-149	**VFT,12x12, tan w/white streaks**	**Bsmt, level, Rm. 4**	**PACM**	**Non-Friable**	**NA/PS**
2nd layer	**…. black mastic**	""	**PACM**	**Non-Friable**	**NA/PS**
1018-150	**VFT,12x12, tan w/white streaks**	**Bsmt, level, Rm. 18**	**3% CH**	**Non-Friable**	
2nd layer	**…. black mastic**	""	**5% CH**	**Non-Friable**	

TABLE 2
SUMMARY OF ANALYTIC DATA
Eureka Veterans Building
1018 "H" Street, Eureka, CA

BOLD TYPE used to highlight asbestos. Note: Some samples had multiple layers, as analyzed

Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
1018-151	Plaster surfacing, lime green	Bsmt, level, Rm. 16	None Detected	Non-Friable	
1018-152	Cardboard door fill	Bsmt, level, Rm. 18	None Detected	Non-Friable	
1018-153	Plaster surfacing, gray	Bsmt, level, Rm. 15	None Detected	Non-Friable	
1018-154	Plaster surfacing, white top coat	Bsmt, level, Rm. 15	None Detected	Non-Friable	
1018-155	Plaster, gray rough coat	Bsmt, level, Rm. 15, closet #9	None Detected	Non-Friable	
1018-156	Tar, black	Bsmt, level, Rm. 15, closet #9, bottom layer	None Detected	Non-Friable	
1018-157	Carpet glue, brown	Bsmt, level, Rm. 1	None Detected	Non-Friable	
1018-158	Baseboard mastic, brown	Bsmt, level, Rm. 1	None Detected	Non-Friable	
1018-159	Baseboard mastic, gray, mixed with below…	Bsmt, level, Rm. 1	None Detected	Non-Friable	
2nd layer	…. white wall texture	""	None Detected	Non-Friable	
1018-160	Carpet glue, yellow brown, mixed w /below	Bsmt, level, Rm. 1	None Detected	Non-Friable	
2nd layer	….brown glue	""	None Detected	Friable	
1018-161	**TSI elbow, tan cmpd.**	**Bsmt, level, Rm. 15**	**10% CH**	**Friable**	
1018-162	**TSI elbow, tan cmpd.**	**Bsmt, level, Rm. 1**	**PACM**	**Friable**	**NA/PS**
1018-163	**TSI elbow, tan cmpd.**	**Bsmt, level, Rm. 15**	**PACM**	**Friable**	**NA/PS**
1018-164	**TSI elbow, tan cmpd.**	**Bsmt, level, Rm. 1**	**PACM**	**Friable**	**NA/PS**
1018-165	**TSI, brown air-cell paper under white jacketing**	**Bsmt, level, Rm. 1**	**40% CH**	**Friable**	

TABLE 2
SUMMARY OF ANALYTIC DATA
Eureka Veterans Building
1018 "H" Street, Eureka, CA

BOLD TYPE used to highlight asbestos. Note: Some samples had multiple layers, as analyzed

Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
1018-166	**TSI, brown air-cell paper under white jacketing**	**Bsmt, level, Rm. 15**	**PACM**	**Friable**	**NA/PS**
1018-167	**TSI, brown air-cell paper under white jacketing**	**Bsmt, level, Rm. 1**	**PACM**	**Friable**	**NA/PS**
1018-168	**TSI, brown air-cell paper under white jacketing**	**Bsmt, level, Rm. 15**	**PACM**	**Friable**	**NA/PS**
1018-169	No Sample				
1018-170	**TSI elbow, beige cmpd.**	**Bsmt, level, Rm. 15**	**10% AM CR 3%**	**Friable**	
1018-171	TSI, fiberglass like	Bsmt, level, Rm. 15	None Detected	Friable	
1018-172	**TSI, brown air-cell paper under white jacketing**	**Bsmt, level, Rm. 1**	**40% CH**	**Friable**	
1018-173	**TSI, brown air-cell paper under white jacketing**	**Bsmt, level, Rm. 15**	**PACM**	**Friable**	**NA/PS**
1018-174	**TSI, brown air-cell paper under white jacketing**	**Bsmt, level, Rm. 1**	**PACM**	**Friable**	**NA/PS**
1018-175	**TSI elbow, beige cmpd.**	**Bsmt, level, Rm. 1**	**20% CH**	**Friable**	
1018-176	**TSI elbow, beige cmpd.**	**Bsmt, level, Rm. 1**	**PACM**	**Friable**	**NA/PS**
1018-177	**TSI elbow, beige cmpd.**	**Bsmt, level, Rm. 15**	**PACM**	**Friable**	**NA/PS**

TABLE 2
SUMMARY OF ANALYTIC DATA
Eureka Veterans Building
1018 "H" Street, Eureka, CA

BOLD TYPE used to highlight asbestos. Note: Some samples had multiple layers, as analyzed

Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
1018-178	Plaster, grey, thick surfacing coat	Bsmt, level, Rm. 13, only on north concrete wall	<1% CH	Non-Friable	All along north wall of Rm.13
1,000 Point Count	On above sample	""	<0.1% CH	Non-Friable	By 1,000 Point Count analysis
1018-179	Plaster, grey, thick surfacing coat	Bsmt, level, Rm. 13	<1% CH	Non-Friable	See both comment boxes above
1018-180	TSI, white cmpd.	Bsmt, level, Rm. 14	10% AM 5% CH	Friable	
1018-181	TSI, end seal, white cmpd.	Bsmt, level, Rm. 14	PACM	Friable	NA/PS
1018-182	TSI, brown air-cell paper under white jacketing	Bsmt, level, Rm. 15	40% CH	Friable	
1018-183	TSI, brown air-cell paper under white jacketing	Bsmt, level, Rm. 15	40% CH	Friable	
1018-184	TSI elbow, beige cmpd.	Bsmt, level, Rm. 14	3% AM 10% CH	Friable	
1018-185	TSI elbow, beige cmpd.	Bsmt, level, Rm. 13	PACM	Friable	NA/PS
1018-186	TSI elbow, beige cmpd.	Bsmt, level, Rm. 13	PACM	Friable	NA/PS
1018-187	TSI, brown air-cell paper under jacketing	Bsmt, level, Rm. 13	40% CH	Friable	
1018-188	TSI, brown air-cell paper under jacketing	Bsmt, level, Rm. 13	PACM	Friable	NA/PS

TABLE 2
SUMMARY OF ANALYTIC DATA
Eureka Veterans Building
1018 "H" Street, Eureka, CA

BOLD TYPE used to highlight asbestos. Note: Some samples had multiple layers, as analyzed

Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
1018-189	**TSI, brown air-cell paper under jacketing**	**Bsmt level, Rm. 13**	**PACM**	**Friable**	**NA/PS**
1018-190	**TSI elbow, tan cmpd.**	**Bsmt level, Rm. 13**	**13% CH**	**Friable**	
1018-191	**TSI elbow, tan cmpd.**	**Bsmt level, Rm. 13**	**PACM**	**Friable**	**NA/PS**
1018-192	**TSI elbow, tan cmpd.**	**Bsmt level, Rm. 13**	**PACM**	**Friable**	**NA/PS**
1018-193	**TSI elbow, tan cmpd.**	**Bsmt level, Rm. 13**	**15% CH**	**Friable**	
1018-194	**TSI elbow, tan cmpd.**	**Bsmt level, Rm. 13**	**PACM**	**Friable**	**NA/PS**
1018-195	**TSI elbow, tan cmpd.**	**Bsmt level, Rm. 14**	**PACM**	**Friable**	**NA/PS**
1018-196	**TSI, brown air-cell paper under jacketing**	**Bsmt level, Rm. 13**	**40 % CH**	**Friable**	
1018-197	**TSI, brown air-cell paper under jacketing**	**Bsmt level, Rm. 13**	**40 % CH**	**Friable**	
1018-198	**TSI, brown air-cell paper under jacketing**	**Bsmt level, Rm. 13**	**PACM**	**Friable**	**NA/PS**
1018-199	Plaster, grey rough coat	Bsmt level, Rm. 13	None Detected	Non-Friable	Single coat
1018-200	Plaster, grey rough coat	Bsmt level, Rm. 13	None Detected	Non-Friable	""
1018-201	Concrete, red	Bsmt level, Rm. 13	None Detected	Non-Friable	
1018-202	Window putty, gray	Bsmt level, Rm. 13	None Detected	Non-Friable	
1018-203	Window putty, gray	Bsmt level, Rm. 14	None Detected	Non-Friable	
1018-204	Window putty, gray	Bsmt level, Rm. 14	None Detected	Non-Friable	
1018-205	Window putty, gray	Bsmt level, Rm. 15	None Detected	Non-Friable	
1018-206	Window putty, white	Bsmt level, Rm. 15	None Detected	Non-Friable	
1018-207	Plaster, single coat, gray	Bsmt level, Rm. 14	None Detected	Non-Friable	
1018-208	Plaster, single coat, gray	Bsmt level, Rm. 14	None Detected	Non-Friable	
1018-209	Plaster, Single coat, gray	Bsmt level, Rm. 14	None Detected	Non-Friable	
1018-210	Mortar, gray	Bsmt level, Rm. 14	None Detected	Non-Friable	

TABLE 2
SUMMARY OF ANALYTIC DATA
Eureka Veterans Building
1018 "H" Street, Eureka, CA

BOLD TYPE used to highlight asbestos. Note: Some samples had multiple layers, as analyzed

Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
1018-211	Brick, red	Bsmt level, Rm. 14	None Detected	Non-Friable	
1018-212	Concrete, gray	Bsmt level, Rm. 14	None Detected	Non-Friable	
1018-213	Concrete, gray	Bsmt level, Rm. 14	None Detected	Non-Friable	
1018-214	Plaster, white top, coat	Bsmt level, Rm. 15	None Detected	Non-Friable	
2nd layer	....plaster, grey	""	None Detected	Non-Friable	
1018-215	Plaster, single coat, gray	Bsmt level, Rm. 16	None Detected	Non-Friable	
1018-216	Particle board, brown	Bsmt level, Rm. 15	None Detected	Non-Friable	
1018-217	Plaster, white top, coat	Bsmt level, Rm. 15	None Detected	Non-Friable	
2nd layer	....plaster, grey	""	None Detected	Non-Friable	
1018-218	Plaster, white top, coat	Bsmt level, Rm. 17	None Detected	Non-Friable	
2nd layer	....plaster, grey	""	None Detected	Non-Friable	
1018-219	Gypsum board only	Bsmt level, Rm. 1	None Detected	Non-Friable	
1018-220	Plaster, brown block pattern	Bsmt level, Rm. 1	None Detected	Non-Friable	
1018-221	Plaster, brown block pattern	Bsmt level, Rm. 1	None Detected	Non-Friable	
1018-222	Plaster, brown block pattern	Bsmt level, Rm. 1	None Detected	Non-Friable	
1018-223	Plaster, white, heavy skip trowel	Bsmt level, Rm. 1	None Detected	Non-Friable	
1018-224	Plaster, white, heavy skip trowel	Bsmt level, Rm. 1	None Detected	Non-Friable	
1018-225	Plaster, white, heavy skip trowel	Bsmt level, Rm. 1	None Detected	Non-Friable	
1018-226	Baseboard mastic, cream	Bsmt level, Rm. 1	None Detected	Non-Friable	
1018-227	Floor sealant, white	Bsmt level, Rm. 1	None Detected	Non-Friable	

TABLE 2
SUMMARY OF ANALYTIC DATA
Eureka Veterans Building
1018 "H" Street, Eureka, CA

BOLD TYPE used to highlight asbestos. Note: Some samples had multiple layers, as analyzed

Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
1018-228	Carpet glue/cork flooring/dk brown glue	Bsmt level, Rm. 1	None Detected	Non-Friable	
1018-229	Carpet glue/cork flooring/dk brown glue	Bsmt level, Rm. 1	None Detected	Non-Friable	
1018-230	Carpet glue, mixed w/lt & dk brown mastics	Bsmt level, Rm. 1	None Detected	Non-Friable	
1018-231	Baseboard mastic, tan	Bsmt level, Rm. 1	None Detected	Non-Friable	
1018-232	Floor sizing, tan	Bsmt level, Rm. 1	None Detected	Non-Friable	
1018-233	Plaster, single coat gray	Bsmt level, Rm. 1	None Detected	Non-Friable	
1018-234	Window putty, cream	Bsmt level, Rm. 1	None Detected	Non-Friable	
1018-235	Window putty, tan	Bsmt level, Rm. 1	None Detected	Non-Friable	
1018-236	Concrete, gray	Exterior, front entry	None Detected	Non-Friable	
1018-237	Asphalt, black	Exterior, south parking lot	None Detected	Non-Friable	
1018-238	Concrete, gray	Exterior, N. entrance walk.	None Detected	Non-Friable	
1018-239	Concrete, gray	Exterior, west wall	None Detected	Non-Friable	
1018-240	Concrete, gray	Exterior, N. bsmt. ramp surfacing	None Detected	Non-Friable	
1018-241	Concrete, gray.	Exterior, N. bsmt ramp.	None Detected	Non-Friable	

CH = Chrysotile asbestos CR = Crocidolite asbestos. AM = Amosite asbestos

<1% CH* = Trace amount, less than 1% asbestos, as visually estimated by initial PLM. Requires verification by more accurate point count analyses.

ACM = Asbestos containing material.
PACM= Presumed ACM. See below.
NA/PS = Not analyzed, Positive stop: Stopped analysis after 1st positive test for identical material (see prev. sample).

TABLE 3

PAINT ANALYSES

Eureka Veterans Building, 1018 "H" Street, Eureka, CA

SAMPLE ID	LOCATION	MATERIAL	COLOR	SUBSTRATE	LEAD CONTENT by weight %	LEAD CONTENT parts per million (ppm) or mg/kg
1018-1P	2nd level, Rm. 47, wall	Paint	Yellow	Plaster	0.14	1,400
1018-2P	Stairway,mid level ldg, attic hatch door trim	Paint	Yellow	Wood	0.44	4,400
1018-3P	Gnd flr, Amer.Legion bar, Rm. 20, window trim	Paint	Beige	Wood	0.89	8,900
1018-4P	Gnd Flr, as above, interior entry door	Paint	Beige	Wood	057	5,700
1018-5P	Gnd Flr. so.hall, wall	Paint	Lt. Green	Plaster	0.13	1,300
1018-6P	Exterior, lower roof enclosure wall	Paint	White	Concrete	0.25	2,500
1018-7P	Gnd. Flr., custodial, Rm. 24, door	Stain	Brown	Wood	0.66	6,600
1018-8P	Bsmt., Rm. 1 , door	Paint	Red/peach/cream	Wood	0.20	2,000
1018-9P	Bsmt., Rm. 1, door jamb	Paint	Brown/cream	Wood	<0.01	<100
1018-10P	Bsmt., Rm. 14, wall	Paint	Green	Concrete	0.16	1,600
1018-11P	Bsmt., Rm 15, wall	Paint	White	Plaster	0.17	1,700
1018-12P	Bsmt., Rm. 15, cabinet	Paint	White/gray/tan	Wood	0.077	770
1018-13P	Bsmt., 13, baseboard	Paint	White/green./tan	Wood	0.47	4,700

1018-14P	Bsmt., Rm. 10, door trim	Paint	Brown/tan	Wood	0.072	720
1018-15P	Exterior, entry ceiling	Paint	Green/pink	Concrete	0.58	5,800
1018-16P	Exter., east window sill	Paint	Brown	Wood	1.8	18,000
1018-17P	Exter., west window sill	Paint	Brown	Wood	2.6	26,000
1018-18P	Exter., wall	Paint	Tan/pink	Concrete	0.29	2,900
1018-19P	Exter., front door	Paint	Brown	Wood	0.052	520
1018-20P	Exter., north side ramp railing	Paint	Black	Metal	<0.01	<100

Analysis by Lead in Paint USEPA Method 3050B/7000B

Parts per million (ppm) = milligrams per kilogram (mg/kg)

Lead content at 5,000 ppm (or 0.5% by wt.) or greater is defined as "Lead Based Paint", materials with lesser amounts of detectable lead over 600 ppm are described as "Lead Containing Surface Coatings" (LCSC).

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DUE DATE:
☐ 1 DAY ☐ 2 DAY ☒ 3 DAY ☐ 5 DAY ☐ 7 DAY ☐ 10 DAY

TEMP UPON RECEIPT:

DATA PACKAGE:

P.O.#

COMPANY: TERRY CLARK CONSULTING, LLC.

ADDRESS: 1636 Old Arcata Rd, Bayside, CA 95524

PHONE: (707) 826-1560 | FAX 1: (707) 826-0635 | FAX 2:

CLIENT CONTACT: TERRY CLARK | EMAIL: TERRYCLARKLLC@SUDDENLINK.NET

PROJECT NAME: 1018 14 ST EUREKA, CA | PROJECT NUMBER: 1400303 | PROJECT STATE: CA

MATRIX: A-WATER S-SOIL/SOLIDS SL-SLUDGE OIL-OIL CH-CHIPS WI-WIPES C-CASSETTES W-WASTE O-OTHER

CONTAINER: P-PLASTIC G-GLASS V-VOA

LAB ID	CLIENT SAMPLE IDENTIFICATION	MATRIX	CONTAINER SIZE	CONTAINER TYPE	CONTAINER #	SAMPLING INFORMATION DATE	TIME	TECH	GRAB (G) OR COMPOSITE (C)	PRESERVATIVES	SAMPLE pH AT LOGIN	LEAD IN PAINT						Notes:
P1	1018-1P	CH	S	P	1	9/19/14		VENUS CLARK				X						YELLOW
P2	4 -2P				1							X						YELLOW
P3	4 -3P				1							X						BEIGE
P4	4 -4P				1							X						BEIGE
P5	4 -5P				1							X						GREEN
P6	4 -6P				1							X						WHITE
P7	4 -7P	↓	↓	↓	1	↓						X						STAIN, BASE

(14)

SAMPLED BY: (PRINT)	DATE:	RECEIVED BY: (PRINT)	DATE:
TERRY CLARK	9/19/14		9/19/14
(SIGN)	TIME:	(SIGN)	TIME: 0100
RELINQUISHED BY: (PRINT) TERRY CLARK	DATE: 9/26/14	RECEIVED BY: (PRINT)	DATE:
(SIGN)	TIME:	(SIGN)	TIME:
RELINQUISHED BY: (PRINT)	DATE:	RECEIVED FOR LABORATORY BY:	DATE:
(SIGN)	TIME:	(SIGN)	TIME:

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CLIENT CONTACT: TERRY CLARK | EMAIL: TERRYCLARKLLC@SUDDENLINK.NET

PROJECT NAME: 1018 "H" St. Eureka CA | PROJECT NUMBER: 1400303 | PROJECT STATE: CA

MATRIX: A-WATER S-SOIL/SOLIDS SL-SLUDGE OIL-OIL OW-OTHER W-WIPES C-CHARCOAL WW-WASTE O-OTHER | CONTAINER: P-PLASTIC G-GLASS V-VOA

LAB ID	CLIENT SAMPLE IDENTIFICATION	MATRIX	CONTAINER SIZE	CONTAINER TYPE	CONTAINER #	SAMPLING INFORMATION DATE	TIME	TECH	GRAB (G) OR COMPOSITE (C)	PRESERVATIVES	SAMPLE pH AT LOGIN	Lead in Paint	Notes:
1018-8P	Basement / Rm 1 / Door	CA	S.	P	1	12/4/14		Zindar Brunelle				X	Red, peach, cream
-9P	/ ↓ / Door Jamb											X	Brown, cream
-10P	/ Rm 14 / on concrete wall											X	Green
-11P	/ Rm 15 / wall											X	white
-12P	/ ↓ / cabinet											X	white, gray, Tan
-13P	/ Rm 13 / Baseboard											X	white, green, Tan
-14P	/ Rm 10 / Door Trim											X	Brown, Tan
-15P	Exterior / Entry Ceiling											X	green, pink
-16P	/ East window sill											X	Brown
-17P	/ West window sill											X	Brown
-18P	/ On Concrete wall											X	Tan, pink
-19P	/ Front Door											X	Brown

SAMPLED BY: (PRINT) Zindar Brunelle	DATE: 12/4/14	RECEIVED BY: (PRINT)	DATE: 12/08/14
(SIGN) Zindar Brunelle	TIME:	(SIGN)	TIME: 08:30
RELINQUISHED BY: (PRINT) Zindar Brunelle	DATE: 12/5/14	RECEIVED BY: (PRINT)	DATE:
(SIGN) Zindar Brunelle	TIME:	(SIGN)	TIME:
RELINQUISHED BY: (PRINT)	DATE:	RECEIVED FOR LABORATORY BY:	DATE:
(SIGN)	TIME:	(SIGN)	TIME:

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COMPANY: TERRY CLARK CONSULTING, LLC.

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CLIENT CONTACT: TERRY CLARK | EMAIL: TERRYCLARKLLC@SUDDENLINK.NET

PROJECT NAME: 1018 "H" St. Eureka CA | PROJECT NUMBER: 1400303 | PROJECT STATE: CA

MATRIX: | CONTAINER:

LAB ID	CLIENT SAMPLE IDENTIFICATION	MATRIX	CONTAINER SIZE	CONTAINER TYPE	CONTAINER #	SAMPLING INFORMATION DATE	SAMPLING INFORMATION TIME	SAMPLING INFORMATION TECH	GRAB (G) OR COMPOSITE (C)	PRESERVATIVES	SAMPLE pH AT LOGIN	Lead in Paint	Notes:
1018-209	Exterior/Ramp Railing	CH	S	P	1	12/4/14		Zindar Brunelle				X	Black

SAMPLED BY: (PRINT) Zindar Brunelle
(SIGN) Zindar Brunelle
DATE: 12/4/14
TIME:

RELINQUISHED BY: (PRINT) Zindar Brunelle
(SIGN) Zindar Brunelle
DATE: 12/5/14
TIME:

RELINQUISHED BY: (PRINT)
(SIGN)
DATE:
TIME:

RECEIVED BY: (PRINT)
(SIGN)

RECEIVED BY: (PRINT)
(SIGN)

RECEIVED FOR LABORATORY BY:
(SIGN)

DATE: 12/08/14
TIME: 10:20

DATE:
TIME:

DATE:
TIME:

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AmeriSci Los Angeles
24416 S. Main Street, Ste 308
Carson, California 90745
TEL: (310) 834-4868 • FAX: (310) 834-4772

AmeriSci Job #: 414091539

Date Received: 09/29/14
Date Analyzed: 10/01/14

Lead Analysis Results

Paint

EPA Method 3050B/7000B

Terry Clark Consulting, LLC

Bayside, CA

Job Site: 1400303; 1018 H St. Eureka CA

AmeriSci # 414091539	Client Number	Sample Location	% Lead (w/w)	Lead Content (mg/kg = ppm)
01	1018-1P	2nd Lvl, Rm 4, Wall / Yellow	0.14	1,400
02	1018-2P	Stair Mid Ldg, Door Trim / Yellow	0.44	4,400
03	1018-3P	1st Flr, So Bar, Win Trim / Beige	0.89	8,900
04	1018-4P	1st Flr, So Bar, Door / Beige	0.57	5,700
05	1018-5P	1st Floor Hall, Wall / Green	0.13	1,300
06	1018-6P	Ext, Lower Roof, Wall / White	0.25	2,500
07	1018-7P	1st Flr, Custodian, Door / Stain Brn	0.66	6,600

AmeriSci Reporting Limit is 0.01%, or 100mg/kg prior to any dilutions due to high analyte concentrations or matrix interferences. AmeriSci does not correct sample results by the blank value. All analytical batch data met quality control criteria unless otherwise noted. CA ELAP No. 2322. AIHA Lab No. 100530.

Reviewed by: _____

Analyzed by: _____
Minh Phung, Chemist

ELAP No: CA 2322

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24416 S. Main Street, Ste 308
Carson, California 90745
TEL: (310) 834-4868 • FAX: (310) 834-4772

AmeriSci Job #: 414121095

Date Received: 12/08/14
Date Analyzed: 12/11/14

Lead Analysis Results

Paint
EPA Method 3050B/7000B

Terry Clark Consulting, LLC
Bayside, CA
Job Site: 1400303; 1018 "H" St. Eureka CA

AmeriSci # 414121095	Client Number	Sample Location	% Lead (w/w)	Lead Content (mg/kg = ppm)
01	1018-8P	Basement / Rm 1 / Door / Red, Peach, Cream	0.20	2,000
02	1018-9P	Basement / Rm 1 / Door Jamb / Brown, Cream	<0.01	<100
03	1018-10P	Basement / Rm 14 / On Concrete Wall / Green	0.16	1,600
04	1018-11P	Basement / Rm 15 / Wall / White	0.17	1,700
05	1018-12P	Basement / Rm 15 / Cabinet / White, Gray, Tan	0.077	770
06	1018-13P	Basement / Rm 13 / Baseboard / White, Green Tan	0.47	4,700
07	1018-14P	Basement / Rm 10 / Door Trim / Brown, Tan	0.072	720
08	1018-15P	Exterior / Entry Ceiling / Green, Pink	0.58	5,800
09	1018-16P	Exterior / East Window Sill / Brown	1.8	18,000
10	1018-17P	Exterior / West Window Sill / Brown	2.6	26,000
11	1018-18P	Exterior / On Concrete Wall / Tan, Pink	0.29	2,900
12	1018-19P	Exterior / Front Door / Brown	0.052	520
13	1018-20P	Exterior / Ramp Railing / Black	<0.01	<100

AmeriSci Reporting Limit is 0.01%, or 100mg/kg prior to any dilutions due to high analyte concentrations or matrix interferences. AmeriSci does not correct sample results by the blank value. All analytical batch data met quality control criteria unless otherwise noted. CA ELAP No. 2322. AIHA Lab No. 100530.

Reviewed by: _____

Analyzed by: _____
Minh Phung, Chemist

9140918 89

Analysis:	Turnaround Time:		
X Standard PLM	<12-hr/1-day/2-days/3-days/>3 days	TERRY CLARK CONSULTING, L.L.C. 1636 Old Arcata Road Bayside, CA 95524 Ph: (707) 822-4058 Fax: (707) 826-0635 Cell #: (707) 616-9852 terryclarkLLC@suddenlink.net	Date: 9/19/14 Site: 1018 "H" St Eureka CA 95501 Proj.# 1400303
___ 400 Point Count			
___ 1,000 Point Count			

BULK ASBESTOS SAMPLING

Sample No.	Sample Description	Hom, Area	Location	Mat'l Type	Mat'l Cond.	Friable
1018-1	Window glazing, brn.	1	EXT. ROOF DOME	MM	ND	NF
-2	, white	2				
-3		2				
-4	Silver Paint	3				
-5	Roof Patch, black faded to gray	4				
-6		4				
-7	Roof Patch, black faded to gray	5	TOP ROOF, NORTH			
-8	Surfacing, silver-black tar	6				
-9	Patch, black faded to gray	7				
-10	Caulking, green	8				
-11	Concrete, gray	9				
-12	Roofing, built-up, gray comp	10				
-13	Concrete, decorative	11	TOP ROOF, SOUTH	SM		
-14	Roofing, built-up, gray comp	12	MIDDLE ROOF	MM		
-15		13	LOWER SO. ROOF			

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SF = Sheet Flooring
GB/JC = Gypsum board/Joint Compound
CT = Ceiling Tile (glued or nailed)
CP = Ceiling Panel (t-grid or drop ceil.)

Material Type
Thermal System Insulation = TSI
Misc. Material = MM
Surfacing Material = SM

Material Condition
Not Damaged = ND
Damaged = DG
Significantly Damaged – SD
Potentially Significantly Damaged = PSD

~~Stop analysis for any layer at first positive, if >1%, where indicated.~~

Sampled by: Zindar Brundige	Received by:
Relinquished by:	Date/time
Date/Time:	Date/Time: 9/22/14 @ 1010

9140911889

Analysis: X Standard PLM ___ 400 Point Count ___ 1,000 Point Count Turnaround Time: <12-hr/1-day/2-days/3-days/>3 days	TERRY CLARK CONSULTING, L.L.C. 1636 Old Arcata Road Bayside, CA 95524 Ph: (707) 822-4058 Fax: (707) 826-0635 Cell #: (707) 616-9852 terryclarkLLC@suddenlink.net	Date: 9/19/14 Site: 1018 "H" St Eureka CA 95501 Proj.# 1400303

BULK ASBESTOS SAMPLING

Sample No.	Sample Description	Hom. Area	Location	Mat'l Type	Mat'l Cond.	Friable
1018-16	Fiberboard	14	LOWER So. ROOF	MM	ND	F
-17	Tar, black	15	↓	↓	↓	NF
-18	Roofing, built-up, gray comp	16	LOWER NORTH ROOF			
-19	Roof Patch, black	17				
-20	↓, gray	18				
-21	Roof Patch, black and gray	19				
-22	Roof Patch, brown	20				
-23	Tar, black	21	↓			
-24	Surfacing, silver-black tar	22				
-25	Roof Patch, dark gray	23	↓			
-26	Surfacing, silver-black Tar	24	MIDDLE ROOF			
-27	Roof Patch, brown	25				
-28	Roof Patch, Light gray	26				
-29	↓	26				
-30	Silver paint	27	↓	↓	↓	↓

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Sampled by: Zindar Brundige
Relinquished by:
Date/Time:

Received by: K. V
Date/time
Date/Time: 9/22/14 @ 10:00

9140 91889

Analysis: X Standard PLM ___ 400 Point Count ___ 1,000 Point Count Turnaround Time: <12-hr/1-day/2-days/3-days/>3 days	TERRY CLARK CONSULTING, L.L.C. 1636 Old Arcata Road Bayside, CA 95524 Ph: (707) 822-4058 Fax: (707) 826-0635 Cell #: (707) 616-9852 terryclarkLLC@suddenlink.net	Date: 9/19/14 Site: 1018 "H" St Eureka CA 95501 Proj.# 1400303

BULK ASBESTOS SAMPLING

Sample No.	Sample Description	Hom, Area	Location	Mat'l Type	Mat'l Cond.	Friable
1018-31	Roof Patch, brown	28	LOWER SOUTH ROOF	MM	ND	NF
-32	, light gray	29				
-33	, gray	30				
-34	Silver Paint	31				
-35	Tar, black	32				
-36	Roof Patch, black-gray	33	MIDDLE ROOF			
-37	Roof Patch, silver-gray	34	TOP ROOF			
-38	, silver gray with cloth mesh	35				
-39	Roof Patch, black	36				
-40	Roof Patch, black	37	LOWER ROOF, EAST			
-41	Roof Patch, black	38				
-42	Roof Patch, light gray	39				
-43	Roof Patch, silver-gray	40				
-44	Silver Paint / Roofing, built-up	41				
-45	Fiberboard, brown	42				F

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Sampled by: Zindar Brunelle	Received by: K. V
Relinquished by:	Date/time
Date/Time:	Date Time: 9/22/14 @ 1010

Please check all layers

9140911889

Analysis:	TERRY CLARK CONSULTING, L.L.C.	Date: 9/19/14
X Standard PLM ___ 400 Point Count ___ 1,000 Point Count	1636 Old Arcata Road Bayside. CA 95524 Ph: (707) 822-4058 Fax: (707) 826-0635 Cell #: (707) 616-9852 terryclarkLLC@suddenlink.net	Site: 1018 "H" St Eureka CA 95501
Turnaround Time: <12-hr/1-day/2-days/3-days/>3 days		Proj.# 1400303

BULK ASBESTOS SAMPLING

Sample No.	Sample Description	Hom. Area	Location	Mat'l Type	Mat'l Cond.	Friable
1018-46	Tar, black	43	LOWER ROOF, EAST	MM	ND	NF
-47	Mastic, dark brown	44	2nd level, RM. #3			
-48	↓	44	" "			
-49	Ceiling Tile, brown painted white	45	" "			
-50	Plaster; Brown TC / gray RC	46	RM. #4	SM	D/	
-51	↓ ↓ ↓	46	RM #2			
-52	Plaster; white TC / Brown mid-coat / gray RC	47	" "			
-53	↓ ↓ ↓	47	" "			
-54	Plaster; white TC / gray RC	48	" "			
-55	Window glazing, gray	49	RM #1, INTERIOR metal board	MM	ND	
-56	↓	49	"			
-57	↓	49	"			
-						
-						
-						

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[redacted] for any layer at first positive if >1% where indicated.

Sampled by: Zindar Brundige
Relinquished by:
Date/Time:

Received by: K V
Date/time
Date/Time: 9/22/14 @ 1010

Please check all Layers

91411114

Analysis:	Turnaround Time:	TERRY CLARK CONSULTING, L.L.C.	Date / Site / Proj.#
X Standard PLM ___ 400 Point Count ___ 1,000 Point Count	<12-hr/1-day/2-days/3-days/>3 days	1636 Old Arcata Road Bayside, CA 95524 Ph: (707) 822-4058 Fax: (707) 826-0635 Cell #: (707) 616-9852 terryclarkLLC@suddenlink.net	Date 10/30/14 Site: 1018 H" St Eureka CA 95501 Proj.# 1400303

BULK ASBESTOS SAMPLING

Sample No.	Sample Description	Hom, Area	Location	Mat'l Type	Mat'l Cond.	Friable
1018-58	Battleship BLACK LINOLEUM, marbled		2nd Level ROTUNDA Rm 46	MM	ND	NF
-59	↓ Red-BRN STRUCTURAL		"			
-60	CONCRETE,		MID ATTIC STRUCTURAL Level SPACE, Beam			
-61	TERRAZZO TILE, Base Board		2nd Level, ROTUNDA			
-62	Battleship WOOD LINOLEUM, PATTERN		1-2 STAIRWAY TREAD			
-63	Plaster, WHITE TOP COAT / EGGY ROUGH SINGLE COAT		Rm. 44, CEILING	SM		
-64	GRAINY GRAY		Rm. # 22 CEILING			
-65	WHT TOP COAT / GRAY ROUGH COAT		1-2 STAIRWAY			
-66	BROWN TOP COAT / GRAY ROUGH COAT		Rm # 30			
-67	GRAY ROUGH COAT		Rm. #44			
-68	LT GRAY TOP COAT (GUNKY)					F
-69	" "					↓
-70	" "		↓			↓
-71	BROWN TOP COAT GRAY ROUGH COAT		Rm # 40			NF
-72	GRAY-BRN TOP COAT LT. GRY ROUGH COAT		Rm # 31	↓	↓	↓

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[redacted] Stop analysis for any layer at first positive if >1%, where indicated.

Sampled by: Zindar Brandt	Received by: K.V 11/3/14 0102
Relinquished by: ZB 10/31/14	Date/time
Date/Time:	Date/Time:

91411114

Analysis: X Standard PLM ___ 400 Point Count ___ 1,000 Point Count Turnaround Time: <12-hr/1-day/2-days/3-days/>3 days	TERRY CLARK CONSULTING, L.L.C. 1636 Old Arcata Road Bayside, CA 95524 Ph: (707) 822-4058 Fax: (707) 826-0635 Cell #: (707) 616-9852 terryclarkLLC@suddenlink.net	Date: 10/30/14 Site: 1018 "H" St Eureka CA 95501 Proj.# 1400303

BULK ASBESTOS SAMPLING

Sample No.	Sample Description	Hom, Area	Location	Mat'l Type	Mat'l Cond.	Friable
1018-73	Plaster, white and stringy		Rm #31 deco FREIZE BLOCK	SM	ND	NF
-74	Plaster; white TC, gray RC		Rm #28 closet			
-75	" , "		Rm #42, Kitchen			
-76	" , "		" " "			
-77	CT (1x1), white on brown		Rm #30 CEILING	MM		
-78	Mastic, brown		" "			
-79	Plaster, RC gray		" "	SM	DG	F
-80	Plaster, Lt. gray punky		" CEIL. above CT.			
-81	Plaster, white		" " FREIZE BLOCK			
-82	"		" " "			
-83	CT, white on brown		WALL	MM	ND	NF
-84	Mastic, brown		" WALL			
-85	GB/JC		RM. 39 (HVAC, RM)			
-86	"		" "			
-87	"		" "			

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Sampled by: Zindar Brunette	Received by: K. [illegible] 11/3/14 0102
Relinquished by: [illegible]	Date/time
Date/Time: 10/31/14	Date/Time:

91411114

Analysis: X Standard PLM ___ 400 Point Count ___ 1,000 Point Count Turnaround Time: <12-hr/1-day/2-days/(3-days)/>3 days	TERRY CLARK CONSULTING, L.L.C. 1636 Old Arcata Road Bayside, CA 95524 Ph: (707) 822-4058 Fax: (707) 826-0635 Cell #: (707) 616-9852 terryclarkLLC@suddenlink.net	Date: 10/30/14 Site: 1018 "H" St Eureka CA 95501 Proj.# 1400303

BULK ASBESTOS SAMPLING

Sample No.	Sample Description	Hom, Area	Location	Mat'l Type	Mat'l Cond.	Friable
1018-88	Surfacing, white		Attic Space above 1st Floor	SM	ND	F?
-89	Tile grout, white		Rm #43 (Woman's RR)	MM		NF
-90	Tile mortar, gray		" "			
-91	Battleship wood pattern Linoleum, Brown		Rm #26			
-92	↓ , green		Rm #21			
-93	Mortar		Rm #22 chimney			
-94	Brick		" "			
-95	Carpet glue, clear		Rm #22			↓
-96	SF, Beige and white / Tan glue		Rm #23 (Hall) Top layer			NF/F
-97	Floor sizing, white		" ↓ ↓			F
-98	SF, black with paper backing		↓ ↓ Bottom Layer			NF/F
-99	VFT (12x12), Black and white / Yellow mastic		Rm #20			NF
-100	↓ gray with black spots / ↓		↓ ↓			↓
-101	↓ Beige with white streaks / ↓		↓ ↓			↓
-102	VFT (12x12), Tan / Black mastic		Rm #42 Top Layer	↓	↓	↓

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Sampled by: Zindar Brunelle	Received by: K. M 11/3/14 @ 1020
Relinquished by: ZB 10/31/14	Date/time
Date/Time:	Date/Time:

30 & 31

Analysis: X Standard PLM ___ 400 Point Count ___ 1,000 Point Count Turnaround Time: <12-hr/1-day/2-days/3-days/>3 days	TERRY CLARK CONSULTING, L.L.C. 1636 Old Arcata Road Bayside, CA 95524 Ph: (707) 822-4058 Fax: (707) 826-0635 Cell #: (707) 616-9852 terryclarkLLC@suddenlink.net	Date: 10/16/14 Site: 1018 "H" St Eureka CA 95501 Proj.# 1400303

BULK ASBESTOS SAMPLING

Sample No.	Sample Description	Hom, Area	Location	Mat'l Type	Mat'l Cond.	Friable
1018-103	VFT (12x12), Tan / Black mastic		Rm 42 / top layer	MM	ND	NF
-104	↓ / ↓		↓ / ↓			
-105	Battleship Linoleum, Green		↓ / under particle board			
-106	Terrazzo, grey multicolor		Rm 25 / stall	↓	↓	↓
-107	Felt, GREEN		Rm #41 Hall w/ HVAC Reg. gasket	MM	ND	ND
-108	GB/JC		Rm #2			
-109	" / "		BSMM			
-110	" / "		↓			
-111	wall paper and velvet					
-112	Panel glue, cream		↓			
-113	cardboard CORR.? glue, BRN.		Rm #8			
-114	VFT 12x12 BEIGE w/DK gy STICKS yellow glue		Rm #2			
-115	" "		" "			
-116	VFT 12x12 BEIGE, BRN STICKS		Rm #6			
-117	" "		Rm #10	↓	↓	↓

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Sampled by: Zindar Brandke	Received by: K. V	11/3/14 @ 1020
Relinquished by: [signature] 10/31/14	Date/time	
Date/Time:	Date/Time:	

9141111114

Analysis: ☒ Standard PLM ☐ 400 Point Count ☐ 1,000 Point Count Turnaround Time: <12-hr/1-day/2-days/3-days/>3 days	TERRY CLARK CONSULTING, L.L.C. 1636 Old Arcata Road Bayside, CA 95524 Ph: (707) 822-4058 Fax: (707) 826-0635 Cell #: (707) 616-9852 terryclarkLLC@suddenlink.net	Date: 10/31/14 Site: 1018 "H" St Eureka CA 95501 Proj.# 1400303

BULK ASBESTOS SAMPLING

Sample No.	Sample Description	Hom, Area	Location	Mat'l Type	Mat'l Cond.	Friabl
1018-118	Baseboard MASTIC cream			MM	ND	NF
-119	Floor SHEET GLUE					
-120	Baseboard MASTIC, cream					
-121	VFT 9x9 green & BROWN checks / BLK MASTIC		Rm #1 & #2, bottom layer			
-122	" " / "		#2,			
-123	" " / "		#2,			
-124	carpet glue, yellow		#2			
-125	Baseboard MASTIC, cream		#2			
-126	window PUTTY		Rm #8			
-127	concrete		Rm #8			
-128	TSI air cell		Rm #8 at pipe	TSI?		
-129	Plaster with gray ROUGH coat / top coat		Rm #10, ceil.	SM		
-130	" " / "		, wall			
-131	concrete		Rm #12 wall	MM		
-132	waterproofing, Black Tar		" " , Floor	SM		

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Sampled by: Zindar Brunette	Received by:
Relinquished by:	Date/time
Date/Time: 10/31/14	Date/Time:

9141111114

Analysis: X Standard PLM ___ 400 Point Count ___ 1,000 Point Count Turnaround Time: <12-hr/1-day/2-days/3-days/>3 days	TERRY CLARK CONSULTING, L.L.C. 1636 Old Arcata Road Bayside, CA 95524 Ph: (707) 822-4058 Fax: (707) 826-0635 Cell #: (707) 616-9852 terryclarkLLC@suddenlink.net	Date: 10/31/14 Site: 1018 "H" St Eureka CA 95501 Proj.# 1400303

BULK ASBESTOS SAMPLING

Sample No.	Sample Description	Hom, Area	Location	Mat'l Type	Mat'l Cond.	Friabl
1018-133	Transite		Rm # 12 short Pipe	MM	ND	NF
-134	Plaster wht Top coat / GRAY ROUGH COAT		Rm # 10	SM		
-135	GB / JC		↓	MM		
-136	" / "		Rm #7			
-137	" / "		↓			
-138	Plaster, gray SCRATCH COAT		Rm #11	SM		
-139	WINDOW CAULKING, WHITE		↓	MM		
-140	WINDOW PUTTY		↓			
-141	GB / JC		Rm #19			
-142	Plaster SURFACING, WHITE		↓ ON CONCRETE			
-143	BASEBOARD MASTIC, BROWN					↓
-144	S.F. dk gray MOSAIC / YEL GLUE		↓	↓		NFR
-145	Plaster, SCRATCH COAT GRAY		Rm #3	SM		NF
-146	Plaster BROWN TOP COAT / gray ROUGH COAT		Rm #6			
-147	Plaster, gray ROUGH COAT		Rm #5	↓	↓	↓

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Sampled by: Zinder Brundle	Received by:
Relinquished by:	Date/time
Date/Time: 10/31/14	Date/Time:

914111114

Analysis: X Standard PLM ___ 400 Point Count ___ 1,000 Point Count Turnaround Time: <12-hr/1-day/2-days/3-days/>3 days	TERRY CLARK CONSULTING, L.L.C. 1636 Old Arcata Road Bayside, CA 95524 Ph: (707) 822-4058 Fax: (707) 826-0635 Cell #: (707) 616-9852 terryclarkLLC@suddenlink.net	Date: 10/31/14 Site: 1018 "H" St Eureka CA 95501 Proj.# 1400303

BULK ASBESTOS SAMPLING

Sample No.	Sample Description	Hom, Area	Location	Mat'l Type	Mat'l Cond.	Friabl
1018-148	VFT 12x12 TAN w/WHT STREAKS / BLK MASTIC		RM #4	MM	ND	NF
-149	" " / "		↓	↓	↓	↓
-150	" " / "		RM #16	↓	↓	↓
-151	Plaster SURFACING, LIME GREEN		↓	SM	↓	↓
-152	Cardboard DOOR FILL		RM #18	MM	↓	↓
-153	Plaster SURFACING, GRAY		RM #15, Closet #9	SM	↓	↓
-154	↓ WHITE TOP COAT		↓ ↓	↓	↓	↓
-155	Plaster COAT ROUGH GRAY		↓ ↓	↓	↓	↓
-156	Tar, BLACK		↓ ↓ bottom layer	↓	↓	↓
-157	carpet glue, BROWN		RM #1	MM	↓	↓
-158	Baseboard MASTIC, BROWN		" "	↓	↓	↓
-159	BB MASTIC GRAY mixed w/ TEXTURE WHITE		RM #1	↓	↓	↓
-160	carpet yel-brn glue, on top / BRN glue on BOTTOM		RM #1	↓	↓	↓

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Surfacing Material = SM

Material Condition
Not Damaged = ND
Damaged = DG
Significantly Damaged – SD
Potentially Significantly Damaged = PSD

= Stop analysis for any layer at first positive if >1%. where indicated.

Sampled by: Zindel Brunette
Relinquished by: [signature] Date/Time: 10/31/14
Received by:
Date/time
Date/Time:

Analysis: X Standard PLM ___ 400 Point Count ___ 1,000 Point Count Turnaround Time: <12-hr/1-day/2-days/3-days/>3 days	TERRY CLARK CONSULTING, L.L.C. 1636 Old Arcata Road Bayside, CA 95524 Ph: (707) 822-4058 Fax: (707) 826-0635 Cell #: (707) 616-9852 terryclarkLLC@suddenlink.net	Date: 12/4/14 Site: 1018 "H" St. Eureka CA Proj.# 1400303

BULK ASBESTOS SAMPLING 9141289

Sample No.	Sample Description	Hom, Area	Location	Mat'l Type	Mat'l Cond.	Friable
1018-161	TSI Elbow, 4"	1	Basement / Rm 15	TSI	ND	F
-162		1	/ Rm 1			
-163		1	/ Rm 15			
-164		1	/ Rm 1			
-165	TSI Air-Cell, 4"	2	/			
-166		2	/ Rm 15			
-167		2	/ Rm 1			
-168		2	/ Rm 15			
-169	"No Sample"					
-170	TSI Elbow 3"	3	Basement / Rm 15	TSI	ND	F
-171	TSI, strait, fiberglass, 3"	4	/			
-172	TSI Air-cell, 5"	5	/ Rm 1			
-173		5	/ Rm 15			
-174		5	/ Rm 1			
-175	TSI Elbow, 5"	6	/			

Sample Abbreviations
VFT/M = Vinyl Floor Tile & Mastic
SF = Sheet Flooring
JC/GB = Joint Compound/Gypsum Board
CT = Ceiling Tile (glued or nailed)
CP = Ceiling Panel (t-grid or drop ceil.)

Material Type
Thermal System Insulation = TSI
Misc. Material = MM
Surfacing Material = SM

Material Condition
Not Damaged = ND
Damaged = DG
Significantly Damaged – SD
Potentially Significantly Damaged = PSD

* = Stop analysis for any layer at first positive, if >1%, where indicated.

Sampled by: Zindar Brundlo	Received by: 12/8/14 10:20
Relinquished by: Date/Time: 12/5/14	Date/time Date/Time:

Analysis: X Standard PLM ___ 400 Point Count ___ 1,000 Point Count Turnaround Time: <12-hr/1-day/2-days/3-days/>3 days	TERRY CLARK CONSULTING, L.L.C. 1636 Old Arcata Road Bayside, CA 95524 Ph: (707) 822-4058 Fax: (707) 826-0635 Cell #: (707) 616-9852 terryclarkLLC@suddenlink.net	Date: 12/4/14 Site: 1018 "H" St. Eureka CA Proj.# 1400303

BULK ASBESTOS SAMPLING 914 121289

	Sample No.	Sample Description	Hom. Area	Location	Mat'l Type	Mat'l Cond.	Friable
*	1018-176	TSI Elbow, 5"	6	Basement / Rm 1	TSI	ND	F
	-177	↓	6	/ Rm 15	↓	↓	↓
*	-178	Plaster, gray Rough Coat Only	7	/ Rm 13	SM	↓	NF
	-179	↓	7	/ ↓	↓	↓	↓
*	-180	TSI, strait, white powder	8	/ Rm 14	TSI	↓	F
	-181	TSI, End Cap, white powder	8	/ ↓	↓	↓	↓
	-182	TSI Aircell, 5"	9	/ Rm 15	↓	↓	↓
	-183	TSI Aircell, 4"	10	/ Rm 14	↓	↓	↓
	-184	TSI Elbow, 3"	11	/ Rm 13	↓	↓	↓
*	-185	↓	11	/ ↓	↓	↓	↓
	-186	↓	11	/ ↓	↓	↓	↓
	-187	TSI Air-cell, 4"	12	/ ↓	↓	↓	↓
*	-188	↓	12	/ ↓	↓	↓	↓
	-189	↓	12	/ ↓	↓	↓	↓
	-190	TSI Elbow 4"	13	/ ↓	↓	↓	↓
*							

Sample Abbreviations
VFT/M = Vinyl Floor Tile & Mastic
SF = Sheet Flooring
JC/GB = Joint Compound/Gypsum Board
CT = Ceiling Tile (glued or nailed)
CP = Ceiling Panel (t-grid or drop ceil.)

Material Type
Thermal System Insulation = TSI
Misc. Material = MM
Surfacing Material = SM

Material Condition
Not Damaged = ND
Damaged = DG
Significantly Damaged – SD
Potentially Significantly Damaged = PSD

* = Stop analysis for any layer at first positive, if >1%, where indicated.

Sampled by: Zindar Brandle	Received by:
Relinquished by: Date/Time: 12/5/14	Date/time Date/Time:

Analysis: X Standard PLM ___ 400 Point Count ___ 1,000 Point Count Turnaround Time: <12-hr/1-day/2-days/3-days>3 days	TERRY CLARK CONSULTING, L.L.C. 1636 Old Arcata Road Bayside, CA 95524 Ph: (707) 822-4058 Fax: (707) 826-0635 Cell #: (707) 616-9852 terryclarkLLC@suddenlink.net	Date: 12/4/14 Site: 1018 "H" St. Eureka CA Proj.# 1400303

BULK ASBESTOS SAMPLING 914121289

Sample No.	Sample Description	Hom, Area	Location	Mat'l Type	Mat'l Cond.	Friable
* 1018-191	TSI Elbow, 4"	B	Basement / Rm 13	ISI	ND	F
-192	↓	13	/			
* -193	TSI Elbow, 6"	14	/			
-194	↓	14	/ ↓			
-195	↓	14	/ Rm 14			
-196	TSI Air-cell, 5"	15	/ Rm 13			
* -197	TSI Aircell, 6"	16	/ ↓			
-198	↓	16	/ Rm 14	↓		↓
* -199	Plaster, RL Only, gray	17	/ Rm 13	SM		NF
-200	↓	17	/ ↓	↓		
-201	Concrete, red	18	/	MM		
* -202	Window glazing, gray	19	/ ↓			
-203	↓	19	/ Rm 14			
-204	↓	19	/ ↓			
-205	↓	19	/ Rm 15	↓	↓	↓

Sample Abbreviations
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CP = Ceiling Panel (t-grid or drop ceil.)

Material Type
Thermal System Insulation = TSI
Misc. Material = MM
Surfacing Material = SM

Material Condition
Not Damaged = ND
Damaged = DG
Significantly Damaged – SD
Potentially Significantly Damaged = PSD

* = Stop analysis for any layer at first positive, if >1%, where indicated.

Sampled by: Zindar Bounelle	Received by: [illegible] 12/5/14 10:20
Relinquished by: [illegible] 12/5/14 Date/Time:	Date/time Date/Time:

Analysis:	TERRY CLARK CONSULTING, L.L.C.	Date: 12/4/14
X Standard PLM ___ 400 Point Count ___ 1,000 Point Count	1636 Old Arcata Road Bayside, CA 95524	Site: 1018 "H" St Eureka CA 95501
Turnaround Time: <12-hr/1-day/2-days/3-days/>3 days	Ph: (707) 822-4058 Fax: (707) 826-0635 Cell #: (707) 616-9852 terryclarkLLC@suddenlink.net	Proj.# 1400303

BULK ASBESTOS SAMPLING 914121289

	Sample No.	Sample Description	Hom, Area	Location	Mat'l Type	Mat'l Cond.	Friabl:
	1018-206	Window glazing, white	20	Basement / Rm 15	MM	ND	NF
*	-207	Plaster, Single Coat, gray	21	/ Rm 14	SM		
*	-208	↓	21	/ ↓	↓		
*	-209	↓	21	/ ↓	↓		
	-210	Mortar, gray	22	/	MM		
	-211	Brick, Red,	23	/	↓		
	-212	Congrete, gray	24	/			
	-213	concrete, gray	25	/ ↓	↓		
	-214	Plaster; white TC / gray RC	26	/ Rm 15	SM		
	-215	Plaster, single coat, gray	27	/ Rm 16	↓		
	-216	Particle board, brown	28	/ Rm 15	MM		
*	-217	Plaster; white TC / gray RC	29	/ ↓	SM		
*	-218	↓	29	/ Rm 17	↓		
	-219	GB Only	30	/ Rm 1	MM		
*	-220	Plaster, Brown, Black Pattern	31	/ ↓	SM		

Sample Abbreviations
VFT/M = Vinyl Floor Tile & Mastic
SF = Sheet Flooring
GB/JC = Gypsum board/Joint Compound
CT = Ceiling Tile (glued or nailed)
CP = Ceiling Panel (t-grid or drop ceil.)

Material Type
Thermal System Insulation = TSI
Misc. Material = MM
Surfacing Material = SM

Material Condition
Not Damaged = ND
Damaged = DG
Significantly Damaged – SD
Potentially Significantly Damaged = PSD

* = Stop analysis for any layer at first positive, if >1%, where indicated.

Sampled by: Zindar Brumfield	Received by:
Relinquished by: [signature] 12/5/14	Date/time 10:20
Date/Time:	Date/Time:

Analysis:	Turnaround Time:		
X Standard PLM	<12-hr/1-day/2-days/(3-days)/>3 days	TERRY CLARK CONSULTING, L.L.C.	Date: 12/4/14
___ 400 Point Count		1636 Old Arcata Road	Site: 1018 "H" St
___ 1,000 Point Count		Bayside, CA 95524	Eureka CA 95501
		Ph: (707) 822-4058 Fax: (707) 826-0635	Proj.# 1400303
		Cell #: (707) 616-9852	
		terryclarkLLC@suddenlink.net	

BULK ASBESTOS SAMPLING 0141212289

Sample No.	Sample Description	Hom, Area	Location	Mat'l Type	Mat'l Cond.	Friabl
1018-221	Plaster, Brown Block pattern	31	Basement / Rm 1	SM	ND	NF
-222	↓	31	/ /			
-223	Plaster, white, Heavy Skip Trowel	32	/ /			
-224	↓	32	/ /			
-225	↓	32	/ /	↓		
-226	Baseboard Mastic, cream	33	/ /	MM		
-227	Floor Sealant, white	34	/ /			
-228	Brown Carpet glue / Cork Flooring / Dark Brown glue	35	/ /			
-229	↓ / ↓ / ↓	35	/ /			
-230	Carpet glue, Mix, lt. to brown and dark brown	36	/ /			
231	Baseboard Mastic, Tan	37	/ /			
-232	Floor sizing, Tan	38	/ /	↓		
-233	Plaster, Single Coat, gray	39	/ /	SM		
-234	Window glazing, cream	40	/ /	MM		
-235	Window glazing, Tan	41	↓ / ↓	↓	↓	↓

Sample Abbreviations
VFT/M = Vinyl Floor Tile & Mastic
SF = Sheet Flooring
GB/JC = Gypsum board/Joint Compound
CT = Ceiling Tile (glued or nailed)
CP = Ceiling Panel (t-grid or drop ceil.)

Material Type
Thermal System Insulation = TSI
Misc. Material = MM
Surfacing Material = SM

Material Condition
Not Damaged = ND
Damaged = DG
Significantly Damaged – SD
Potentially Significantly Damaged = PSD

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Sampled by: Zindar Brundette	Received by:
Relinquished by: Zindar Brundette 12/5/14	Date/time 10:20
Date/Time:	Date/Time:

Analysis: X Standard PLM ___ 400 Point Count ___ 1,000 Point Count Turnaround Time: <12-hr/1-day/2-days/3-days/>3 days	TERRY CLARK CONSULTING, L.L.C. 1636 Old Arcata Road Bayside, CA 95524 Ph: (707) 822-4058 Fax: (707) 826-0635 Cell #: (707) 616-9852 terryclarkLLC@suddenlink.net	Date: 12/4/14 Site: 1018 "H" St. Eureka CA Proj.# 1400303

BULK ASBESTOS SAMPLING 914121289

Sample No.	Sample Description	Hom, Area	Location	Mat'l Type	Mat'l Cond.	Friable
1018-236	Concrete, gray	42	Exterior / Front Entry	MM	ND	NF
-237	Asphault, black	43	/ Parking Lot			
-238	Concrete, gray	44	/ N-Entrance walkway			
-239		45	/ West Wall			
-240		46	/ Ramp Surface			
-241		47	/ Ramp			

Sample Abbreviations
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SF = Sheet Flooring
JC/GB = Joint Compound/Gypsum Board
CT = Ceiling Tile (glued or nailed)
CP = Ceiling Panel (t-grid or drop ceil.)

Material Type
Thermal System Insulation = TSI
Misc. Material = MM
Surfacing Material = SM

Material Condition
Not Damaged = ND
Damaged = DG
Significantly Damaged – SD
Potentially Significantly Damaged = PSD

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Sampled by: Zindar Brunelle	Received by: 12/5/14 10:00 a
Relinquished by: Zindar Brunelle 12/5/14 Date/Time:	Date/time Date/Time:

AMERISCI

AmeriSci Los Angeles
24416 S. Main Street, Ste 308
Carson, California 90745
TEL: (310) 834-4868 • FAX: (310) 834-4772

PLM Bulk Asbestos Report

Terry Clark Consulting, LLC
Attn: Terry Clark
1636 Old Arcata Road

Bayside, CA 95524

Date Received 09/22/14 **AmeriSci Job #** 914091889
Date Examined 09/24/14 **P.O. #**
Page 1 **of** 12

RE: 1400303; 1018 "H" St. Eureka, CA 95501

PART 3 of 4

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-1	914091889-01	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
	Location: Window Glazing, Brn / Ext. Roof Dome		
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Glazing **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-2 2	914091889-02	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
	Location: Window Glazing, White / Ext. Roof Dome		
Analyst Description: Light Grey, Homogeneous, Non-Fibrous, Glazing **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-3 2	914091889-03	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
	Location: Window Glazing, White / Ext. Roof Dome		
Analyst Description: Beige, Homogeneous, Non-Fibrous, Glazing **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-4	914091889-04	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
	Location: Silver Paint / Ext. Roof Dome		
Analyst Description: Silver, Homogeneous, Fibrous, Paint **Asbestos Types:** **Other Material:** Cellulose 5 %, Non-fibrous 95 %			
1018-5 4	914091889-05	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
	Location: Roof Patch, Black Faded To Gray / Ext. Roof Dome		
Analyst Description: Black/Grey, Heterogeneous, Fibrous, Roofing Patch **Asbestos Types:** **Other Material:** Cellulose 5 %, Non-fibrous 95 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka, CA 95501

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-6 4	914091889-06 **Location:** Roof Patch, Black Faded To Gray / Ext. Roof Dome	***No***	NAD (by CVES) by Paola Ducoing on 09/24/14
Analyst Description: Black/Grey, Heterogeneous, Fibrous, Roofing Patch **Asbestos Types:** **Other Material:** Cellulose 5 %, Non-fibrous 95 %			
1018-7	914091889-07 **Location:** Roof Patch, Black Faded To Gray / Top Roof, North	***Yes***	5 % (by CVES) by Paola Ducoing on 09/24/14
Analyst Description: Black/Grey, Homogeneous, Fibrous, Roofing Patch **Asbestos Types:** Chrysotile 5.0 % **Other Material:** Non-fibrous 95 %			
1018-8	914091889-08 **Location:** Surfacing / Silver - Black Tar / Top Roof, North	***Yes***	5 % (by CVES) by Paola Ducoing on 09/24/14
Analyst Description: Black/Grey, Homogeneous, Fibrous, Surfacing **Asbestos Types:** Chrysotile 5.0 % **Other Material:** Non-fibrous 95 %			
1018-9	914091889-09 **Location:** Patch, Black Faded To Gray / Top Roof, North	***Yes***	5 % (by CVES) by Paola Ducoing on 09/24/14
Analyst Description: Black/Grey, Homogeneous, Fibrous, Roofing Patch **Asbestos Types:** Chrysotile 5.0 % **Other Material:** Non-fibrous 95 %			
1018-10	914091889-10 **Location:** Caulking, Green / Top Roof, North green paint over Tar patch	***Yes***	2 % (by CVES) by Paola Ducoing on 09/24/14
Analyst Description: Green/Black, Homogeneous, Non-Fibrous, Caulking **Asbestos Types:** Chrysotile 2.0 % **Other Material:** Non-fibrous 98 %			
1018-11	914091889-11 **Location:** Concrete, Gray / Top Roof, North	***No***	NAD (by CVES) by Paola Ducoing on 09/24/14
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Concrete **Asbestos Types:** **Other Material:** Non-fibrous 100 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka, CA 95501

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-12	914091889-12	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Location: Roofing, Built-Up, Gray Comp. / Top Roof, North			
Analyst Description: Black, Heterogeneous, Fibrous, Roofing **Asbestos Types:** **Other Material:** Fibrous glass 20 %, Non-fibrous 80 %			
1018-13	914091889-13	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Location: Concrete, Decorative / Top Roof, South			
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Concrete **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-14	914091889-14	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Location: Roofing, Built-Up, Gray Comp. / Middle Roof			
Analyst Description: Black, Heterogeneous, Fibrous, Roofing **Asbestos Types:** **Other Material:** Fibrous glass 20 %, Non-fibrous 80 %			
1018-15	914091889-15	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Location: Roofing, Built-Up, Gray Comp. / Lower So. Roof			
Analyst Description: Black, Heterogeneous, Fibrous, Roofing **Asbestos Types:** **Other Material:** Fibrous glass 20 %, Non-fibrous 80 %			
1018-16	914091889-16	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Location: Fiberboard / Lower So. Roof			
Analyst Description: Brown, Homogeneous, Non-Fibrous, Fiber Board **Asbestos Types:** **Other Material:** Cellulose 75 %, Non-fibrous 25 %			
1018-17	914091889-17	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Location: Tar, Black / Lower So. Roof			
Analyst Description: Black, Homogeneous, Non-Fibrous, Tar **Asbestos Types:** **Other Material:** Non-fibrous 100 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka, CA 95501

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-18	914091889-18	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Location: Roofing, Built-Up, Gray Comp. / Lower North Roof			
Analyst Description: Black, Heterogeneous, Fibrous, Roofing			
Asbestos Types:			
Other Material: Fibrous glass 20 %, Non-fibrous 80 %			
1018-19	914091889-19	*Yes*	5 % (by CVES) by Paola Ducoing on 09/24/14
Location: Roof Patch, Black / Lower North Roof			
Analyst Description: Black/Grey, Homogeneous, Fibrous, Roofing Patch			
Asbestos Types: Chrysotile 5.0 %			
Other Material: Non-fibrous 95 %			
1018-20	914091889-20	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Location: Roof Patch, Gray / Lower North Roof			
Analyst Description: Black/Grey, Homogeneous, Fibrous, Roofing Patch			
Asbestos Types:			
Other Material: Cellulose 5 %, Non-fibrous 95 %			
1018-21	914091889-21	*Yes*	5 % (by CVES) by Paola Ducoing on 09/24/14
Location: Roof Patch, Black And Gray / Lower North Roof			
Analyst Description: Black, Homogeneous, Fibrous, Roofing Patch			
Asbestos Types: Chrysotile 5.0 %			
Other Material: Non-fibrous 95 %			
1018-22	914091889-22	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Location: Roof Patch, Brown / Lower North Roof			
Analyst Description: Black, Homogeneous, Fibrous, Roofing Patch			
Asbestos Types:			
Other Material: Cellulose 5 %, Non-fibrous 95 %			
1018-23	914091889-23	*Yes*	3 % (by CVES) by Paola Ducoing on 09/24/14
Location: Tar, Black / Lower North Roof			
Analyst Description: Black/Silver, Homogeneous, Non-Fibrous, Tar			
Asbestos Types: Chrysotile 3.0 %			
Other Material: Non-fibrous 97 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka, CA 95501

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-24	914091889-24	*Yes*	5 % (by CVES) by Paola Ducoing on 09/24/14
	Location: Surfacing, Silver - Black Tar / Lower North Roof		
Analyst Description: Black/Grey, Homogeneous, Fibrous, Surfacing **Asbestos Types:** Chrysotile 5.0 % **Other Material:** Non-fibrous 95 %			
1018-25	914091889-25	*Yes*	5 % (by CVES) by Paola Ducoing on 09/24/14
	Location: Roof Patch, Dark Gray / Lower North Roof		
Analyst Description: Black, Homogeneous, Fibrous, Roofing Patch **Asbestos Types:** Chrysotile 5.0 % **Other Material:** Non-fibrous 95 %			
1018-26	914091889-26	*Yes*	5 % (by CVES) by Paola Ducoing on 09/24/14
	Location: Surfacing, Silver - Black Tar / Middle Roof		
Analyst Description: Black/Silver, Homogeneous, Fibrous, Surfacing **Asbestos Types:** Chrysotile 5.0 % **Other Material:** Non-fibrous 95 %			
1018-27	914091889-27	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
	Location: Roof Patch, Brown / Middle Roof		
Analyst Description: Black, Homogeneous, Fibrous, Roofing Patch **Asbestos Types:** **Other Material:** Cellulose 5 %, Non-fibrous 95 %			
1018-28 26	914091889-28	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
	Location: Roof Patch, Light Gray / Middle Roof		
Analyst Description: Black/Grey, Homogeneous, Fibrous, Roofing Patch **Asbestos Types:** **Other Material:** Cellulose 5 %, Non-fibrous 95 %			
1018-29 26	914091889-29	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
	Location: Roof Patch, Light Gray / Middle Roof		
Analyst Description: Black/Grey, Homogeneous, Fibrous, Roofing Patch **Asbestos Types:** **Other Material:** Cellulose 15 %, Non-fibrous 85 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka, CA 95501

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-30	914091889-30	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Location: Silver Paint / Middle Roof			
Analyst Description: Silver, Homogeneous, Fibrous, Paint **Asbestos Types:** **Other Material:** Cellulose 3 %, Non-fibrous 97 %			
1018-31	914091889-31	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Location: Roof Patch, Brown / Lower South Roof			
Analyst Description: Black, Homogeneous, Fibrous, Roofing Patch **Asbestos Types:** **Other Material:** Cellulose 8 %, Non-fibrous 92 %			
1018-32	914091889-32	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Location: Roof Patch, Light Gray / Lower South Roof			
Analyst Description: Black/Grey, Homogeneous, Fibrous, Roofing Patch **Asbestos Types:** **Other Material:** Cellulose 5 %, Non-fibrous 95 %			
1018-33	914091889-33	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Location: Roof Patch, Gray / Lower South Roof			
Analyst Description: Black/Grey, Homogeneous, Fibrous, Roofing Patch **Asbestos Types:** **Other Material:** Cellulose 5 %, Non-fibrous 95 %			
1018-34	914091889-34	*Yes*	2 % (by CVES) by Paola Ducoing on 09/24/14
Location: Silver Paint / Lower South Roof			
Analyst Description: Silver/Black, Homogeneous, Non-Fibrous, Paint **Asbestos Types:** Chrysotile 2.0 % **Other Material:** Non-fibrous 98 %			
1018-35	914091889-35	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Location: Tar, Black / Lower South Roof			
Analyst Description: Black, Homogeneous, Non-Fibrous, Tape **Asbestos Types:** **Other Material:** Non-fibrous 100 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka, CA 95501

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-36	914091889-36	*Yes*	5 % (by CVES) by Paola Ducoing on 09/24/14
Location: Roof Patch, Black - Gray / Middle Roof			
Analyst Description: Black, Homogeneous, Fibrous, Roofing Patch **Asbestos Types:** Chrysotile 5.0 % **Other Material:** Non-fibrous 95 %			
1018-37	914091889-37	*Yes*	5 % (by CVES) by Paola Ducoing on 09/24/14
Location: Roof Patch, Silver - Gray / Top Roof			
Analyst Description: Black/Grey, Homogeneous, Fibrous, Roofing Patch **Asbestos Types:** Chrysotile 5.0 % **Other Material:** Non-fibrous 95 %			
1018-38	914091889-38	*Yes*	5 % (by CVES) by Paola Ducoing on 09/24/14
Location: Roof Patch, Silver Gray With Cloth Mesh / Top Roof			
Analyst Description: Black/Grey, Homogeneous, Fibrous, Roofing Patch **Asbestos Types:** Chrysotile 5.0 % **Other Material:** Non-fibrous 95 %			
1018-39	914091889-39	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Location: Roof Patch, Black / Top Roof			
Analyst Description: Black, Homogeneous, Fibrous, Roofing Patch **Asbestos Types:** **Other Material:** Cellulose 3 %, Non-fibrous 97 %			
1018-40	914091889-40	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Location: Roof Patch, Black / Lower Roof, East			
Analyst Description: Black, Homogeneous, Fibrous, Roofing Patch **Asbestos Types:** **Other Material:** Cellulose 3 %, Non-fibrous 97 %			
1018-41	914091889-41	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Location: Roof Patch, Black / Lower Roof, East			
Analyst Description: Black/Silver, Homogeneous, Fibrous, Roofing Patch **Asbestos Types:** **Other Material:** Cellulose 5 %, Non-fibrous 95 %			

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PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka, CA 95501

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-42	914091889-42	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Location: Roof Patch, Light Gray / Lower Roof, East			
Analyst Description: Black/Grey, Homogeneous, Fibrous, Roofing Patch **Asbestos Types:** **Other Material:** Cellulose 5 %, Non-fibrous 95 %			
1018-43	914091889-43	*Yes*	3 % (by CVES) by Paola Ducoing on 09/24/14
Location: Roof Patch, Silver - Gray / Lower Roof, East			
Analyst Description: Black/Silver, Heterogeneous, Fibrous, Roofing Patch **Asbestos Types:** Chrysotile 3.0 % **Other Material:** Cellulose 5 %, Non-fibrous 92 %			
1018-44	914091889-44L1	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Location: Silver Paint / Roofing, Built-Up / Lower Roof, East			
Analyst Description: Silver, Homogeneous, Non-Fibrous, Paint **Asbestos Types:** **Other Material:** Cellulose 2 %, Non-fibrous 98 %			
1018-44	914091889-44L2	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Location: Silver Paint / Roofing, Built-Up / Lower Roof, East			
Analyst Description: Black, Heterogeneous, Fibrous, Roofing **Asbestos Types:** **Other Material:** Fibrous glass 15 %, Non-fibrous 85 %			
1018-45	914091889-45	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Location: Fiberboard, Brown / Lower Roof, East			
Analyst Description: Brown, Heterogeneous, Fibrous, Fiber Board **Asbestos Types:** **Other Material:** Cellulose 75 %, Non-fibrous 25 %			
1018-46	914091889-46	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Location: Tar, Black / Lower Roof, East			
Analyst Description: Black, Homogeneous, Non-Fibrous, Tar **Asbestos Types:** **Other Material:** Non-fibrous 100 %			

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PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka, CA 95501

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-47 44	914091889-47 **Location:** Mastic, Dark Brown / 2nd Level, Rm # 3	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Analyst Description: Dark Brown, Homogeneous, Non-Fibrous, Mastic **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-48 44	914091889-48 **Location:** Mastic, Dark Brown / 2nd Level, Rm # 3	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Analyst Description: Dark Brown, Homogeneous, Non-Fibrous, Mastic **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-49	914091889-49 **Location:** Ceiling Tile, Brown Painted White / 2nd Level, Rm # 3	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Analyst Description: White/Brown, Heterogeneous, Fibrous, Ceiling Tile **Asbestos Types:** **Other Material:** Cellulose 90 %, Non-fibrous 10 %			
1018-50 46	914091889-50.1 **Location:** Plaster; Brown TC / Gray RC / 2nd Level, Rm # 4	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Analyst Description: Tan, Heterogeneous, Non-Fibrous, Cementitious, Plaster-Top Coat **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-50 46	914091889-50.2 **Location:** Plaster; Brown TC / Gray RC / 2nd Level, Rm # 4	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Plaster-Base Coat **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-51 46	914091889-51.1 **Location:** Plaster; Brown TC / Gray RC / 2nd Level, Rm # 2	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Analyst Description: Tan, Heterogeneous, Non-Fibrous, Cementitious, Plaster-Top Coat **Asbestos Types:** **Other Material:** Non-fibrous 100 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka, CA 95501

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-51 46	914091889-51.2 **Location:** Plaster; Brown TC / Gray RC / 2nd Level, Rm # 2	***No***	NAD (by CVES) by Paola Ducoing on 09/24/14
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Plaster-Base Coat **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-52 47	914091889-52.1 **Location:** Plaster; White TC / Brown Mid-Coat / Gray RC / 2nd Level, Rm # 2	***No***	NAD (by CVES) by Paola Ducoing on 09/24/14
Analyst Description: White, Homogeneous, Non-Fibrous, Plaster-Skim Coat **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-52 47	914091889-52.2 **Location:** Plaster; White TC / Brown Mid-Coat / Gray RC / 2nd Level, Rm # 2	***No***	NAD (by CVES) by Paola Ducoing on 09/24/14
Analyst Description: Tan, Heterogeneous, Non-Fibrous, Cementitious, Plaster-Top Coat **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-52 47	914091889-52.3 **Location:** Plaster; White TC / Brown Mid-Coat / Gray RC / 2nd Level, Rm # 2	***No***	NAD (by CVES) by Paola Ducoing on 09/24/14
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Plaster-Base Coat **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-53 47	914091889-53.1 **Location:** Plaster; White TC / Brown Mid-Coat / Gray RC / 2nd Level, Rm # 2	***No***	NAD (by CVES) by Paola Ducoing on 09/24/14
Analyst Description: White, Homogeneous, Non-Fibrous, Plaster-Skim Coat **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-53 47	914091889-53.2 **Location:** Plaster; White TC / Brown Mid-Coat / Gray RC / 2nd Level, Rm # 2	***No***	NAD (by CVES) by Paola Ducoing on 09/24/14
Analyst Description: Tan, Heterogeneous, Non-Fibrous, Cementitious, Plaster-Top Coat **Asbestos Types:** **Other Material:** Non-fibrous 100 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka, CA 95501

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-53 47	914091889-53.3 **Location:** Plaster; White TC / Brown Mid-Coat / Gray RC / 2nd Level, Rm # 2	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Plaster-Base Coat **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-54	914091889-54.1 **Location:** Plaster; White TC / Gray RC / 2nd Level, Rm # 2	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Analyst Description: White, Homogeneous, Non-Fibrous, Plaster-Top Coat **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-54	914091889-54.2 **Location:** Plaster; White TC / Gray RC / 2nd Level, Rm # 2	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Plaster-Base Coat **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-55 49	914091889-55 **Location:** Window Glazing, Gray / 2nd Level, Rm # 1, Interior Metal Wind.	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Analyst Description: Grey, Homogeneous, Non-Fibrous, Glazing **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-56 49	914091889-56 **Location:** Window Glazing, Gray / 2nd Level, Rm # 1, Interior Metal Wind.	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Analyst Description: Grey, Homogeneous, Non-Fibrous, Glazing **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-57 49	914091889-57 **Location:** Window Glazing, Gray / 2nd Level, Rm # 1, Interior Metal Wind.	*No*	NAD (by CVES) by Paola Ducoing on 09/24/14
Analyst Description: Grey, Homogeneous, Non-Fibrous, Glazing **Asbestos Types:** **Other Material:** Non-fibrous 100 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka, CA 95501

Reporting Notes:

Analyzed By: Paola Ducoing _____; Date Analyzed: 9/24/2014 9/24/14

*NAD = no asbestos detected; Detection Limit <1%; Reporting Limits: CVES = 1%, 400 Pt Ct = 0.25%, 1000 Pt Ct = 0.1%; NA = not analyzed; NA/PS = not analyzed / positive stop; NVA = No Visible Asbestos; PLM (polarized light microscopy) Bulk Asbestos Analysis by EPA 600/M4-82-020 per 40 CFR 763 (NVLAP Lab #200346-0, CA ELAP lab #2322); Note: PLM is not consistently reliable in detecting asbestos in floor coverings and similar NOB materials. TEM is currently the only method that can be used to determine if this material can be considered or treated as non-asbestos-containing in New York State (also see EPA Advisory for floor tile, FR 59, 146, 38970, 8/1/94). NIST Accreditation requirements mandate that this report must not be reproduced except in full with the approval of the laboratory. This PLM report relates ONLY to the items tested.

Reviewed By: _____

AMERISCI

AmeriSci Los Angeles
24416 S. Main Street, Ste 308
Carson, California 90745
TEL: (310) 834-4868 • FAX: (310) 834-4772

PLM Bulk Asbestos Report

Terry Clark Consulting, LLC
Attn: Terry Clark
1636 Old Arcata Road

Bayside, CA 95524

Date Received 11/03/14 **AmeriSci Job #** 914111114
Date Examined 11/06/14 **P.O. #**
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RE: 1400303; 1018 "H" St. Eureka CA 95501

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-58	914111114-01	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Battleship Linoleum, Black Marbled / 2nd Level Rotunda			
Analyst Description: Black/Brown, Heterogeneous, Fibrous, Flooring			
Asbestos Types:			
Other Material: Cellulose 60 %, Non-fibrous 40 %			
1018-59	914111114-02	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Battleship Linoleum,Red Brn / 2nd Level Rotunda			
Analyst Description: Brown, Heterogeneous, Fibrous, Flooring			
Asbestos Types:			
Other Material: Cellulose 60 %, Non-fibrous 40 %			
1018-60	914111114-03	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Concrete / Mid Level Attic Space/ Structure Beam			
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Concrete			
Asbestos Types:			
Other Material: Non-fibrous 100 %			
1018-61	914111114-04	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Terrazo Tile, Baseboard / 2nd Level, Rotunda			
Analyst Description: Black, Homogeneous, Non-Fibrous, Cementitious, Terrazzo			
Asbestos Types:			
Other Material: Non-fibrous 100 %			
1018-62	914111114-05	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Battleship Linoleum, Wood Pattern / 1-2 Stairway Tread			
Analyst Description: Black/Brown, Heterogeneous, Fibrous, Flooring			
Asbestos Types:			
Other Material: Cellulose 60 %, Non-fibrous 40 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA 95501

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-63	914111114-06	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Plaster, White Top Coat / ETGG Rough / Rm 44 (Ceiling)			
Analyst Description: White, Homogeneous, Non-Fibrous, Cementitious, Plaster			
Asbestos Types:			
Other Material: Non-fibrous 100 %			
1018-64	914111114-07	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Plaster, Single Coat Grainy Gray / Rm #22 Ceiling			
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Plaster			
Asbestos Types:			
Other Material: Non-fibrous 100 %			
1018-65	914111114-08.1	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Plaster / Wht Top Coat / Gray Rough Coat / 1-2 Stairway			
Analyst Description: White, Homogeneous, Non-Fibrous, Cementitious, Plaster-Top Coat			
Asbestos Types:			
Other Material: Non-fibrous 100 %			
1018-65	914111114-08.2	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Plaster / Wht Top Coat / Gray Rough Coat / 1-2 Stairway			
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Plaster-Base Coat			
Asbestos Types:			
Other Material: Non-fibrous 100 %			
1018-66	914111114-09.1	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Plaster Brown Top Coat / Gray Rough Coat / Rm #30			
Analyst Description: Tan, Heterogeneous, Non-Fibrous, Cementitious, Plaster-Top Coat			
Asbestos Types:			
Other Material: Non-fibrous 100 %			
1018-66	914111114-09.2	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Plaster Brown Top Coat / Gray Rough Coat / Rm #30			
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Plaster-Base Coat			
Asbestos Types:			
Other Material: Non-fibrous 100 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA 95501

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-67	914111114-10	*No*	NAD
	Location: Plaster / Gray Rough Coat / Rm 44		(by CVES) by Paola Ducoing on 11/06/14
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Plaster			
Asbestos Types:			
Other Material: Non-fibrous 100 %			
1018-68 01	914111114-11	*Yes*	8 %
	Location: Plaster / Lt Gray Top Coat / (Punky) / Rm #44		(by CVES) by Paola Ducoing on 11/06/14
Analyst Description: Beige, Homogeneous, Non-Fibrous, Wall Material			
Asbestos Types: Chrysotile 8.0 %			
Other Material: Non-fibrous 92 %			
1018-69 01	914111114-12	*Yes*	8 %
	Location: Plaster / Lt Gray Top Coat / (Punky) / Rm #44		(by CVES) by Paola Ducoing on 11/06/14
Analyst Description: Beige, Homogeneous, Non-Fibrous, Wall Material			
Asbestos Types: Chrysotile 8.0 %			
Other Material: Non-fibrous 92 %			
1018-70 01	914111114-13	*Yes*	8 %
	Location: Plaster / Lt Gray Top Coat / (Punky) / Rm #44		(by CVES) by Paola Ducoing on 11/06/14
Analyst Description: Beige, Homogeneous, Non-Fibrous, Wall Material			
Asbestos Types: Chrysotile 8.0 %			
Other Material: Non-fibrous 92 %			
1018-71	914111114-14.1	*No*	NAD
	Location: Plaster Brown Top Coat Gray Rough Coat / Rm #40		(by CVES) by Paola Ducoing on 11/06/14
Analyst Description: Brown, Heterogeneous, Non-Fibrous, Cementitious, Plaster-Top Coat			
Asbestos Types:			
Other Material: Non-fibrous 100 %			
1018-71	914111114-14.2	*No*	NAD
	Location: Plaster Brown Top Coat Gray Rough Coat / Rm #40		(by CVES) by Paola Ducoing on 11/06/14
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Plaster-Base Coat			
Asbestos Types:			
Other Material: Non-fibrous 100 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA 95501

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-72	914111114-15.1	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
	Location: Plaster / Gray Brn Top Coat Lt Gry Rough Coat / Rm #31		
Analyst Description: Brown, Heterogeneous, Non-Fibrous, Cementitious, Plaster-Top Coat **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-72	914111114-15.2	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
	Location: Plaster / Gray Brn Top Coat Lt Gry Rough Coat / Rm #31		
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Plaster-Base Coat **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-73	914111114-16	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
	Location: Plaster, White And Stringy / Rm #31 Deco Freize Block		
Analyst Description: White, Homogeneous, Non-Fibrous, Plaster **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-74 02	914111114-17.1	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
	Location: Plaster, White TC, Gray RC / Rm #43 Closet		
Analyst Description: White, Homogeneous, Non-Fibrous, Plaster-Top Coat **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-74 02	914111114-17.2	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
	Location: Plaster, White TC, Gray RC / Rm #43 Closet		
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Plaster-Base Coat **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-75 02	914111114-18.1	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
	Location: Plaster, White TC, Gray RC / Rm #42 Kitchen		
Analyst Description: White, Homogeneous, Non-Fibrous, Plaster-Top Coat **Asbestos Types:** **Other Material:** Non-fibrous 100 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA 95501

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-75 02	914111114-18.2 **Location:** Plaster, White TC, Gray RC / Rm #42 Kitchen	***No***	NAD (by CVES) by Paola Ducoing on 11/06/14
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Plaster-Base Coat **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-76 02	914111114-19.1 **Location:** Plaster, White TC, Gray RC / Rm #42 Kitchen	***No***	NAD (by CVES) by Paola Ducoing on 11/06/14
Analyst Description: White, Homogeneous, Non-Fibrous, Plaster-Top Coat **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-76 02	914111114-19.2 **Location:** Plaster, White TC, Gray RC / Rm #42 Kitchen	***No***	NAD (by CVES) by Paola Ducoing on 11/06/14
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Plaster-Base Coat **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-77	914111114-20 **Location:** CT, (1x1) White On Brown / Rm #30 Ceiling	***No***	NAD (by CVES) by Paola Ducoing on 11/06/14
Analyst Description: White/Brown, Heterogeneous, Fibrous, Ceiling Tile **Asbestos Types:** **Other Material:** Cellulose 90 %, Non-fibrous 10 %			
1018-78	914111114-21 **Location:** Mastic, Brown / Rm #30 Ceiling	***No***	NAD (by CVES) by Paola Ducoing on 11/06/14
Analyst Description: Dark Brown, Homogeneous, Non-Fibrous, Mastic **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-79	914111114-22 **Location:** Plaster, RC Gray / Rm #30 Ceiling	***No***	NAD (by CVES) by Paola Ducoing on 11/06/14
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Plaster **Asbestos Types:** **Other Material:** Non-fibrous 100 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA 95501

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-80	914111114-23	*Yes*	8 %
Location: Plaster, LT Gray Punky / Rm #30 Ceil Above C.T. Rm#30			(by CVES) by Paola Ducoing on 11/06/14
Analyst Description: Beige, Homogeneous, Non-Fibrous, Wall Material			
Asbestos Types: Chrysotile 8.0 %			
Other Material: Non-fibrous 92 %			
1018-81	914111114-24	*No*	NAD
Location: Plaster, White / Rm #30 Freize Block			(by CVES) by Paola Ducoing on 11/06/14
Analyst Description: White, Homogeneous, Non-Fibrous, Plaster			
Asbestos Types:			
Other Material: Non-fibrous 100 %			
1018-82	914111114-25	*No*	NAD
Location: Plaster, White / Rm #30 Freize Block			(by CVES) by Paola Ducoing on 11/06/14
Analyst Description: White, Homogeneous, Non-Fibrous, Plaster			
Asbestos Types:			
Other Material: Non-fibrous 100 %			
1018-83	914111114-26	*No*	NAD
Location: CT, White On Brown / Rm #30 Wall			(by CVES) by Paola Ducoing on 11/06/14
Analyst Description: White/Brown, Heterogeneous, Fibrous, Ceiling Tile			
Asbestos Types:			
Other Material: Cellulose 90 %, Non-fibrous 10 %			
1018-84	914111114-27	*No*	NAD
Location: Mastic Brown / Rm #30 Wall			(by CVES) by Paola Ducoing on 11/06/14
Analyst Description: Dark Brown, Homogeneous, Non-Fibrous, Mastic			
Asbestos Types:			
Other Material: Non-fibrous 100 %			
1018-85	914111114-28.1	*Yes*	2 %
Location: GB/JC / Rm #39 (HVAC, Rm)			(by CVES) by Paola Ducoing on 11/06/14
Analyst Description: Beige, Homogeneous, Non-Fibrous, Joint Compound			
Asbestos Types: Chrysotile 2.0 %			
Other Material: Non-fibrous 98 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA 95501

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-85	914111114-28.2	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: GB/JC / Rm #39 (HVAC, Rm)			
Analyst Description: White/Brown, Heterogeneous, Fibrous, Gypsum Board **Asbestos Types:** **Other Material:** Cellulose 15 %, Non-fibrous 85 %			
1018-86	914111114-29.1	*Yes*	2 % (by CVES) by Paola Ducoing on 11/06/14
Location: GB/JC / Rm #39 (HVAC, Rm)			
Analyst Description: Beige, Homogeneous, Non-Fibrous, Joint Compound **Asbestos Types:** Chrysotile 2.0 % **Other Material:** Non-fibrous 98 %			
1018-86	914111114-29.2	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: GB/JC / Rm #39 (HVAC, Rm)			
Analyst Description: White/Brown, Heterogeneous, Fibrous, Gypsum Board **Asbestos Types:** **Other Material:** Cellulose 15 %, Non-fibrous 85 %			
1018-87	914111114-30.1	*Yes*	2 % (by CVES) by Paola Ducoing on 11/06/14
Location: GB/JC / Rm #39 (HVAC, Rm)			
Analyst Description: Beige, Homogeneous, Non-Fibrous, Joint Compound **Asbestos Types:** Chrysotile 2.0 % **Other Material:** Non-fibrous 98 %			
1018-87	914111114-30.2	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: GB/JC / Rm #39 (HVAC, Rm)			
Analyst Description: White/Brown, Heterogeneous, Fibrous, Gypsum Board **Asbestos Types:** **Other Material:** Cellulose 15 %, Non-fibrous 85 %			
1018-88	914111114-31	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Surfacing, White / Attic Space Above 1st Floor			
Analyst Description: Off-White, Homogeneous, Non-Fibrous, Cementitious, Surfacing **Asbestos Types:** **Other Material:** Non-fibrous 100 %			

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PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA 95501

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-89	914111114-32	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Tile Grout, White / Rm #43 (Womens RR)			
Analyst Description: White, Homogeneous, Non-Fibrous, Cementitious, Grout **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-90	914111114-33	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Tile Mortar, Gray / Rm #43 (Womens RR)			
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Mortar **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-91	914111114-34	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Battleship Linoleum, Wood Pattern Brown / Rm #26			
Analyst Description: Brown, Heterogeneous, Fibrous, Flooring **Asbestos Types:** **Other Material:** Cellulose 60 %, Non-fibrous 40 %			
1018-92	914111114-35	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Battleship Linoleum, Green / Rm #21			
Analyst Description: Green, Heterogeneous, Fibrous, Flooring **Asbestos Types:** **Other Material:** Cellulose 60 %, Non-fibrous 40 %			
1018-93	914111114-36	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Mortar / Rm #22 Chimney			
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Mortar **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-94	914111114-37	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Brick / Rm #22 Chimney			
Analyst Description: Brick Red, Heterogeneous, Non-Fibrous, Cementitious, Brick **Asbestos Types:** **Other Material:** Non-fibrous 100 %			

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PLM Bulk Asbestos Report

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Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-95	914111114-38L1	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Carpet Glue, Clear / Rm #22			
Analyst Description: Blue/Grey, Heterogeneous, Fibrous, Carpet			
Asbestos Types:			
Other Material: Synthetic fibers 45 %, Non-fibrous 55 %			
1018-95	914111114-38L2	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Carpet Glue, Clear / Rm #22			
Analyst Description: Clear, Homogeneous, Non-Fibrous, Carpet Glue			
Asbestos Types:			
Other Material: Non-fibrous 100 %			
1018-96	914111114-39L1	*Yes*	3 % (by CVES) by Paola Ducoing on 11/06/14
Location: SF, Beige And White / Tan Glue / Rm 23 (Hall) Top Layer			
Analyst Description: Beige/Tan, Heterogeneous, Fibrous, Sheet Flooring			
Asbestos Types: Chrysotile 3.0 %			
Other Material: Cellulose 15 %, Non-fibrous 82 %			
1018-96	914111114-39L2	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: SF, Beige And White / Tan Glue / Rm 23 (Hall) Top Layer			
Analyst Description: Tan, Homogeneous, Non-Fibrous, Glue			
Asbestos Types:			
Other Material: Non-fibrous 100 %			
1018-97	914111114-40	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Floor Sizing, White / Rm 23 (Hall) Top Layer			
Analyst Description: White, Homogeneous, Non-Fibrous, Floor Material			
Asbestos Types:			
Other Material: Non-fibrous 100 %			
1018-98	914111114-41	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: SF, Black With Paper Backing / Rm #23 (Hall) Bottom Layer			
Analyst Description: Black, Heterogeneous, Fibrous, Sheet Flooring			
Asbestos Types:			
Other Material: Cellulose 60 %, Non-fibrous 40 %			
Comment: Backing not found in sample.			

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PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA 95501

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-99	914111114-42L1	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: VFT (12x12) Black And White / Yellow Mastic / Rm #20			
Analyst Description: White, Homogeneous, Non-Fibrous, Vinyl Flooring **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-99	914111114-42L2	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: VFT (12x12) Black And White / Yellow Mastic / Rm #20			
Analyst Description: Clear/Yellow, Homogeneous, Non-Fibrous, Mastic **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-100	914111114-43L1	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: VFT (12x12) Gray With Black Spots / Yellow Mastic / Rm #20			
Analyst Description: White/Grey, Homogeneous, Non-Fibrous, Floor Tile **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-100	914111114-43L2	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: VFT (12x12) Gray With Black Spots / Yellow Mastic / Rm #20			
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Mastic **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-101	914111114-44L1	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: VFT (12x12) Beige With white Streaks / Yellow Mastic / Rm #20			
Analyst Description: Light Grey, Homogeneous, Non-Fibrous, Floor Tile **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-101	914111114-44L2	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: VFT (12x12) Beige With white Streaks / Yellow Mastic / Rm #20			
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Mastic **Asbestos Types:** **Other Material:** Non-fibrous 100 %			

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PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA 95501

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-102	914111114-45L1	*Yes*	3 %
03	**Location:** VFT (12x12), Tan / Black Mastic / Rm #42 Top Layer		(by CVES) by Paola Ducoing on 11/06/14
Analyst Description: Tan, Homogeneous, Non-Fibrous, Floor Tile **Asbestos Types:** Chrysotile 3.0 % **Other Material:** Non-fibrous 97 %			
1018-102	914111114-45L2	*Yes*	5 %
03	**Location:** VFT (12x12), Tan / Black Mastic / Rm #42 Top Layer		(by CVES) by Paola Ducoing on 11/06/14
Analyst Description: Black, Homogeneous, Non-Fibrous, Mastic **Asbestos Types:** Chrysotile 5.0 % **Other Material:** Non-fibrous 95 %			
1018-103	914111114-46L1		NA/PS
03	**Location:** VFT (12x12), Tan / Black Mastic / Rm #42 Top Layer		
Analyst Description: Floor Tile **Asbestos Types:** **Other Material:**			
1018-103	914111114-46L2		NA/PS
03	**Location:** VFT (12x12), Tan / Black Mastic / Rm #42 Top Layer		
Analyst Description: Mastic **Asbestos Types:** **Other Material:**			
1018-104	914111114-47L1		NA/PS
03	**Location:** VFT (12x12), Tan / Black Mastic / Rm #42 Top Layer		
Analyst Description: Floor Tile **Asbestos Types:** **Other Material:**			
1018-104	914111114-47L2		NA/PS
03	**Location:** VFT (12x12), Tan / Black Mastic / Rm #42 Top Layer		
Analyst Description: Mastic **Asbestos Types:** **Other Material:**			

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PLM Bulk Asbestos Report

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Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-105	914111114-48L1	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Battleship Linoleum, Green / Rm 42 / Under Particle Board			
Analyst Description: Green, Heterogeneous, Fibrous, Flooring **Asbestos Types:** **Other Material:** Cellulose 60 %, Non-fibrous 40 %			
1018-105	914111114-48L2	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Battleship Linoleum, Green / Rm 42 / Under Particle Board			
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Flooring **Asbestos Types:** **Other Material:** Cellulose 60 %, Non-fibrous 40 %			
1018-105	914111114-48L3	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Battleship Linoleum, Green / Rm 42 / Under Particle Board			
Analyst Description: Grey, Heterogeneous, Fibrous, Felt Paper **Asbestos Types:** **Other Material:** Cellulose 45 %, Synthetic fibers 25 %, Non-fibrous 30 %			
1018-106	914111114-49	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Terrazo, Gray Multi Color / Rm 25 / Stall			
Analyst Description: White/Green, Heterogeneous, Non-Fibrous, Cementitious, Terrazzo **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-107	914111114-50	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Felt Green / Rm #41 Hall Gasket HVAC Reg.			
Analyst Description: Green, Heterogeneous, Fibrous, Felt Paper **Asbestos Types:** **Other Material:** Synthetic fibers 95 %, Non-fibrous 5 %			
1018-108	914111114-51.1	*Yes*	2 % (by CVES) by Paola Ducoing on 11/06/14
Location: GB/JC / Rm #2			
Analyst Description: Beige, Homogeneous, Non-Fibrous, Joint Compound **Asbestos Types:** Chrysotile 2.0 % **Other Material:** Non-fibrous 98 %			

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PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA 95501

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-108	914111114-51.2	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: GB/JC / Rm #2			
Analyst Description: White/Brown, Heterogeneous, Fibrous, Gypsum Board **Asbestos Types:** **Other Material:** Cellulose 15 %, Non-fibrous 85 %			
1018-109	914111114-52.1	*Yes*	2 % (by CVES) by Paola Ducoing on 11/06/14
Location: GB/JC / Rm #2			
Analyst Description: Beige, Homogeneous, Non-Fibrous, Joint Compound **Asbestos Types:** Chrysotile 2.0 % **Other Material:** Non-fibrous 98 %			
1018-109	914111114-52.2	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: GB/JC / Rm #2			
Analyst Description: White/Brown, Heterogeneous, Fibrous, Gypsum Board **Asbestos Types:** **Other Material:** Cellulose 15 %, Non-fibrous 85 %			
1018-110	914111114-53.1	*Yes*	2 % (by CVES) by Paola Ducoing on 11/06/14
Location: GB/JC / Rm #2			
Analyst Description: Beige, Homogeneous, Non-Fibrous, Joint Compound **Asbestos Types:** Chrysotile 2.0 % **Other Material:** Non-fibrous 98 %			
1018-110	914111114-53.2	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: GB/JC / Rm #2			
Analyst Description: White/Brown, Heterogeneous, Fibrous, Gypsum Board **Asbestos Types:** **Other Material:** Cellulose 15 %, Non-fibrous 85 %			
1018-111	914111114-54	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Wall Paper Red. / Rm #2			
Analyst Description: Red/Beige, Heterogeneous, Fibrous, Wallpaper **Asbestos Types:** **Other Material:** Cellulose 25 %, Synthetic fibers 60 %, Non-fibrous 15 %			

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PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA 95501

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-112	914111114-55	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Panel Glue, Cream / Rm #2			
Analyst Description: Cream, Homogeneous, Non-Fibrous, Glue **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-113	914111114-56	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Cardboard Sheet, Corr & Brn / Rm #8			
Analyst Description: Brown, Heterogeneous, Fibrous, Cardboard **Asbestos Types:** **Other Material:** Cellulose 95 %, Non-fibrous 5 %			
1018-114 04	914111114-57L1	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: VFT 12x12 Beige w/ Dk Gy Streaks / Yellow Glue / Rm #2			
Analyst Description: Off-White, Homogeneous, Non-Fibrous, Floor Tile **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-114 04	914111114-57L2	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: VFT 12x12 Beige w/ Dk Gy Streaks / Yellow Glue / Rm #2			
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Mastic **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-115 04	914111114-58L1	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: VFT 12x12 Beige w/ Dk Gy Streaks / Yellow Glue / Rm #2			
Analyst Description: White, Homogeneous, Non-Fibrous, Floor Tile **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-115 04	914111114-58L2	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: VFT 12x12 Beige w/ Dk Gy Streaks / Yellow Glue / Rm #2			
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Mastic **Asbestos Types:** **Other Material:** Non-fibrous 100 %			

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PLM Bulk Asbestos Report

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Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-116	914111114-59L1	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: VFT 12x12 Beige Brn Stricks / Yellow Glue / Rm #6			
Analyst Description: Beige, Homogeneous, Non-Fibrous, Floor Tile **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-116	914111114-59L2	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: VFT 12x12 Beige Brn Stricks / Yellow Glue / Rm #6			
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Mastic **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-117	914111114-60L1	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: VFT 12x12 Beige Brn Stricks / Yellow Glue / Rm #10			
Analyst Description: White, Homogeneous, Non-Fibrous, Floor Tile **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-117	914111114-60L2	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: VFT 12x12 Beige Brn Stricks / Yellow Glue / Rm #10			
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Mastic **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-118	914111114-61	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Baseboard Mastic, Cream			
Analyst Description: Cream, Homogeneous, Non-Fibrous, Mastic **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-119	914111114-62	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Floor String / Glue			
Analyst Description: Grey/Yellow, Heterogeneous, Non-Fibrous, Underlayment/Glue **Asbestos Types:** **Other Material:** Non-fibrous 100 % **Comment:** Inseparable layers.			

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PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA 95501

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-120	914111114-63	***No***	NAD
Location: Baseboard Mastic, Cream			(by CVES) by Paola Ducoing on 11/06/14
Analyst Description: Cream, Homogeneous, Non-Fibrous, Mastic **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-121 05	914111114-64L1	***Yes***	4 %
Location: VFT 9x9 Green & Brown D. / Blk Mastic / Rm #10 Bottom Layer			(by CVES) by Paola Ducoing on 11/06/14
Analyst Description: Green, Homogeneous, Non-Fibrous, Floor Tile **Asbestos Types:** Chrysotile 4.0 % **Other Material:** Non-fibrous 96 %			
1018-121 05	914111114-64L2	***Yes***	5 %
Location: VFT 9x9 Green & Brown D. / Blk Mastic / Rm #10 Bottom Layer			(by CVES) by Paola Ducoing on 11/06/14
Analyst Description: Black, Homogeneous, Non-Fibrous, Mastic **Asbestos Types:** Chrysotile 5.0 % **Other Material:** Non-fibrous 95 %			
1018-122 05	914111114-65L1		NA/PS
Location: VFT 9x9 Green & Brown D. / Blk Mastic / Rm #10 Bottom Layer			
Analyst Description: Floor Tile **Asbestos Types:** **Other Material:**			
1018-122 05	914111114-65L2		NA/PS
Location: VFT 9x9 Green & Brown D. / Blk Mastic / Rm #10 Bottom Layer			
Analyst Description: Mastic **Asbestos Types:** **Other Material:**			
1018-123 05	914111114-66L1		NA/PS
Location: VFT 9x9 Green & Brown D. / Blk Mastic / Rm #10 Bottom Layer			
Analyst Description: Floor Tile **Asbestos Types:** **Other Material:**			

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PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA 95501

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-123 05	914111114-66L2 **Location:** VFT 9x9 Green & Brown D. / Blk Mastic / Rm #1 Bottom Layer	2	NA/PS
Analyst Description: Mastic **Asbestos Types:** **Other Material:**			
1018-124	914111114-67 **Location:** Carpet Glue, Yellow / Rm #1 Bottom Layer	***No*** 2	NAD (by CVES) by Paola Ducoing on 11/06/14
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Carpet Glue **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-125	914111114-68 **Location:** Baseboard Mastic, Cream / Rm #1 Bottom Layer	***No*** 2	NAD (by CVES) by Paola Ducoing on 11/06/14
Analyst Description: Cream, Homogeneous, Non-Fibrous, Mastic **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-126	914111114-69 **Location:** Window Putty / Rm #8	***No***	NAD (by CVES) by Paola Ducoing on 11/06/14
Analyst Description: Grey, Homogeneous, Non-Fibrous, Window Putty **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-127	914111114-70 **Location:** Concrete / Rm #8	***No***	NAD (by CVES) by Paola Ducoing on 11/06/14
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Concrete **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-128	914111114-71 **Location:** TSI Aircell / Rm #8 Pipe On Cell TSI	***Yes***	35 % (by CVES) by Paola Ducoing on 11/06/14
Analyst Description: Brown, Heterogeneous, Fibrous, TSI **Asbestos Types:** Chrysotile 35.0 % **Other Material:** Cellulose 25 %, Non-fibrous 40 %			

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PLM Bulk Asbestos Report

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Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-129	914111114-72.1	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Plaster Wht Top Coat / Gray Rough Coat / Rm #10 Ceil			
Analyst Description: White, Homogeneous, Non-Fibrous, Cementitious, Plaster-Top Coat **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-129	914111114-72.2	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Plaster Wht Top Coat / Gray Rough Coat / Rm #10 Ceil			
Analyst Description: Beige, Heterogeneous, Non-Fibrous, Cementitious, Plaster-Base Coat **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-130	914111114-73.1	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Plaster Wht Top Coat / Gray Rough Coat / Rm #10 Wall			
Analyst Description: White, Homogeneous, Non-Fibrous, Cementitious, Plaster-Top Coat **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-130	914111114-73.2	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Plaster Wht Top Coat / Gray Rough Coat / Rm #10 Wall			
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Plaster-Base Coat **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-131	914111114-74	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Concrete / Rm# 12 Wall			
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Concrete **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-132	914111114-75	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Water Proofing Tar, Black / Rm #12 Floor			
Analyst Description: Black, Heterogeneous, Fibrous, Tar **Asbestos Types:** **Other Material:** Synthetic fibers 10 %, Non-fibrous 90 %			

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PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA 95501

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-133	914111114-76	*Yes*	40 % (by CVES) by Paola Ducoing on 11/06/14
Location: Transite / Rm #12 Short Pipe			
Analyst Description: Grey, Homogeneous, Fibrous, Transite **Asbestos Types:** Crocidolite 5.0 %, Chrysotile 35.0 % **Other Material:** Non-fibrous 60 %			
1018-134	914111114-77.1	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Plaster wht Top Coat / Gray Rough Coat / Rm #10			
Analyst Description: Beige, Homogeneous, Non-Fibrous, Plaster-Top Coat **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-134	914111114-77.2	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Plaster wht Top Coat / Gray Rough Coat / Rm #10			
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Plaster-Base Coat **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-135	914111114-78.1	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: GB/JC / Rm #10			
Analyst Description: White, Homogeneous, Non-Fibrous, Joint Compound **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-135	914111114-78.2	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: GB/JC / Rm #10			
Analyst Description: White/Brown, Heterogeneous, Fibrous, Gypsum Board **Asbestos Types:** **Other Material:** Cellulose 15 %, Non-fibrous 85 %			
1018-136	914111114-79.1	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: GB/JC / Rm #7			
Analyst Description: Off-White, Homogeneous, Non-Fibrous, Joint Compound **Asbestos Types:** **Other Material:** Non-fibrous 100 %			

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PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA 95501

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-136	914111114-79.2	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: GB/JC / Rm #7			
Analyst Description: White/Brown, Heterogeneous, Fibrous, Gypsum Board **Asbestos Types:** **Other Material:** Cellulose 15 %, Non-fibrous 85 %			
1018-137	914111114-80.1	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: GB/JC / Rm #7			
Analyst Description: Off-White, Homogeneous, Non-Fibrous, Joint Compound **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-137	914111114-80.2	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: GB/JC / Rm #7			
Analyst Description: White/Brown, Heterogeneous, Fibrous, Gypsum Board **Asbestos Types:** **Other Material:** Cellulose 15 %, Non-fibrous 85 %			
1018-138	914111114-81	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Plaster Gray Single Coat / Rm #11			
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Plaster **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-139	914111114-82	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Window Caulking, White / Rm #11			
Analyst Description: White, Homogeneous, Non-Fibrous, Caulking **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-140	914111114-83	*Yes*	2 % (by CVES) by Paola Ducoing on 11/06/14
Location: Window Putty / Rm #11			
Analyst Description: Beige, Homogeneous, Non-Fibrous, Window Putty **Asbestos Types:** Chrysotile 2.0 % **Other Material:** Non-fibrous 98 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA 95501

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-141	914111114-84.1	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: GB/JC / Rm #19			
Analyst Description: Off-White, Homogeneous, Non-Fibrous, Joint Compound **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-141	914111114-84.2	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: GB/JC / Rm #19			
Analyst Description: White/Brown, Heterogeneous, Fibrous, Gypsum Board **Asbestos Types:** **Other Material:** Cellulose 15 %, Non-fibrous 85 %			
1018-142	914111114-85	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Plaster Surfacing, White / Rm #19 On Concrete			
Analyst Description: Beige, Heterogeneous, Non-Fibrous, Cementitious, Plaster **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-143	914111114-86	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Baseboard Mastic, Brown / Rm #19 On Concrete			
Analyst Description: Dark Brown, Homogeneous, Non-Fibrous, Mastic **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-144	914111114-87L1	*Yes*	20 % (by CVES) by Paola Ducoing on 11/06/14
Location: S.F. Dk Gray Mosaic / Yel Glue / Rm #19 On Concrete			
Analyst Description: Grey, Heterogeneous, Fibrous, Sheet Flooring **Asbestos Types:** Chrysotile 20.0 % **Other Material:** Cellulose 10 %, Non-fibrous 70 %			
1018-144	914111114-87L2	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: S.F. Dk Gray Mosaic / Yel Glue / Rm #19 On Concrete			
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Mastic **Asbestos Types:** **Other Material:** Non-fibrous 100 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA 95501

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-145	914111114-88	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
	Location: Plaster Single Coat Gray / Rm #3		
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Plaster **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-146	914111114-89.1	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
	Location: Plaster Brown Top Coat / Gray Rough Coat / Rm #6		
Analyst Description: Brown, Heterogeneous, Non-Fibrous, Cementitious, Plaster-Top Coat **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-146	914111114-89.2	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
	Location: Plaster Brown Top Coat / Gray Rough Coat / Rm #6		
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Plaster-Base Coat **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-147	914111114-90	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
	Location: Plaster, Gray Rough Coat / Rm #5		
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Plaster **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-148 06	914111114-91L1	*Yes*	3 % (by CVES) by Paola Ducoing on 11/06/14
	Location: VFT 12x12 Tan w/ Wht Streaks / Blk Mastic / Rm#4		
Analyst Description: Tan, Homogeneous, Non-Fibrous, Floor Tile **Asbestos Types:** Chrysotile 3.0 % **Other Material:** Non-fibrous 97 %			
1018-148 06	914111114-91L2	*Yes*	5 % (by CVES) by Paola Ducoing on 11/06/14
	Location: VFT 12x12 Tan w/ Wht Streaks / Blk Mastic / Rm#4		
Analyst Description: Black, Homogeneous, Non-Fibrous, Mastic **Asbestos Types:** Chrysotile 5.0 % **Other Material:** Non-fibrous 95 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA 95501

PART 4 of 4

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-149 06	914111114-92L1 **Location:** VFT 12x12 Tan w/ Wht Streaks / Blk Mastic / Rm#4		NA/PS
	Analyst Description: Floor Tile **Asbestos Types:** **Other Material:**		
1018-149 06	914111114-92L2 **Location:** VFT 12x12 Tan w/ Wht Streaks / Blk Mastic / Rm#4		NA/PS
	Analyst Description: Mastic **Asbestos Types:** **Other Material:**		
1018-150	914111114-93L1 **Location:** VFT 12x12 Tan w/ Wht Streaks / Blk Mastic / Rm#16	***Yes***	3 % (by CVES) by Paola Ducoing on 11/06/14
	Analyst Description: Tan, Homogeneous, Non-Fibrous, Floor Tile **Asbestos Types:** Chrysotile 3.0 % **Other Material:** Non-fibrous 97 %		
1018-150	914111114-93L2 **Location:** VFT 12x12 Tan w/ Wht Streaks / Blk Mastic / Rm#16	***Yes***	5 % (by CVES) by Paola Ducoing on 11/06/14
	Analyst Description: Black, Homogeneous, Non-Fibrous, Mastic **Asbestos Types:** Chrysotile 5.0 % **Other Material:** Non-fibrous 95 %		
1018-151	914111114-94 **Location:** Plaster Surfacing, Lime Green / Rm #16	***No***	NAD (by CVES) by Paola Ducoing on 11/06/14
	Analyst Description: Light Green, Homogeneous, Non-Fibrous, Plaster **Asbestos Types:** **Other Material:** Non-fibrous 100 %		
1018-152	914111114-95 **Location:** Cardboard Door Fill / Rm #18	***No***	NAD (by CVES) by Paola Ducoing on 11/06/14
	Analyst Description: Brown, Heterogeneous, Fibrous, Cardboard **Asbestos Types:** **Other Material:** Cellulose 95 %, Non-fibrous 5 %		

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA 95501

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-153	914111114-96	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Plaster Surfacing, Gray / Rm #15 Closet #9			
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Plaster **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-154	914111114-97	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Plaster Surfacing, White Top Coat / Rm #15 Closet #9			
Analyst Description: White, Heterogeneous, Non-Fibrous, Cementitious, Plaster **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-155	914111114-98	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Plaster Rough Coat Gray / Rm #15 Closet #9			
Analyst Description: White, Homogeneous, Non-Fibrous, Plaster **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-156	914111114-99	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Tar Black / Rm #15 Closet #9 Bottom Laye			
Analyst Description: Black, Homogeneous, Non-Fibrous, Tar **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-157	914111114-100	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Carpet Glue, Brown / Rm #1			
Analyst Description: Tan/Brown, Homogeneous, Non-Fibrous, Carpet Glue **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-158	914111114-101	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Baseboard Mastic, Brown / Rm #1			
Analyst Description: Tan, Homogeneous, Non-Fibrous, Mastic **Asbestos Types:** **Other Material:** Non-fibrous 100 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA 95501

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-159	914111114-102L1	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: BB Mastic Gray, Mixed w/ Texture White / Rm #1			
Analyst Description: Light Grey, Homogeneous, Non-Fibrous, Mastic **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-159	914111114-102L2	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: BB Mastic Gray, Mixed w/ Texture White / Rm #1			
Analyst Description: White, Homogeneous, Non-Fibrous, Cementitious, Texture **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-160	914111114-103L1	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Carpet Glue Yel Brn On Top / Brn Glue Bottom / Rm #1			
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Carpet Glue **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-160	914111114-103L2	*No*	NAD (by CVES) by Paola Ducoing on 11/06/14
Location: Carpet Glue Yel Brn On Top / Brn Glue Bottom / Rm #1			
Analyst Description: Dark Brown, Homogeneous, Non-Fibrous, Mastic **Asbestos Types:** **Other Material:** Non-fibrous 100 %			

Reporting Notes:

Analyzed By: Paola Ducoing Paola Ducoing; Date Analyzed: 11/6/2014 11/6/14

*NAD = no asbestos detected; Detection Limit ~~<1%~~; Reporting Limits: CVES = 1%, 400 Pt Ct = 0.25%, 1000 Pt Ct = 0.1%; NA = not analyzed; NA/PS = not analyzed / positive stop; NVA = No Visible Asbestos; PLM (polarized light microscopy) Bulk Asbestos Analysis by EPA 600/M4-82-020 per 40 CFR 763 (NVLAP Lab #200346-0, CA ELAP lab #2322); Note: PLM is not consistently reliable in detecting asbestos in floor coverings and similar NOB materials. TEM is currently the only method that can be used to determine if this material can be considered or treated as non-asbestos-containing in New York State (also see EPA Advisory for floor tile, FR 59, 146, 38970, 8/1/94). NIST Accreditation requirements mandate that this report must not be reproduced except in full with the approval of the laboratory. This PLM report relates ONLY to the items tested.

Reviewed By:

AmeriSci Los Angeles
24416 S. Main Street, Ste 308
Carson, California 90745
TEL: (310) 834-4868 • FAX: (310) 834-4772

PLM Bulk Asbestos Report

Terry Clark Consulting, LLC
Attn: Terry Clark
1636 Old Arcata Road

Bayside, CA 95524

Date Received 12/08/14 **AmeriSci Job #** 914121289
Date Examined 12/09/14 **P.O. #**
Page 1 **of** 15
RE: 1400303; 1018 "H" St. Eureka CA

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-161	914121289-01	*Yes*	10 %
1	**Location:** TSI Elbow. 4" / Basement Rm 15		(by CVES) by Arturo A. Aldana on 12/09/14
Analyst Description: Tan, Heterogeneous, Fibrous, TSI **Asbestos Types:** Chrysotile 10.0 % **Other Material:** Non-fibrous 90 %			
1018-162	914121289-02		NA/PS
1	**Location:** TSI Elbow. 4" / Basement Rm 1		
Analyst Description: Bulk Material **Asbestos Types:** **Other Material:**			
1018-163	914121289-03		NA/PS
1	**Location:** TSI Elbow. 4" / Basement Rm 15		
Analyst Description: Bulk Material **Asbestos Types:** **Other Material:**			
1018-164	914121289-04		NA/PS
1	**Location:** TSI Elbow. 4" / Basement Rm 1		
Analyst Description: Bulk Material **Asbestos Types:** **Other Material:**			
1018-165	914121289-05	*Yes*	40 %
2	**Location:** TSI Air Cell, 4" / Basement Rm 1		(by CVES) by Arturo A. Aldana on 12/09/14
Analyst Description: Grey, Homogeneous, Fibrous, Aircell **Asbestos Types:** Chrysotile 40.0 % **Other Material:** Non-fibrous 60 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-166	914121289-06		NA/PS
2	**Location:** TSI Air Cell, 4" / Basement Rm 15		
Analyst Description: Bulk Material **Asbestos Types:** **Other Material:**			
1018-167	914121289-07		NA/PS
2	**Location:** TSI Air Cell, 4" / Basement Rm 1		
Analyst Description: Bulk Material **Asbestos Types:** **Other Material:**			
1018-168	914121289-08		NA/PS
2	**Location:** TSI Air Cell, 4" / Basement Rm 15		
Analyst Description: Bulk Material **Asbestos Types:** **Other Material:**			
1018-169	914121289-09		NA
	Location: No Sample		
Analyst Description: N/A **Asbestos Types:** **Other Material:**			
1018-170	914121289-10	***Yes***	13 % (by CVES) by Arturo A. Aldana on 12/09/14
3	**Location:** TSI Elbow 3" / Basement / Rm 15		
Analyst Description: Beige, Heterogeneous, Fibrous, TSI **Asbestos Types:** Crocidolite 3.0 %, Amosite 10.0 % **Other Material:** Non-fibrous 87 %			
1018-171	914121289-11	***No***	NAD (by CVES) by Arturo A. Aldana on 12/09/14
4	**Location:** TSI, Strait, Fiberglass, 3" / Basement / Rm 15		
Analyst Description: Yellow/Beige/Grey, Heterogeneous, Fibrous, TSI **Asbestos Types:** **Other Material:** Cellulose 5 %, Fibrous glass 60 %, Non-fibrous 35 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-172 5	914121289-12 **Location:** TSI Air Cell, 5" / Basement / Rm 1	*Yes*	40 % (by CVES) by Arturo A. Aldana on 12/09/14
Analyst Description: Grey, Homogeneous, Fibrous, Aircell **Asbestos Types:** Chrysotile 40.0 % **Other Material:** Non-fibrous 60 %			
1018-173 5	914121289-13 **Location:** TSI Air Cell, 5" / Basement / Rm 15		NA/PS
Analyst Description: Bulk Material **Asbestos Types:** **Other Material:**			
1018-174 5	914121289-14 **Location:** TSI Air Cell, 5" / Basement / Rm 1		NA/PS
Analyst Description: Bulk Material **Asbestos Types:** **Other Material:**			
1018-175 6	914121289-15 **Location:** TSI Elbow, 5" / Basement / Rm 1	*Yes*	20 % (by CVES) by Arturo A. Aldana on 12/09/14
Analyst Description: Beige, Homogeneous, Fibrous, TSI **Asbestos Types:** Chrysotile 20.0 % **Other Material:** Non-fibrous 80 %			
1018-176 6	914121289-16 **Location:** TSI Elbow, 5" / Basement / Rm 1		NA/PS
Analyst Description: Bulk Material **Asbestos Types:** **Other Material:**			
1018-177 6	914121289-17 **Location:** TSI Elbow, 5" / Basement / Rm 15		NA/PS
Analyst Description: Bulk Material **Asbestos Types:** **Other Material:**			

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-178	914121289-18	*Yes*	Trace (<1 %)
7	**Location:** Plaster, Raugh Gray Coat Only / Basement / Room 13		(by CVES) by Arturo A. Aldana on 12/09/14
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Plaster **Asbestos Types:** Chrysotile <1. % **Other Material:** Non-fibrous 100 %			
1018-179	914121289-19	*Yes*	Trace (<1 %)
7	**Location:** Plaster, Raugh Gray Coat Only / Basement / Room 13		(by CVES) by Arturo A. Aldana on 12/09/14
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Plaster **Asbestos Types:** Chrysotile <1. % **Other Material:** Non-fibrous 100 %			
1018-180	914121289-20	*Yes*	15 %
8	**Location:** TSI, Strait, White Powder / Basement / Rm 14		(by CVES) by Arturo A. Aldana on 12/09/14
Analyst Description: White, Homogeneous, Fibrous, TSI **Asbestos Types:** Chrysotile 5.0 %, Amosite 10.0 % **Other Material:** Non-fibrous 85 %			
1018-181	914121289-21		NA/PS
8	**Location:** TSI, End Cap, White Powder / Basement / Rm 14		
Analyst Description: Bulk Material **Asbestos Types:** **Other Material:**			
1018-182	914121289-22	*Yes*	40 %
9	**Location:** TSI Air Cell, 5" / Basement / Rm 15		(by CVES) by Arturo A. Aldana on 12/09/14
Analyst Description: Grey, Homogeneous, Fibrous, Aircell **Asbestos Types:** Chrysotile 40.0 % **Other Material:** Non-fibrous 60 %			
1018-183	914121289-23	*Yes*	40 %
10	**Location:** TSI Air Cell, 4" / Basement / Rm 14		(by CVES) by Arturo A. Aldana on 12/09/14
Analyst Description: Grey, Homogeneous, Fibrous, Aircell **Asbestos Types:** Chrysotile 40.0 % **Other Material:** Non-fibrous 60 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-184 11	914121289-24 **Location:** TSI Elbow, 3" / Basement / Rm 13	*Yes*	13 % (by CVES) by Arturo A. Aldana on 12/09/14
Analyst Description: Beige, Heterogeneous, Fibrous, TSI **Asbestos Types:** Chrysotile 10.0 %, Amosite 3.0 % **Other Material:** Non-fibrous 87 %			
1018-185 11	914121289-25 **Location:** TSI Elbow, 3" / Basement / Rm 13		NA/PS
Analyst Description: Bulk Material **Asbestos Types:** **Other Material:**			
1018-186 11	914121289-26 **Location:** TSI Elbow, 3" / Basement / Rm 13		NA/PS
Analyst Description: Bulk Material **Asbestos Types:** **Other Material:**			
1018-187 12	914121289-27 **Location:** TSI Air - Cell, 4" / Basement / Rm 13	*Yes*	40 % (by CVES) by Arturo A. Aldana on 12/09/14
Analyst Description: Grey, Homogeneous, Fibrous, Aircell **Asbestos Types:** Chrysotile 40.0 % **Other Material:** Non-fibrous 60 %			
1018-188 12	914121289-28 **Location:** TSI Air - Cell, 4" / Basement / Rm 13		NA/PS
Analyst Description: Bulk Material **Asbestos Types:** **Other Material:**			
1018-189 12	914121289-29 **Location:** TSI Air - Cell, 4" / Basement / Rm 13		NA/PS
Analyst Description: Bulk Material **Asbestos Types:** **Other Material:**			

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-190	914121289-30	*Yes*	13 %
13 **Location:** TSI Elbow 4" / Basement / Rm 1			(by CVES) by Arturo A. Aldana on 12/09/14
Analyst Description: Tan, Homogeneous, Fibrous, TSI **Asbestos Types:** Chrysotile 13.0 % **Other Material:** Non-fibrous 87 %			
1018-191	914121289-31		NA/PS
13 **Location:** TSI Elbow, 4" / Basement / Rm 13			
Analyst Description: Bulk Material **Asbestos Types:** **Other Material:**			
1018-192	914121289-32		NA/PS
13 **Location:** TSI Elbow, 4" / Basement / Rm 13			
Analyst Description: Bulk Material **Asbestos Types:** **Other Material:**			
1018-193	914121289-33	*Yes*	15 %
14 **Location:** TSI Elbow, 6" / Basement / Rm 13			(by CVES) by Arturo A. Aldana on 12/09/14
Analyst Description: Tan, Heterogeneous, Fibrous, TSI **Asbestos Types:** Chrysotile 15.0 % **Other Material:** Non-fibrous 85 %			
1018-194	914121289-34		NA/PS
14 **Location:** TSI Elbow, 6" / Basement / Rm 13			
Analyst Description: Bulk Material **Asbestos Types:** **Other Material:**			
1018-195	914121289-35		NA/PS
14 **Location:** TSI Elbow, 6" / Basement / Rm 14			
Analyst Description: Bulk Material **Asbestos Types:** **Other Material:**			

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-196 15	914121289-36 **Location:** TSI Air-Cell, 5" / Basement / Rm 13	*Yes*	40 % (by CVES) by Arturo A. Aldana on 12/09/14
Analyst Description: Grey, Homogeneous, Fibrous, Aircell **Asbestos Types:** Chrysotile 40.0 % **Other Material:** Non-fibrous 60 %			
1018-197 16	914121289-37 **Location:** TSI Air-Cell, 6" / Basement / Rm 13	*Yes*	40 % (by CVES) by Arturo A. Aldana on 12/09/14
Analyst Description: Grey, Heterogeneous, Fibrous, Aircell **Asbestos Types:** Chrysotile 40.0 % **Other Material:** Non-fibrous 60 %			
1018-198 16	914121289-38 **Location:** TSI Air-Cell, 6" / Basement / Rm 14		NA/PS
Analyst Description: Bulk Material **Asbestos Types:** **Other Material:**			
1018-199 17	914121289-39 **Location:** Plaster, RC Only, Gray / Basement / Rm 13	*No*	NAD (by CVES) by Arturo A. Aldana on 12/09/14
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Plaster **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-200 17	914121289-40 **Location:** Plaster, RC Only, Gray / Basement / Rm 13	*No*	NAD (by CVES) by Arturo A. Aldana on 12/09/14
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Plaster **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-201 18	914121289-41 **Location:** Concrete, Red / Basement / Rm 13	*No*	NAD (by CVES) by Arturo A. Aldana on 12/09/14
Analyst Description: Red, Homogeneous, Non-Fibrous, Cementitious, Concrete **Asbestos Types:** **Other Material:** Non-fibrous 100 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-202 19	914121289-42 **Location:** Window Glazing, Gray / Basement / Rm 13	*No*	NAD (by CVES) by Arturo A. Aldana on 12/09/14
Analyst Description: Grey, Homogeneous, Non-Fibrous, Window Glazing **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-203 19	914121289-43 **Location:** Window Glazing, Gray / Basement / Rm 14	*No*	NAD (by CVES) by Arturo A. Aldana on 12/09/14
Analyst Description: Grey, Homogeneous, Non-Fibrous, Window Glazing **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-204 19	914121289-44 **Location:** Window Glazing, Gray / Basement / Rm 14	*No*	NAD (by CVES) by Arturo A. Aldana on 12/09/14
Analyst Description: Grey, Homogeneous, Non-Fibrous, Window Glazing **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-205 19	914121289-45 **Location:** Window Glazing, Gray / Basement / Rm 15	*No*	NAD (by CVES) by Arturo A. Aldana on 12/09/14
Analyst Description: Grey, Homogeneous, Non-Fibrous, Window Glazing **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-206 20	914121289-46 **Location:** Window Glazing, White / Basement / Rm 15	*No*	NAD (by CVES) by Arturo A. Aldana on 12/09/14
Analyst Description: White, Homogeneous, Non-Fibrous, Window Glazing **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-207 21	914121289-47 **Location:** Plaster, Single Coat, Gray / Basement / Rm 14	*No*	NAD (by CVES) by Arturo A. Aldana on 12/09/14
Analyst Description: Grey, Homogeneous, Non-Fibrous, Cementitious, Plaster **Asbestos Types:** **Other Material:** Non-fibrous 100 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-208 21	914121289-48 **Location:** Plaster, Single Coat, Gray / Basement / Rm 14	*No*	NAD (by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: Grey, Homogeneous, Non-Fibrous, Cementitious, Plaster **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-209 21	914121289-49 **Location:** Plaster, Single Coat, Gray / Basement / Rm 14	*No*	NAD (by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: Grey, Homogeneous, Non-Fibrous, Cementitious, Plaster **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-210 22	914121289-50 **Location:** Mortar, Gray / Basement / Rm 14	*No*	NAD (by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Mortar **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-211 23	914121289-51 **Location:** Brick, Red / Basement / Rm 14	*No*	NAD (by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: Brick Red, Homogeneous, Non-Fibrous, Cementitious, Brick **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-212 24	914121289-52 **Location:** Concrete, Gray / Basement / Rm 14	*No*	NAD (by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: Grey, Homogeneous, Non-Fibrous, Cementitious, Concrete **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-213 25	914121289-53 **Location:** Concrete, Gray / Basement / Rm 14	*No*	NAD (by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Concrete **Asbestos Types:** **Other Material:** Non-fibrous 100 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-214 26	914121289-54.1 **Location:** Plaster; White TC / Gray RC / Basement / Rm 15	*No*	NAD (by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: White, Homogeneous, Non-Fibrous, Cementitious, Plaster-Finish Coat **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-214 26	914121289-54.2 **Location:** Plaster; White TC / Gray RC / Basement / Rm 15	*No*	NAD (by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: Grey, Homogeneous, Non-Fibrous, Cementitious, Plaster-Base Coat **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-215 27	914121289-55 **Location:** Plaster; Shingle Coat, Gray / Basement / Rm 16	*No*	NAD (by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: Off-White/Grey, Homogeneous, Non-Fibrous, Cementitious, Plaster **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-216 28	914121289-56 **Location:** Particle Board, Brown / Basement / Rm 15	*No*	NAD (by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: Brown, Homogeneous, Fibrous, Particle Board **Asbestos Types:** **Other Material:** Cellulose 60 %, Non-fibrous 40 %			
1018-217 29	914121289-57.1 **Location:** Plaster; White TC / Gray RC / Basement / Rm 15	*No*	NAD (by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: White, Homogeneous, Non-Fibrous, Plaster-Finish Coat **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-217 29	914121289-57.2 **Location:** Plaster; White TC / Gray RC / Basement / Rm 15	*No*	NAD (by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: Grey, Homogeneous, Non-Fibrous, Cementitious, Plaster-Base Coat **Asbestos Types:** **Other Material:** Non-fibrous 100 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-218 29	914121289-58 **Location:** Plaster; White TC / Gray RC / Basement / Rm 17	*No*	NAD (by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: Off-White/Grey, Homogeneous, Non-Fibrous, Cementitious, Plaster **Asbestos Types:** **Other Material:** Non-fibrous 100 % **Comment:** No plaster finish coat found			
1018-219 30	914121289-59 **Location:** GB Only / Basement / Rm 1	*No*	NAD (by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: White/Brown, Homogeneous, Fibrous, Gypsum Board **Asbestos Types:** **Other Material:** Cellulose 3 %, Fibrous glass Trace, Non-fibrous 97 %			
1018-220 31	914121289-60 **Location:** Plaster, Brown, Block Pattern / Basement / Rm 1	*No*	NAD (by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: White, Homogeneous, Non-Fibrous, Cementitious, Plaster **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-221 31	914121289-61 **Location:** Plaster, Brown Block Pattern / Basement / Rm 1	*No*	NAD (by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: White, Homogeneous, Non-Fibrous, Cementitious, Plaster **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-222 31	914121289-62 **Location:** Plaster, Brown Block Pattern / Basement / Rm 1	*No*	NAD (by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: White, Homogeneous, Non-Fibrous, Cementitious, Plaster **Asbestos Types:** **Other Material:** Non-fibrous 100 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-223	914121289-63	*No*	NAD
32	**Location:** Plaster, White, Heavy Skip Trowel / Basement / Rm 1		(by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: White, Homogeneous, Non-Fibrous, Cementitious, Plaster **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-224	914121289-64	*No*	NAD
32	**Location:** Plaster, White, Heavy Skip Trowel / Basement / Rm 1		(by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: White, Homogeneous, Non-Fibrous, Cementitious, Plaster **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-225	914121289-65	*No*	NAD
32	**Location:** Plaster, White, Heavy Skip Trowel / Basement / Rm 1		(by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: White, Homogeneous, Non-Fibrous, Cementitious, Plaster **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-226	914121289-66	*No*	NAD
33	**Location:** Baseboard Mastic, Cream / Basement / Rm 1		(by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: Off-White, Homogeneous, Non-Fibrous, Mastic **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-227	914121289-67	*No*	NAD
34	**Location:** Floor Sealant, White / Basement / Rm 1		(by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: Off-White, Homogeneous, Non-Fibrous, Sealant **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-228	914121289-68	*No*	NAD
35	**Location:** Brown Carpet Glue / Cork Flooring / Dark Brown Glue / Basement / Rm 1		(by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Glue **Asbestos Types:** **Other Material:** Non-fibrous 100 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-229 35	914121289-69 **Location:** Brown Carpet Glue / Cork Flooring / Dark Brown Glue / Basement / Rm 1	*No*	NAD (by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Glue **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-230 36	914121289-70 **Location:** Carpet Glue, Mix. Lt. Brown And Dark Brown / Basement / Rm 1	*No*	NAD (by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Glue **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-231 37	914121289-71 **Location:** Baseboard Mastic, Tan / Basement / Rm 1	*No*	NAD (by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Mastic **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-232 38	914121289-72L1 **Location:** Floor Sizing, Tan / Basement / Rm 1	*No*	NAD (by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: Dark Brown, Homogeneous, Non-Fibrous, Mastic **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-232 38	914121289-72L2 **Location:** Floor Sizing, Tan / Basement / Rm 1	*No*	NAD (by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: White, Homogeneous, Non-Fibrous, Sizing **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-232 38	914121289-72L3 **Location:** Floor Sizing, Tan / Basement / Rm 1	*No*	NAD (by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: Black, Homogeneous, Non-Fibrous, Mastic **Asbestos Types:** **Other Material:** Non-fibrous 100 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-233 39	914121289-73 **Location:** Plaster, Single Coat Gray / Basement / Rm 1	*No*	NAD (by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: Off-White/Grey, Homogeneous, Non-Fibrous, Cementitious, Plaster **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-234 40	914121289-74 **Location:** Window Glazing, Cream / Basement / Rm 1	*No*	NAD (by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: White, Homogeneous, Non-Fibrous, Window Glazing **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-235 41	914121289-75 **Location:** Window Glazing, Tan / Basement / Rm 1	*No*	NAD (by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: White, Homogeneous, Non-Fibrous, Window Glazing **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-236 42	914121289-76 **Location:** Concrete, Gray / Exterior / Front Entry	*No*	NAD (by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Concrete **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-237 43	914121289-77 **Location:** Ashault, Black / Exterior / Parking Lot	*No*	NAD (by CVES) by Arturo A. Aldena on 12/11/14
Analyst Description: Black, Homogeneous, Non-Fibrous, Asphalt **Asbestos Types:** **Other Material:** Non-fibrous 100 %			
1018-238 44	914121289-78 **Location:** Concrete, Gray / Exterior / N-Entrance Walkway	*No*	NAD (by CVES) by Arturo A. Aldana on 12/11/14
Analyst Description: Grey, Homogeneous, Non-Fibrous, Cementitious, Concrete **Asbestos Types:** **Other Material:** Non-fibrous 100 %			

See Reporting notes on last page

PLM Bulk Asbestos Report

1400303; 1018 "H" St. Eureka CA

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-239	914121289-79	*No*	NAD
45	**Location:** Concrete, Gray / Exterior / West Wall		(by CVES) by Arturo A. Aldana on 12/11/14
	Analyst Description: Grey, Homogeneous, Non-Fibrous, Cementitious, Concrete		
	Asbestos Types:		
	Other Material: Non-fibrous 100 %		
1018-240	914121289-80	*No*	NAD
46	**Location:** Concrete, Gray / Exterior / Ramp Surface		(by CVES) by Arturo A. Aldana on 12/11/14
	Analyst Description: Grey, Homogeneous, Non-Fibrous, Cementitious, Concrete		
	Asbestos Types:		
	Other Material: Non-fibrous 100 %		
1018-241	914121289-81	*No*	NAD
47	**Location:** Concrete, Gray / Exterior / Ramp		(by CVES) by Arturo A. Aldana on 12/11/14
	Analyst Description: Grey, Homogeneous, Non-Fibrous, Cementitious, Concrete		
	Asbestos Types:		
	Other Material: Non-fibrous 100 %		

Reporting Notes:

Analyzed By: Arturo A. Aldana aaldana; Date Analyzed: 12/9/2014 12/11/14

*NAD = no asbestos detected; Detection Limit <1%; Reporting Limits: CVES = 1%, 400 Pt Ct = 0.25%, 1000 Pt Ct = 0.1%; NA = not analyzed; NA/PS = not analyzed / positive stop; NVA = No Visible Asbestos; PLM (polarized light microscopy) Bulk Asbestos Analysis by EPA 600/M4-82-020 per 40 CFR 763 (NVLAP Lab #200346-0, CA ELAP lab #2322); Note: PLM is not consistently reliable in detecting asbestos in floor coverings and similar NOB materials. TEM is currently the only method that can be used to determine if this material can be considered or treated as non-asbestos-containing in New York State (also see EPA Advisory for floor tile, FR 59, 146, 38970, 8/1/94). NIST Accreditation requirements mandate that this report must not be reproduced except in full with the approval of the laboratory. This PLM report relates ONLY to the items tested.

Reviewed By:

AmeriSci Los Angeles
24416 S. Main Street, Ste 308
Carson, California 90745
TEL: (310) 834-4868 • FAX: (310) 834-4772

PLM Bulk Asbestos Report

Terry Clark Consulting, LLC
Attn: Terry Clark
1636 Old Arcata Road

Bayside, CA 95524

Date Received 11/10/14 **AmeriSci Job #** 914111363
Date Examined 11/13/14 **P.O. #**
Page 1 **of** 1

RE: 1400303; 1018 "H" St. Eureka CA 95501

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-85	914111363-01.1	*Yes*	Trace (<0.25 % pc) [1] (by 400 pt ct) by Paola Ducoing on 11/13/14

Location: GB/JC / Rm #39 (HVAC, Rm)

Analyst Description: Beige, Homogeneous, Non-Fibrous, Joint Compound
Asbestos Types: Chrysotile <0.25 % pc
Other Material: Non-Asbestos/Inert 32.8 %
Comment: Heat Sensitive (organic): 25.5%; Acid Soluble (inorganic): 41.5%; Inert (Non-asbestos): 32.8%

POINT COUNT
GB/JC composite

Reporting Notes:

(1) EPA 400 Point Count ~~Analysis performed on~~ Inert Residue remaining after 480C heat and HCl acid treatments

Analyzed By: Paola Ducoing ; Date Analyzed: 11/13/2014 11/13/14

*NAD = no asbestos detected; Detection Limit <1%; Reporting Limits: CVES = 1%, 400 Pt Ct = 0.25%, 1000 Pt Ct = 0.1%; NA = not analyzed; NA/PS = not analyzed / positive stop; NVA = No Visible Asbestos; PLM (polarized light microscopy) Bulk Asbestos Analysis by EPA 600/M4-82-020 per 40 CFR 763 (NVLAP Lab #200346-0, CA ELAP lab #2322); Note: PLM is not consistently reliable in detecting asbestos in floor coverings and similar NOB materials. TEM is currently the only method that can be used to determine if this material can be considered or treated as non-asbestos-containing in New York State (also see EPA Advisory for floor tile, FR 59, 146, 38970, 8/1/94). NIST Accreditation requirements mandate that this report must not be reproduced except in full with the approval of the laboratory. This PLM report relates ONLY to the items tested.

Reviewed By:

AmeriSci Los Angeles
24416 S. Main Street, Ste 308
Carson, California 90745
TEL: (310) 834-4868 • FAX: (310) 834-4772

PLM Bulk Asbestos Report

Terry Clark Consulting, LLC
Attn: Terry Clark
1636 Old Arcata Road

Bayside, CA 95524

Date Received 12/18/14 **AmeriSci Job #** 914121676
Date Examined 12/19/14 **P.O. #**
Page 1 **of** 1

RE: 1400303; 1018 "H" St. Eureka CA

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
1018-178 7	914121676-01 **Location:** Plaster, Rough Gray Coat Only / Basement / Room 13	***Yes***	Trace (<0.1 % pc) [1] (by 1000 pt ct) by John A. Lopez on 12/19/14

Analyst Description: Grey, Heterogeneous, Non-Fibrous, Cementitious, Plaster
Asbestos Types: Chrysotile <0.1 % pc
Other Material: Non-Asbestos/Inert 43.2 %
Comment: Heat Sensitive (organic): 17.8%; Acid Soluble (inorganic): 39.1%; Inert (Non-asbestos): 43.2%

1,000 POINT COUNT

ROUGH COAT PLASTER

Reporting Notes:

(1) 1000 Point Count Analysis performed on Inert Residue remaining after 480C heat and HCl acid treatments

Analyzed By: John A. Lopez J. A. Lopez ; Date Analyzed: 12/19/2014 12-19-14

*NAD = no asbestos detected; Detection Limit <1%; Reporting Limits: CVES = 1%, 400 Pt Ct = 0.25%, 1000 Pt Ct = 0.1%; NA = not analyzed; NA/PS = not analyzed / positive stop; NVA = No Visible Asbestos; PLM (polarized light microscopy) Bulk Asbestos Analysis by EPA 600/M4-82-020 per 40 CFR 763 (NVLAP Lab #200346-0, CA ELAP lab #2322); Note: PLM is not consistently reliable in detecting asbestos in floor coverings and similar NOB materials. TEM is currently the only method that can be used to determine if this material can be considered or treated as non-asbestos-containing in New York State (also see EPA Advisory for floor tile, FR 59, 146, 38970, 8/1/94). NIST Accreditation requirements mandate that this report must not be reproduced except in full with the approval of the laboratory. This PLM report relates ONLY to the items tested.

Reviewed By: M. Tang

APPENDIX C
NESHAP Notification Form

ASBESTOS * * * NESHAP



Humboldt *Del Norte* *Trinity*

North Coast Unified Air Quality Management District
2300 Myrtle Ave.
Eureka, CA 95501
Phone: (707) 443-3093
Fax: (707) 443-3099

What is the North Coast Unified Air Quality Management District?

The North Coast Unified Air Quality Management District (District) is a government agency responsible for regulating air pollution in the counties of Humboldt, Del Norte, and Trinity.

Why is asbestos regulated?

Asbestos is a listed as a hazardous air pollutant that is known to cause variety of health concerns, including asbestosis, which is scarring of lung tissues, mesothelioma, which is a cancer of the thin tissue layer protecting internal organs, and lung cancer.

What is the asbestos regulation?

The National Emissions Standards for Hazardous Air Pollutants (NESHAP) for asbestos applies to renovations and demolitions of commercial, industrial, or institutional structures, and residential properties with four or more dwelling units. A ***demolition*** is defined as the removal of load supporting structural members of a facility. A ***renovation*** is defined as altering a facility or any of its associated components in any way. Stripping or removing regulated asbestos containing material is considered renovation for the purposes of the Asbestos NESHAP.

How do I know if asbestos is present?

Prior to *conducting a demolition or a renovation, the structure must be surveyed* by a certified and licensed asbestos consultant (CAC) for presence of asbestos materials. Failure to survey a project prior to working is a violation of Federal law. The AQMD does not conduct surveys. Suspect materials are typically floor tiles, mastics, siding or wallboards, textured coatings, insulation, roofing materials, and spray on ceilings.

Where can I get a sample analyzed?

Any materials that are suspect should be sent to an EPA certified lab for analysis. Speak with your CAC or contact the District office for a current list of certified labs.

How do I get clearance to remove the asbestos?

Only state contractors certified to remove asbestos are permitted to do this type of work. Notifying the District in writing is required at least ***10 working days prior*** to the start date of the removal project. Once the District receives a completed notification form and associated fee(s), they will be provided with a letter acknowledging receipt.

What information must I include on the notification form?

The owner operator or designee must fill out the notification form *COMPLETELY*! Incomplete forms will not be processed. Starting a project without completed notification to the District constitutes a violation of the Asbestos NESHAP. If any of the 18 information items on the notification form do not apply to your project, simply write ***N/A*** in the space provided for that item.

What is the notification fee?

The notification fee is $200 for all projects. For fee considerations, asbestos removal is viewed as a separate and individual project from Demolition or Renovation activities. For single location projects where asbestos removal and demolition / renovation takes place, two separate fees totaling $400 are required; however, the projects can be reported on the same notification form.

Can a structure be demolished by intentional burning?

Intentional burning of structures is considered a demolition and is allowed ONLY for fire training purposes conducted by a fire department. The structure must be completely free of ALL asbestos containing material prior to burning and notification must be provided to the District office 10 working days in advance of the burn date. Please remember that notifications are required for ***ALL DEMOLITIONS*** of commercial, institutional, or industrial structures, and residences having greater than four dwelling units on the property. This must be done ***10 WORKING DAYS*** prior to the start date - ***EVEN IF THERE IS NO ASBESTOS PRESENT.***

Can I Remove asbestos from my residence?

Yes, you may remove asbestos yourself if you are the owner. If you hire someone to do the work for you, they must be a licensed asbestos removal contractor. If you do the work yourself, be sure to keep the asbestos material from becoming friable (crumbling) by keeping it wet. Typically, friable and non-friable asbestos waste may not be disposed of at your local transfer station or landfill. Check with the Waste Management Authority requirements in your area prior to disposal.

What can happen if I don't follow these requirements?

According to the California Health & Safety Code and the Federal Clean Air Act, violators could be subject to notices of violation and maximum penalties of up to **$50,000/day** for failure to follow the regulation(s).

Where can I get additional information?

Please call the local Air Quality Management District Office at 707-443-3093 for notification forms, or for further information on these requirements or check the NCUAQMD web site for forms and additional information - www.ncuaqmd.org .

NCUAQMD requirements for completing the application form;

"NOTIFICATION OF DEMOLITION OR RENOVATION SUBJECT TO NESHAP's"

- First and foremost; **ALL** eighteen (18) boxes requiring information **MUST** be acknowledged with an answer.
- This means if the box request information that does not apply to your specific project, you must respond with a Not Applicable (N/A).
- The application must be typed, or completed in ink.
- Be sure in item ten (**X**), to describe & explain the type and scope of construction methods to be used on the entire project. Add addendum sheets if necessary.
- Be sure in item eleven (**XI**), to attach a thorough and complete plan which describes & explains the exact work practices and control strategies to be utilized to prevent asbestos emissions. Add addendum sheets if necessary.
- The application must be signed by the responsible party(ies).
- If this is a DEMOLITION Project, the application **MUST** be accompanied by a valid asbestos survey for the project.
- If this is a DEMOLITION Project, you **MUST** have a Certified Asbestos Consultant (CAC) perform the survey and assist and guide you through the NESHAP aspects of the project.
- If this is a Commercial RENOVATION Project, you should have a Certified Asbestos Consultant (CAC) assist and guide you through the NESHAP determinations for the project.
- If your CAC is unable to answer your question(s), please call 707.443.3093 to make an appointment to speak with Inspector, Eric Bruckner.

ASBESTOS DEMOLITION AND RENOVATION NOTIFICATION FORM GENERAL INFORMATION

The Asbestos NESHAP, 40 CFR Part 61, Subpart M, requires written notification of demolition or renovation operations under Section 61.145. This form may be used to fulfill this requirement. Only complete notification forms are acceptable. Incomplete notification may result in enforcement action.

This notification should be typewritten and postmarked or delivered no later than ten days prior to the beginning of the asbestos removal activity (dates specified in Section VIII) or demolition (dates specified in Section IX). Please submit the form, along with the appropriate fee, to:

NORTH COAST UNIFIED AQMD
2300 MYRTLE AVENUE
EUREKA, CA 95501

INSTRUCTIONS

I. Type of Notification: Enter "O" if the notification is a first time or original notification, "R" if the notification is a revision of a prior notification, or "C" if the activity has been cancelled.

II. Facility Information: Enter the names, addresses, contact persons and telephone numbers of the following:
Owner: Legal owner of the site at which asbestos is being removed or demolition planned
Asbestos Removal Contractor: Certified asbestos contractor hired to remove asbestos (include DOSH registration #)
Other Demolition or Renovation Operator: Demolition contractor, general contractor, or other person who leases, operates, controls, or supervises the site (fire dept if training burn).

III. Type of Operation: Enter "D" for facility demolition, "R" for facility renovation, "O" for ordered demolition, or "E" for emergency renovation. Fire training burns are considered facility demolitions ("D").

IV. Is Asbestos Present?: Answer "yes" or "no" regardless of the amount of asbestos present.

V. Facility Description: Provide detailed information on the areas being renovated or demolished. If applicable, provide the floor numbers and room numbers where renovations are to be conducted.
Site Location: Provide information needed to locate site in event that the address alone is inadequate.
Building Size: Provide in square meters or square feet.
No. of Floors: Enter the number of floors including basement or ground floors.
Age in Years: Enter approximate age of the facility.
Present Use / Prior Use: Describe the primary use of the facility or enter the following codes: H - hospital; S - school; P - public building; O - office; I - industrial; U - university or college; B - ship; C - commercial; or R - residential.

VI. Asbestos Detection Procedure: Describe methods and procedures used to determine whether asbestos is present at the site, including a description of the analytical methods employed. **Building inspections must be performed by an AHERA-accredited Building Inspector** (40 CFR 763, Subpart E, App. C). Include copy of current accreditation. If an inspection report has been prepared by a consultant for the facility please include a copy with the notification.

VII. Approximate Amount of Asbestos, Including: (1) Regulated asbestos containing material (RACM) to be removed (including nonfriable ACM to be sanded, ground, or abraded); (2) Category I ACM not removed ; and (3) Category II ACM not removed. For both removals and demolition, enter the amount of RACM to be removed by entering a number in the appropriate box and an "X" for the unit. For demolition only, enter the amount of Category I and II nonfriable asbestos not to be removed in the appropriate boxes. Category I nonfriable material includes packing, gasket, resilient floor covering, and asphalt roofing materials containing more than one percent asbestos. Category II nonfriable material includes any material, excluding Category I products, containing more than one percent asbestos, that when dry, cannot be crumbled, pulverized, or reduced to powder. Facilities to be used for fire training purposes must have all materials containing more than one percent asbestos removed.

VIII. Scheduled Dates of Asbestos Removal: Enter scheduled dates (month/day/year) for asbestos removal work. Asbestos removal work includes any activity, including site preparation, which may break up, dislodge, or disturb asbestos material. **These dates must be accurate.** Asbestos removal work occurring prior to the start date or after the end date is a violation and could result in substantial enforcement action. If these dates change, notify the District immediately, by submitting a revision request form.

IX. Scheduled Dates of Demo/Renovation: Enter scheduled dates (month/day/year) for beginning and ending of the planned demolition or renovation. For fire training burns this is the time period when the actual fire training burn will take place. **These dates must be accurate.** Demolition or renovation activity occurring prior to the start date or after the end date is a violation and could result in substantial enforcement action. If these dates change, notify the District immediately, by submitting a revision request form.

X. Description of Planned Demolition or Renovation Work, and Method(s) to be Used: Include here a description of the overall work being done and the techniques being used. A work plan can be attached to address this item.

XI. Description of Engineering Controls and Work Practices to be Used to Control Emissions of Asbestos at the Demolition or Renovation Site: Describe the work practices and engineering controls selected to ensure compliance with the requirements of the regulation, including removal and waste handling emission control procedures. A work plan can be attached to address this item.

XII. Waste Transporter(s): Enter the name, addresses, contact persons and telephone numbers of the persons or companies responsible for transporting ACM from the removal site to the waste disposal site. If the removal contractor or owner is the waste transporter, state "same as owner" or "same as removal contractor".

XIII. Waste Disposal Site: Identify the waste disposal site, including the complete name, location, and telephone number of the facility. If ACM is to be disposed of at more than one site, provide complete information on an additional sheet submitted with the form.

XIV. If Demolition Ordered by a Government Agency: Provide the name of the responsible official, title and agency, authority under which the order was issued, the dates of the order and the dates of the ordered demolition. Include a copy of the order with the notification.

XV. Emergency Renovation Information: Provide the date and time of the emergency, a description of the event and a description of unsafe conditions, equipment damage or financial burden resulting from the event. The information should be detailed enough to evaluate whether a renovation falls within the emergency exception.

XVI. Description of Procedures to be Followed in the Event that Unexpected Asbestos is Found or Previously Nonfriable Asbestos Material Becomes Crumbled, Pulverized, or Reduced to Powder: Provide adequate information to demonstrate that appropriate actions have been considered and can be implemented to control asbestos emissions adequately, including at a minimum, conformance with applicable work practice standards. Typically these will include a work stoppage, wetting of material, and notification to the District.

XVII. Certification of Presence of Trained Supervisor: Certify that a person trained in asbestos removal procedures and the provisions of this regulation will be on-site and supervise the demolition or renovation. **When handling RACM, the supervisor must be a current AHERA-accredited contractor/supervisor, and the workers must be AHERA-accredited workers** (40 CFR 763 Subpart E App. C). The supervisor is responsible for the activity on-site. Evidence that the training has been completed by the supervisor must be available for inspection during normal business hours.

XVIII. Verification: Please certify the accuracy and completeness of the information provided by signing and dating the notification form.

FEES AND OTHER REQUIREMENTS

Demolition - OR - Renovation Notifications $200
Asbestos Abatement (with Demolition Projects).....$200 (Regulation IV, Rule 401, §1.1.2)

- ☐ All fees must accompany the notification form.
- ☐ Notification forms must be mailed or hand delivered to the District office; faxes are acceptable, if followed by the original within three (3) days.
- ☐ Notifications must be received or post-marked at least 10 business days prior to the start of demolition or renovation.
- ☐ Incomplete forms will be returned for correction. The 10 day clock does not start until a correctly completed notification is received by the District office.
- ☐ If a person cancels a notification, they may request a fee refund provided:
    1. the fee has been paid,
    2. the District has not performed an inspection,
    3. the request is in writing,
    4. and the request is made within ten days following cancellation.
- ☐ When a Fire Department receives a fee or donation from the property owner of a structure that is to be used for fire training purposes, the notification/inspection fee noted above shall be paid. Coordinated Burn Authorization Permits are required for Fire Department training burns; however they are exempt from the permit fees (Regulation II, Rule 201, 6.2).
- ☐ Rule 401
  §1.1.2 Where a demolition project includes the removal of Regulated Asbestos Containing Material from a facility prior to the wrecking of the structure, the *removal is treated as a separate renovation project for the purposes of fees*, although they may be included in a single notification. This requires a **second $200.00 fee**
- ☐ Any demolition or renovation project that requires physical barriers for the purpose of controlling asbestos emissions (containment) shall install transparent viewing ports which allow observation, to the extent possible, of all stripping and removal of regulated asbestos containing material from outside the containment area.

Questions on completing the asbestos demolition / notification form, or on the NESHAP regulations covering asbestos, can be directed to District staff at (707) 443-3093.

NORTH COAST UNIFIED AIR QUALITY MANAGEMENT DISTRICT

NOTIFICATION OF DEMOLITION OR RENOVATION SUBJECT TO NESHAP's (40 CFR PART 61.145)

IMPORTANT: Notifications must be signed in ink. All numbered items must be addressed, regardless of applicability – e.g., enter N/A where numbered items don't apply to your project. Only originals accepted.

Operator Project #	Postmark	Date Received	Notification #

I. TYPE OF NOTIFICATION Choose One: ◯Original ◯Revised ◯Canceled

II. FACILITY INFORMATION *(Identify owner, removal contractor and any other contractors)*

OWNER NAME:		
Address:		
City:	State:	Zip
Contact:		Tel:
ASBESTOS REMOVAL CONTRACTOR:		DOSH Reg #
Address:		
City:	State:	Zip:
Contact:		Tel:
OTHER DEMOLITION OR RENOVATION OPERATOR:		
Address:		
City:	State:	Zip:
Contact:		Tel:

III. TYPE OF OPERATION Choose One: ◯Demolition ◯Ordered Demolition ◯Renovation ◯Emergency Renovation

IV. IS ASBESTOS PRESENT Choose One: ◯Yes ◯No

V. FACILITY DESCRIPTION *(Include building name, number and floor or room numbers)*

Bldg. Name:			
Address:			
City:	State:	Zip:	County:
Site Location:			
Building Size:	# of Floors:		Age in Years:
Present Use:		Prior Use:	

VI. PROCEDURE USED TO DETECT THE PRESENCE OF ASBESTOS MATERIAL *(reference the attached copy of the asbestos survey)*

VII. APPROXIMATE AMOUNT OF ASBESTOS, INCLUDING: 1. Regulated ACM to be Removed 2. Category 1 ACM to be Removed 3. Category II ACM to be Removed	RACM To Be Removed	Nonfriable Asbestos Material To Be Removed		Indicate Unit of Measurement Below	
		Category I	Category II	Unit	
Pipes				Ln Ft:	Ln m:
Surface Area				Sq Ft:	Sq m:
Vol. RACM Off Facility Component				Cu Ft:	Cu m:

VIII. SCHEDULED DATES ASBESTOS REMOVAL *(MM/DD/YY)*	Start:	Complete:
IX. SCHEDULED DATES DEMO/RENOVATION *(MM/DD/YY)*	Start:	Complete

X. DESCRIPTION OF PLANNED DEMOLITION OR RENOVATION WORK, AND METHOD(S) TO BE USED:

NOTIFICATION OF DEMOLITION OR RENOVATION (continued)

XI. DESCRIPTION OF WORK PRACTICES AND ENGINEERING CONTROLS TO BE USED TO PREVENT EMISSIONS OF ASBESTOS AT THE DEMOLITION OR RENOVATION SITE (*attach work plan, if appropriate*)**:**		
XII. WASTE TRANSPORTER #1		
Name:		
Address:		
City:	State:	Zip:
Contact Person:		Tel:
WASTE TRANSPORTER #2		
Name:		
Address:		
City:	State:	Zip:
Contact Person:		Tel:
XIII. WASTE DISPOSAL SITE		
Name:		
Address:		
City:	State:	Zip:
Tel:		
XIV. IF DEMOLITION ORDERED BY A GOVERNMENT AGENCY PLEASE IDENTIFY THE AGENCY BELOW (*attach copy of demolition order*)**:**		
Name:	Title	
Authority		
Date of Order (*MM/DD/YY*):	Date Ordered to Begin (*MM/DD/YY*):	
XV. FOR EMERGENCY RENOVATIONS		
Date and Hour of Emergency (*MM/DD/YY*):		
Description of the Sudden, Unexpected Event:		
Explanation of how the event caused unsafe conditions or would cause equipment damage or an unreasonable financial burden:		
XVI. DESCRIPTION OF PROCEDURES TO BE FOLLOWED IN THE EVENT THAT UNEXPECTED ASBESTOS IS FOUND, OR PREVIOUSLY NONFRIABLE ASBESTOS MATERIAL BECOMES FRIABLE:		
XVII. I CERTIFY THAT AN INDIVIDUAL TRAINED IN THE PROVISIONS OF THIS REGULATION (40 CFR PART 61, SUBPART M) WILL BE ON-SITE DURING ALL ASBESTOS ABATEMENT, AND EVIDENCE THAT THE REQUIRED CERTIFICATION ACCOMPLISHED BY THIS PERSON WILL BE AVAILABLE FOR INSPECTION BY REGULATING AUTHORITIES DURING NORMAL BUSINESS HOURS. _____ _____ (Signature of Owner/Operator) (Date)		
XVIII. I CERTIFY THAT THE ABOVE INFORMATION IS CORRECT. _____ _____ (Signature of Owner/Operator) (Date)		

Any owner or operator of a demolition or renovation project which is subject to 40 CFR-61, Subpart M (NESHAPS) for asbestos and is required to submit a written notification of the demolition/renovation to the District shall submit with the notification form the following fee:

DEMOLITIONS – OR – RENOVATION PROJECTS **$200**
ASBESTOS ABATEMENT with Demolition (Regulation IV, Rule 401, §1.1.2) **$200**

If a Fire Department receives a fee or donation from the property owner of a structure that is to be used for fire training purposes, the demolition/renovation fees noted above shall apply. Otherwise, Fire Department training burns shall be exempted from fees as noted above.

APPENDIX D

Consultant Certifications

State of California Department of Public Health

Lead-Related Construction Certificate | Certificate Type | Expiration Date



Inspector/Assessor 09/05/2015

Terry A. Clark ID #: 10915

State of California Department of Public Health

Lead-Related Construction Certificate | Certificate Type | Expiration Date



Sampling Technician 09/02/2015

Zindar Brunelle ID #: 25819

State of California
Division of Occupational Safety and Health
Certified Asbestos Consultant



Terry Alan Clark
Name

Certification No. 02-3246

Expires on 12/11/15

This certification was issued by the Division of Occupational Safety and Health as authorized by Sections 7180 et seq. of the Business and Professions Code.

State of California
Division of Occupational Safety and Health
Certified Asbestos Consultant



Zindar Brunelle
Name

Certification No. 14-5295

Expires on 10/15/15

This certification was issued by the Division of Occupational Safety and Health as authorized by Sections 7180 et seq. of the Business and Professions Code.

Certificate of Training

This Certifies that

Terry Clark

has successfully completed 4 hours training entitled

Asbestos Building Inspector Refresher

Toxic Substances Control Act, Title II (AHERA)

This is an annual certification. It must be renewed.

Environmental Safety Training Professionals Ltd.

3035 Prospect Park Drive #110
Rancho Cordova, CA 95670
Phone 916 638-5550
Fax 916 638-5551
Division Approval #CA-006-06

I.D. #: 0362
Certification #: 15127
Course Date: 09/11/14

Expiration Date: 09/11/15

By Neta Snider
Authorized Signature: Neta Snider

Certificate of Training

This Certifies that

Zindar Brunelle

has successfully completed 4 hours training entitled

Asbestos Building Inspector Refresher

Toxic Substances Control Act, Title II (AHERA)

This is an annual certification. It must be renewed.

Environmental Safety Training Professionals Ltd.

3035 Prospect Park Drive #110
Rancho Cordova, CA 95670
Phone 916 638-5550
Fax 916 638-5551
Division Approval #CA-006-06

I.D. #: 7598
Certification #: 14739
Course Date: 06/12/14

Expiration Date: 06/12/15

By Neta Snider
Authorized Signature: Neta Snider

SPECIFICATIONS FOR
ASBESTOS ABATEMENT & PAINT DISTURBANCE
EUREKA VETERANS BUILDING
1018 "H" STREET
EUREKA, CALIFORNIA

January 5, 2015

Prepared for:
County of Humboldt
Public Works Department
1106 Second Street
Eureka, CA 95501
(707) 445-7493

TCC Project 1400303b

Prepared by:
Brunelle & Clark Consulting
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Bayside, CA 95524
(707) 822-4058

SPECIFICATIONS FOR
ASBESTOS ABATEMENT & PAINT DISTURBANCE
EUREKA VETERANS BUILDING
1018 "H" STREET,
EUREKA, CALIFORNIA

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SPECIFICATIONS FOR
ASBESTOS ABATEMENT & PAINT DISTURBANCE
EUREKA VETERANS BUILDING
1018 "H" STREET
EUREKA, CALIFORNIA

1.0 INTRODUCTION/SITE LOCATION

The Eureka Veterans Building is a three level structure, including a basement level, main level (ground floor), and a second level "mezzanine". The roof has several sections/levels. The structure was built in 1930. See Figures, Appendix A.

The exterior building is constructed of steel re-enforced concrete, with some interior load bearing concrete walls and support beams of steel and concrete. The roof substrate is wood framing. The interior walls and ceilings are largely plaster, generally over lath, with some over expanded metal mesh. There is some minor gypsum drywall in the building.

1.1 ASBESTOS SURVEY & PAINT SAMPLING

An asbestos sampling survey for this building, including all interior and exterior components, was completed in December 2014 by this firm, as reported in the "ASBESTOS SURVEY & PAINT SAMPLING, EUREKA VETERANS BUILDING, 1018 "H" STREET, EUREKA, CALIFORNIA" dated December 31, 2014.That survey work also included the collection of paint samples for the analysis of lead content, as evaluated in that report. See Tables 2 & 3, Appendix B for a summary of analytic data.

The extent of seismic damage to this building, and the extent/manner of repair work for that damage is not covered in these specifications. These specifications were prepared to cover complete asbestos abatement for this building, However, limited asbestos abatement, as may be required for focused seismic repair work, will generally require the same abatement procedures as contained herein, as well as the specifications for lead-related construction (repair) work herein.

Several materials that will be disturbed for seismic repair work were found to be *asbestos containing materials* (ACM) and/or *asbestos containing construction material* (ACCM). *Asbestos Containing Materials (ACM)* are materials that contain >1% asbestos. *Asbestos Containing Construction Materials (ACCM)* contain asbestos in amounts between 0.1% and 1.0%. The ACM and/or ACCM project materials are summarized below, and also in Table 1, Appendix B.

ACCM:

- Gypsum drywall/joint compound.
- Plaster surfacing on a concrete wall in one large basement room.

This site does contain some materials defined as ACM; some of which are categorized as RACM and some which are not. Some site ACM are categorized as "non-friable" types of asbestos that will remain "non-friable" if properly abated and therefore are not deemed

to be "regulated" ACM (RACM) under the EPA NESHAP regulations. These are summarized below:

ACM, but not defined as RACM:

- 9X9 VFT/mastic.
- 12x12 VFT/mastic.
- Roof patching compounds (see photos in Fig. 10).
- Transite piping.
- Window glazing (putty).

Three other types of ACM found in this building are categorized as RACM, as summarized below. A NESHAP Notification must be filed with the NCUAQMD at least 10 working days prior to the abatement of RACM. The abatement contractor will file that notification as needed.

ACM that are categorized as RACM:

- Ceiling plaster, several main floor rooms.
- Linoleums, several rooms.
- TSI pipe insulation.

For compliance with Cal/OSHA Title 8 CCR 1529, any work that disturbs project ACMs or ACCMs must be performed by a licensed asbestos abatement contractor, and such work will be in compliance with Cal/OSHA regulations and the specifications herein.

During the survey work, twenty representative samples of paint were collected from the site and submitted to an accredited laboratory for the analyses of lead content, as reported in the asbestos survey report. This included paint from thirteen interior components and seven exterior components. See Table 3, Appendix B, for a summary of analytic data.

For the thirteen interior samples, the lead content in one sample was found to be "less than detectable" (<100 ppm lead), essentially characterized as "lead free". Nine other samples ranged between 720 ppm and 4,700 ppm. These nine paints are categorized as *Lead Containing Surface Coatings* (LCSC), defined as paints ranging between "detectable" amounts of lead (>100 ppm) and 4,999 ppm lead. Three paint samples were found to be *Lead Based Paint* (LBP), which are paints with lead contents above 5,000 parts per million (ppm). These three paints ranged from 5,700 ppm to 29,000 ppm lead.

Of the seven exterior paint coatings, one was found to be lead free (<100 ppm lead), three were found to be LCSC, ranging between 520 ppm and 2,900 ppm lead, and three were found to be LBP, ranging between 5,800 ppm to 26,000 ppm lead.

The disturbance of LCSC by Cal/OSHA defined "trigger tasks" requires compliance with the provisions of the Cal/OSHA Lead in Construction Standard Title 8, CCR Section 1532.1 for worker protection. The Cal/OSHA "trigger tasks" include, among other actions, sanding, cutting, scraping, and hand demolition; actions that might create potentially harmful lead containing dust.

1.2 Definitions

A. "General Contractor" herein refers to the General Contractor for the Project.

B. "Project" refers to asbestos abatement work and the demolition of materials with lead containing paints.

C. "Owner" refers to the site owner, Humboldt County.

D. "County Architect" refers to Mr. Tyler Holmes, Humboldt County Architect.

E. "Project Manager" refers to Mr. Jake Johnson, Humboldt County Architect - Construction Projects Manager.

F. "Environmental Consultant" refers to the project Certified Asbestos Consultant and Certified Lead Inspector/Assessor.

G. "Abatement Contractor" refers to the licensed Asbestos Abatement & Lead Removal Contractor.

1.3 Scope of Asbestos & Lead Related Work

A. Disturbance of any ACM or ACCM as listed in Table 1, Appendix B. See Figures in Appendix A.

B. All Project work that disturbs or contacts ACM or ACCM shall be supervised by individual(s) trained and certified as an Asbestos Supervisor, who are also designated as a "Competent Person".

C. All Project work that disturbs or contacts lead containing materials shall be supervised by individual(s) trained and certified by the California Department of Public Health for lead related work and who is also designated as a "Competent Person".

D. Asbestos abatement and lead removal Contractor shall furnish all labor, materials, services, and equipment required to safely execute operations in accordance with these specifications.

E. The Project work includes the removal, clean-up, storing, and disposal of all friable and non-friable ACM debris, including used HEPA vacuum filters, used personal respirator filters, protective clothing, any plastic sheeting or drop cloths.

F. Removal and disposal of lead containing materials.

1. Contractor must characterize any removed paint coatings for waste disposal, and provide proper disposal of such waste at his expense.

G. Removal and disposal of ACM and/or ACCM.

1. Abatement Contractor will provide an exterior waste bin for storage of all asbestos waste on site. Bin must be secured with a lock.

2. Abatement Contractor will provide for proper disposal of all abated ACM and/or ACCM waste.
3. Copies of all waste transfer/disposal documentation shall be submitted to the Environmental Consultant and the Project Manager within 90 days of transfer, and delivery, and disposal.

H. Damages to the project building caused during the performance of Project work activities shall be repaired by Abatement Contractor no additional expense to the Owner, unless other arrangements and approval have been provided by the Owner.

1.4 Scope of Lead Removal Work

A. Lead removal work will include removal of some lead containing surface coatings (LCSC) and lead base paint (LBP) as required for completion of asbestos abatement work and/or seismic repair work. The disturbance of lead containing materials are subject to the Cal/OSHA worker protection regulations as defined by the Cal/OSHA Lead in Construction Standard, Title 8, CCR Section 1532.1 by Cal/OSHA specific "trigger tasks", which are anticipated for this project.

1.5 Required Licensure

A. The Asbestos Contractor shall be licensed by the State of California, Asbestos Contractors State License Board for the type of abatement work required by the Project abatement or demolition/construction work, per "Contract General Conditions". In addition, the Asbestos Contractor shall have a valid Asbestos Endorsement to that license, including a C-39 endorsement for Roofing Abatement.

B. The Abatement Contractor shall be licensed by the State of California, for the type of lead removal work required by the Project abatement or demolition/construction work, per "Contract General Conditions" and the Abatement Contractor's supervisor shall have received training as required by the Cal/OSHA Lead Construction Standard (Title 8 CCR 1532.1).

1.6 Permits

A. The General Contractor shall be responsible for obtaining any permits or fees.

1.7 Notifications

A. This site is subject to EPA NESHAP review and regulation. The scope of this project and the quantity of NESHAP regulated ACM (RACM) to be disturbed (abated) may require the filing of a NESHAP Notification for this project. If project conditions require a NESAHP Notification for asbestos abatement work, it will be the responsibility of the Abatement Contractor to file a NESHAP Notification for RACM abatement to the

North Coast Unified Air Quality Management District (NCUAQMD) at least 10 working days in advance of RACM abatement, and to pay the requisite review fee, which will be reimbursed by the Owner.

C. The Abatement Contractor shall assume that the Project will disturb more than 100 ft^2 of asbestos containing construction material (ACCM) and therefore will complete the "Cal/OSHA Employee Registration" process, including any associated fees.

D. The Abatement Contractor shall be responsible for filing a "Report of Use of Regulated Carcinogens" (contact the Carcinogen Control Unit at Cal/OSHA). This is required if any amount of asbestos is to be disturbed.

E. The Contractor shall make any other required notifications, at the proper time, to regulatory agencies that include but may not be limited to the following:

2. California Division of Occupational Safety and Health.

1.8 Insurance Requirements

A. Provide as per "Contract."

1.9 Bonding Requirements

A. Provide as per "Contract."

1.10 Project Schedule

A. Project abatement services will be scheduled as needed by the General Contractor or the Project Manager.

B. All work shall be performed in accordance with the requirements established by the General Contractor, Owner and/or Project Manager and these specifications.

1.11 Procedures

A. Abatement Contractor shall perform all asbestos work in compliance with the most recent edition of all applicable federal, state, and local regulations, standards and codes.

1. Requirements include verifying permits, obtaining licenses, inspections, releases and similar documentation, as well as payments, statements and similar requirements associated with codes, regulations, and standards.

B. Regulations, Standards, and Codes (General):

1. General applicability of federal, state, and local regulations, standards and codes governing lead in construction and asbestos abatement, transport, and disposal, except to the extent that more explicit or more

stringent requirements are written directly into the contract documents or these specifications, all applicable regulations, standards, and codes have the same force and effect and are made a part of the contract documents as if copied directly into the contract documents, or as if published copies are bound herewith.

C. The General Contractor Responsibility: The General Contractor shall assume full responsibility and liability for the compliance with all applicable federal, state, and local regulations pertaining to work practices, transport, disposal, and protection of workers, visitors to the site, and persons occupying areas adjacent to the site. The Abatement Contractor is responsible for providing training, medical examinations and maintaining training/medical records of asbestos abatement personnel as required by the applicable federal, state, and local regulations for asbestos and lead related work. The Asbestos Contractor shall indemnify and hold the Owner harmless for failure to comply with any applicable asbestos work, lead related work, transport, disposal, safety, health or other regulation on the part of himself, his employees, or his sub- contractors.

D. The Abatement Contractor will be held responsible for any delays created by failure to comply with any applicable law or regulation. The Owner reserves the right to stop the Asbestos Contractor's work at no cost to the Owner in the event that the Asbestos Contractor's noncompliance poses an imminent health and safety risk to Owner's employees, tenants, or visitors. If the Abatement Contractor fails to take effective measures to correct noncompliant work practices, then the Owner shall contact the appropriate regulatory agency.

E. The General Contractor's "Competent Person" is responsible for exercising general supervisory authority over the work covered by all applicable laws and regulations and these specifications.

1.12 Submittals

A. Prior to commencement of work, Abatement Contractor shall submit two copies to the Project Manager documentation that includes, without limitation, the following:

1. Submit copies of licenses and registrations required by Article 1.5 Required Licensure, including copies of sub contractor's licenses.
2. Submit proof of insurance as required per "Contract".
3. Submit copies of any required permits and notifications.
4. Submit manufacturer's certification that HEPA vacuums and air filtration devices conform to ANSI Z9.2-79.
5. Submit a construction schedule indicating staging or work, milestones and dates of completion for each phase of the work, and basic Work Plan per Section 3.1(B).

6. Submit documentation that Abatement Contractor's employees, including foreman, supervisor, and any other company personnel or agents who may be exposed to airborne asbestos fibers or who may be responsible for any aspects of asbestos abatement and lead removal activities, have received training as required by CFR 1926.1101, 8 CCR 1529, Cal/OSHA Lead Construction Standard (Title 8 CCR 1532.1), and Section 1.17 of these specifications. .
7. Submit documentation from Physician that all employees or agents who may be exposed to airborne asbestos fibers or lead dust in excess of background levels have received medical monitoring to determine whether they are physically capable of working while wearing the respirator required without suffering adverse health effects. The Abatement Contractor must be aware of and provide information to the examining physician about unusual conditions in the workplace environment (e.g. high temperatures, humidity, chemical contaminants) that may impact on the employee's ability to perform work activities.
8. Submit documentation of respirator fit testing for all Asbestos Contractor employees and agents who must enter the regulated work area. This fit testing shall be in accordance with qualitative procedures as required by OSHA regulations or be quantitative in nature.
9. Submit Material Safety Data Sheets for all chemicals and substances to be used.

B. During work activities, Abatement Contractor shall submit to the Owner's Environmental Consultant documentation that includes, without limitation, the following:

1. Submit copies of the work area entry/exit log book. Log book must record name, affiliation, time in, and time out for each entry into the work area.
2. Submit copies of Material Safety Data Sheets (MSDS) for any solvents, encapsulants, paints, wetting agents, chemicals, and replacement materials, as necessary, with the exception of the MSDS for the roof paint/encapsulant as supplied by the General Contractor or County Architect.
3. Submit results of all required OSHA air monitoring. Results shall be available within three days after the start of work and completion of the last shift.
4. Submit copies of all accident/incident reports where injury or damage has occurred on or to the Owner's property.
5. Submit copies of daily logs indicating location(s) worked, type of materials removed, quantity of materials removed and number of personnel conducting the aforementioned activities.

1.13 Notices

A. Post at the entry points of regulated areas an Entry and Exit Log.

B. Additional postings shall include, but not be limited to:

1. OSHA "Regulated Area" warning signs.
2. Proposition 65 Warning Signs.
3. Cal/OSHA Asbestos Registration.
4. Cal/OSHA 'Report of Use of Regulated Carcinogens".
5. Cal/OSHA Work-site Notification.
6. NESHAP abatement Notification.
7. Any local agencies (if applicable).

D. On-site records shall include, but not be limited to the following: Hazard Communication Program; a written plan including required topics; material safety data sheets for products at the site (MSDS warnings), and documentation of training.

1. Emergency Action and Fire Prevention Plan.
2. Respiratory Protection Program (Include documentation of training).
3. Documentation of Class II asbestos work training and Lead, for all employees.

1.14 Site Use and Security

A. Confine operations at the site to the areas required for Project activities under the Contract and as allowed by the General Contractor and Project Manager. Portions of the site beyond which areas on which work is required are not to be entered or disturbed by Abatement Contractor or his employees.

B. Access to the work area shall be restricted only to authorized, trained personnel with adequate respirator protection, including the Abatement Contractor, Abatement Contractor's employees, the Owner's employees and consultants, and State and Local inspectors.

C. Entry into the work area by unauthorized individuals shall be reported immediately to the Project Manager.

D. Abatement Contractor shall be responsible for Project site security during work operations in order to protect work efforts and equipment.

1.15 Emergency Planning

A. Emergency planning and procedures shall be developed by Asbestos Contractor prior to abatement initiation.

B. Asbestos Contractor shall ensure that all persons entering the work area understand the Project site layout and emergency procedures.

C. Emergency planning shall include considerations of accidental ACM release, fire, explosion, electrical hazards, slips, trips and falls, and heat related injury.

D. Employees shall be trained in evacuation procedures in the event of work place emergencies.

1. For non-life threatening situations, employees injured or otherwise incapacitated shall decontaminate following normal procedures with assistance from fellow workers, if necessary, before exiting the work place to obtain proper medical treatment.
2. For life-threatening injury or illness, worker decontamination shall take least priority. After measures to stabilize the injured worker, remove him from the work place and secure proper medical treatment.

1.16 Fire Protection

A. Abatement Contractor shall conduct activities in accordance with all procedures and requirements as outlined by the local fire department.

B. Material Safety Data Sheets (MSDS) for fire retardant materials shall be made available upon request.

C. All combustible rubbish and debris, including properly bagged ACM debris shall be properly stored or disposed of at the end of each working day.

D. A minimum of one (1) 4A/60BC dry-chemical extinguisher shall be maintained at the area of work. Asbestos Contractor shall ensure that on site personnel are aware of the location and proper use of all extinguishers and other fire/life safety equipment.

1.17 Required Asbestos Abatement Training

All Abatement Contractors and Sub-Contractors providing asbestos abatement services for the disturbance of ACM must satisfy all Cal/OSHA training requirements in compliance with Title 8 CCR 1529, Title 8 CCR 1532.1, and any other applicable State and Federal regulations for worker protection.

1.18 Required Lead Related Work Training

All contractors and subcontractors providing lead related work within "Regulated Areas" of the worksite during the disturbance of lead must satisfy all requirements of 8 CCR 1532.1 (Cal/OSHA) and any other applicable State and Federal regulations for worker protection.

2.0 PRODUCTS

2.1 Materials

A. General: Abatement Contractor shall carefully adhere to the following:

1. Deliver all materials in the original packages, containers, or bundles bearing the name of the manufacturer and brand name (where applicable).
2. Polyethylene sheeting utilized for drop cloths and barriers shall be a minimum of 6 mil. thickness.
3. Disposal bags for ACM shall be of 6-mil. minimum polyethylene, and be unlabeled.
4. Warning signs as required by CAL-OSHA shall be utilized, bilingual if needed to accommodate workers.
5. Spray adhesive for sealing polyethylene to polyethylene shall contain no methylene chloride compounds.
6. A commercial grade of chemicals required for the preparation of "amended water" shall be required for this project.

2.2 Equipment

A. General:

1. Provide vacuum equipment with HEPA filtration. If power tools are used on ACM, provide power tools with HEPA assisted exhaust control. Replace HEPA filters when filters become clogged with particulate matter.
2. ½ face air purifying respirators with P-100 filters will be required when disturbing non-friable ACM unless an adequate "negative exposure assessment" is submitted to, and approved by, the Project Asbestos Consultant.
3. Respirators shall be furnished to the abatement workers by Abatement Contractor. The respirators shall have been tested and approved by National Institute of Occupational Safety and Health (NIOSH) for use in asbestos contaminated atmospheres.
4. Disposable protective clothing, including head, body, and foot coverings shall be furnished to all employees and visitors in the "Regulated" work areas, in sizes adequate to accommodate movement without tearing.
5. Additional safety equipment (e.g. hard hats meeting the requirements of ANSI Standard Z89.1-1981, eye protection meeting the requirements of ANSI Standard Z87.1-1979, safety shoes meeting the requirements of ANSI Standard Z41.1-1967, disposable gloves), as necessary, shall be furnished to all workers and authorized visitors.
6. Furnish a sufficient supply of disposable mops, rags, and sponges for work area cleaning and decontamination.

8 All scaffolding and ladders must be in conformance with Cal/OSHA Standards.

9. Provide an exterior waste bin for storage of all project non-friable asbestos waste. Bin must be secured with a lock.

10. All HEPA negative air machines to be used on this jobsite shall pass a "challenge test" as conducted by a certified third party prior to use on this site, to be conducted on-site. Tested machines must then remain onsite for exclusive use on this project. If a machine is removed and returned to the site, it must again pass a third party "challenge test" prior to use on this site.

3.0 GENERAL EXECUTION

3.1 General Project Procedures

A. The Abatement Contractor shall provide at least 3 working day notification to the Project Manager, General Contractor and the Project Environmental Consultant for proposed work on ACM and/or ACCM incidental to the Project.

B Inform the Environmental Consultant upon completion of abatement work in any regulated and/or contained space. The Environmental Consultant will perform a visual clearance of the work area prior to demobilization of the Abatement Contractors work crew and prior to removal of any containments. Negative air conditions will be maintained until the Environmental Consultant has issued either verification or waiver of air clearance.

3.2 Worksite Preparation

A. Prior to abatement, the Abatement Contractor shall coordinate all logistics with the General Contractor.

B. The Owner and/or General Contractor shall provide access to power and water sources and will insure safe installation of temporary power sources and equipment by compliance with all applicable electrical code requirements and Cal/OSHA requirements for temporary electrical systems. Abatement Contractor shall supply sufficient lines and hoses to safely access power and water sources as made available for use.

C. A "Regulated Area" shall be established, and shall, at a minimum, include areas of work on ACM and/or ACCM. Post warning signs meeting the specifications of Cal/OSHA General Industry Safety Order Section 5208 and 29 CFR 1926.1101 at perimeter/entry points to the "Regulated Area"; where airborne concentration of asbestos fibers may exceed ambient background levels. Signs shall be posted at a distance sufficiently far enough away from a work area to permit a person to read the sign and take necessary protective measures to avoid exposure.

D. In "Regulated Areas", all Project workers shall don personnel protective equipment as required in Article 2.2 - Equipment.

E. Secure all entrance/exit doorways against opening, entry, or passage by all unauthorized personnel until all installation work that disturbs ACM and/or ACCM is completed, including clean-up and disposal.

F. Abatement contractor shall supply sufficient portable lighting, if needed, to provide adequate lighting for all work areas.

G. Where "negative air containment" in interior spaces is required, install two layers of 6-mil poly sheeting as "critical barriers" over all doors, windows, vents, and other openings, secured with duct tape. In any other "regulated area" work, install two layers of 6-mil poly sheeting as "critical barriers" over all doors, windows, vents, and other openings within 20 feet of actual work.

H. In any interior "negative air containment" areas, insure that all HVAC systems have been shut-down and will remain so during work, until clearances have been issued by the Asbestos Consultant.

I All abated ACM and/or ACCM must be placed in 6-mil poly disposal bags or double wrapped in 6-mil poly. All debris in disposal bags or wraps must be visibly wetted. Gooseneck and tape closed filled disposal bags or wraps, wet wipe all bags or wraps, and then double bag or wrap debris into second 6-mil disposal bag or 6-mil wrap. All bags are to be goosemeccked closed.

3.3 Abatement of ACCM Drywall/Joint Compound.

There is ACCM drywall/joint compound in several rooms. See Sections 2.2, 3.1, and 3.2 prior to abatement.

A. If removal of drywall panels is required, place room under negative air containment. If crack repair only requires opening cracks for patching, isolation of the room as a "regulated area" by use of 6-mil poly sheeting at the doorway is sufficient, per Sections 3.1 and 3.2.

B. If gross removal of drywall panels is required, remove to the extent required by the general contractor, to the mid-line of the nearest stud.

C. Bag or wrap all abated debris as in Section 3.2 (K).

D. After passing visual clearance, apply latex paint as a sealant to drywall surfaces in and around the cut or scraped edges.

3.4 Abatement of ACCM Surfacing on Concrete.

There is a thick layer of ACCM concrete surfacing on one concrete wall in the basement. Some of the plaster is spalling from the concrete substrate. The same location has TSI piping that may be abated at the same time, which may be performed inside the same containment, if feasible.

8 All scaffolding and ladders must be in conformance with Cal/OSHA Standards.

9. Provide an exterior waste bin for storage of all project non-friable asbestos waste. Bin must be secured with a lock.

10. All HEPA negative air machines to be used on this jobsite shall pass a "challenge test" as conducted by a certified third party prior to use on this site, to be conducted on-site. Tested machines must then remain onsite for exclusive use on this project. If a machine is removed and returned to the site, it must again pass a third party "challenge test" prior to use on this site.

3.0 GENERAL EXECUTION

3.1 General Project Procedures

A. The Abatement Contractor shall provide at least 3 working day notification to the Project Manager, General Contractor and the Project Environmental Consultant for proposed work on ACM and/or ACCM incidental to the Project.

B Inform the Environmental Consultant upon completion of abatement work in any regulated and/or contained space. The Environmental Consultant will perform a visual clearance of the work area prior to demobilization of the Abatement Contractors work crew and prior to removal of any containments. Negative air conditions will be maintained until the Environmental Consultant has issued either verification or waiver of air clearance.

3.2 Worksite Preparation

A. Prior to abatement, the Abatement Contractor shall coordinate all logistics with the General Contractor.

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C. A "Regulated Area" shall be established, and shall, at a minimum, include areas of work on ACM and/or ACCM. Post warning signs meeting the specifications of Cal/OSHA General Industry Safety Order Section 5208 and 29 CFR 1926.1101 at perimeter/entry points to the "Regulated Area"; where airborne concentration of asbestos fibers may exceed ambient background levels. Signs shall be posted at a distance sufficiently far enough away from a work area to permit a person to read the sign and take necessary protective measures to avoid exposure.

D. In "Regulated Areas", all Project workers shall don personnel protective equipment as required in Article 2.2 - Equipment.

E. Secure all entrance/exit doorways against opening, entry, or passage by all unauthorized personnel until all installation work that disturbs ACM and/or ACCM is completed, including clean-up and disposal.

F. Abatement contractor shall supply sufficient portable lighting, if needed, to provide adequate lighting for all work areas.

G. Where "negative air containment" in interior spaces is required, install two layers of 6-mil poly sheeting as "critical barriers" over all doors, windows, vents, and other openings, secured with duct tape. In any other "regulated area" work, install two layers of 6-mil poly sheeting as "critical barriers" over all doors, windows, vents, and other openings within 20 feet of actual work.

H. In any interior "negative air containment" areas, insure that all HVAC systems have been shut-down and will remain so during work, until clearances have been issued by the Asbestos Consultant.

I All abated ACM and/or ACCM must be placed in 6-mil poly disposal bags or double wrapped in 6-mil poly. All debris in disposal bags or wraps must be visibly wetted. Gooseneck and tape closed filled disposal bags or wraps, wet wipe all bags or wraps, and then double bag or wrap debris into second 6-mil disposal bag or 6-mil wrap. All bags are to be goosemeccked closed.

3.3 Abatement of ACCM Drywall/Joint Compound.

There is ACCM drywall/joint compound in several rooms. See Sections 2.2, 3.1, and 3.2 prior to abatement.

A. If removal of drywall panels is required, place room under negative air containment. If crack repair only requires opening cracks for patching, isolation of the room as a "regulated area" by use of 6-mil poly sheeting at the doorway is sufficient, per Sections 3.1 and 3.2.

B. If gross removal of drywall panels is required, remove to the extent required by the general contractor, to the mid-line of the nearest stud.

C. Bag or wrap all abated debris as in Section 3.2 (I).

D. After passing visual clearance, apply latex paint as a sealant to drywall surfaces in and around the cut or scraped edges.

3.4 Abatement of ACCM Surfacing on Concrete.

There is a thick layer of ACCM concrete surfacing on one concrete wall in the basement. Some of the plaster is spalling from the concrete substrate. The same location has TSI piping that may be abated at the same time, which may be performed inside the same containment, if feasible.

A. Prior to closet removal, install a "containment wall" of two layers of 6-mil poly sheeting well outboard of the row of closets along the affected wall far enough to allow removal of the closets, use zip-poles to support that sheeting as needed.

B. Set-up that work area with negative air containment.

C. After the occupants have removed all content from the closets, detach and remove the closets from the wall. Clean up all debris from that removal work, including any debris on the closet materials, using HEPA vacuums and wet wiping. Then remove the closets from the contained work area, breach the containment wall as needed to do so.

D. Restore the poly sheeting "containment wall", re-establish negative air containment. Place at least two 6-mil poly drop cloths on all floor areas, or, if limited removal of plaster surfacing is required only, install drop-sheets extending 20 feet laterally and from the concrete wall to the containment wall.

E. Wet all areas of plaster surfacing to be abated with amended water, allow time for penetration. Then remove all ACCM surfacing from the concrete substrate to the extent required by the General Contractor or Project Manager by scrapping with hand tools. If power tools are required, they must be fitted with HEPA assisted vacuums.

F. After removal, HEPA vacuum and wet wipe the concrete substrate clean.

G. Place all wetted ACCM debris in 6-mil poly disposal bags per Section 3.2 (I).

H. HEPA vacuum any loose debris from the top layer of drop cloths, lightly mist drop sheets, fold inwards, place in disposal bags, goosenecked for disposal as ACCM. Leave the bottom layer of drop sheets in place if TSI glovebag abatement is to also be performed (refer to Section 3.8 below).

3.5 Abatement of ACM Window Glazing.

The windows to be abated are allocated in one room. The ACM putty is on the interior of the window frames. The window frames are set in a concrete wall. If the window frames can be easily removed and replaced, they may be removed for abatement and then replaced, however, abatement in place is likely the best option. See Sections 2.2, 3.1, and 3.2 prior to abatement.

A. Install 2 layers of 6-mil poly sheeting as a critical barrier over the exterior of each window opening.

B. Place the room containing the windows to be abated under negative air containment.

C. Cover the floor in the contained room with two layers of 6-mil poly drop-sheets, secured by duct tape. Cover wall surfaces from the floor to the ceiling with one layer of 6-mil poly sheeting, secured with duct tape. Cover all fixtures and partitions in the room with one layer of 6-mil poly sheeting, secured with duct tape, unless such fixtures are already covered by the poly sheeting.

D. Wet the ACCM window glazing and pry/break it loose from the window frames without damaging the frames. Use a cardboard box or similar method beneath the window to catch debris.

E. A heat gun may be used to soften the window glazing, providing that the glazing is not heated to the point of burning or smoking.

F. Clean all ACM glazing from frames, clean abated frames using a HEPA vacuum and wet-wiping.

G. Place all wetted and abated ACCM debris in a 6-mil poly disposal bag, and assure debris is wetted. Gooseneck and tape closed filled disposal bags. Wet wipe all bags and then double bag debris into second 6-mil disposal bag and gooseneck closed.

3.6 Abatement of ACM VFT/Mastic

This building contains some ACM VFT, with ACM mastic. ACM VFT may be entirely abated to the extent required for seismic repair work. The VFT/mastic is on a concrete substrate.

A. Abatement of ACM VFT and/or mastic by "normal" methods (using hand tools, solvents and rags) will require Class II measures, under negative air containment, including installation of a 6-mil poly splashguard from the base of walls to a height of 4 feet, secured with duct tape.

B. Abatement of ACM VFT and/or mastic by "mechanical" means, including a floor buffer, will require full Class I containment of the work area and filing a NESHAP Notification 10 working days prior to such abatement.

C. Prior to abatement, VFT shall be wetted with water or amended water so that entire surface is wet. Do not allow water to puddle or run off to other areas. If amended water is used, use in strict accordance with the manufacturer's instructions. Keep floor continuously wet through tile removal operations.

C. Remove VFT as intact as possible. If visible dust is produced at any time during the operation, immediately stop work and wet the work surfaces.

D. Bag or wrap all abated ACM per Section 3.2 (K).

E. Mastic solvents may only be used on concrete substrates. Use only an EPA approved low VOC mastic remover. Wipe up mastic and mastic remover with rags. Use of a floor buffer for mastic removal is strictly prohibited unless approved prior to. See (B) above.

F. Any wood substrates contaminated with ACM mastic are to be removed and disposed as non-friable asbestos waste. For removal, wet all wood substrates and pry wood substrates free to the extent possible. If cutting is required, first remove all three dimensional mastic from lines of cut. Any power saws or tools must be equipped with operable HEPA filtered exhaust systems.

G. Bag or wrap any abated wood substrate materials per Section 3.2 (I).

H. Any VFT and/or mastic removed by Class I methods must be properly disposed of as "friable" asbestos waste.

3.7 Abatement of ACM Transite Pipe

A. Place two layers of 6-mil poly drop cloths below the transite piping, to extent out at least 10 feet in all directions, or to the extent of any containment. Then wrap transite pipe sections in 6-mil poly sheeting, secured by duct tape.

B Wet any exposed joints, attempt to pull the transite pipe sections free and intact from walls, floors, or ceilings. If the pipe cannot be removed in this manner, proceed to the next step.

C. If necessary, cut transite pipes into manageable lengths using a "snap cutter", wetting at the cut points. Deliberate breaking of transite pipe using hammers or other tools is not allowed, unless space restrictions do not allow snap cutting at flush surfaces, then proceed as in item "D" below.

D. If transite pipe remains in a concrete wall opening, it may be peened or chipped back enough to allow the opening and any exposed pipe to be encased in grout, as applied by the abatement crew, with approval of a grout material by the Project Manager. However, the work area must be placed under negative air containment prior to such work, drop cloths will be used below work areas, extending at least ten feet out in all direction, or to the extent of the containment, and the transite must be kept wetted during such operations.

E. If transite pipe remains in the concrete wall opening, it is to be peened or chipped back enough to allow the opening and any exposed pipe to be encased in grout, as applied by the abatement crew, with approval of a grout material by the Project Manager.

F All abated transite is to be bagged or wrapped as required in Section 3.2 (I).

3.8 Abatement of ACM TSI.

Most of the TSI runs in this building is ACM "air-cell" wrapping, with some TSI compounds used. The elbows and tees are typically ACM compounds. Abatement may be accomplished by glovebag methods, or under full Class I containment.

A. If ACM TSI is to be removed by glovebag methods, establish a regulated area per Section 3.2 prior to glovebag abatement, install critical barriers over all openings within 20 feet of glovebag removals, and place a 6-mil poly drop sheet on floors and/or horizontal surfaces (counters, etc) below such locations, extending 15 feet out in all directions, unless interrupted by a wall.

B. If any ACM TSI in any particular space cannot be abated by glovebag, due to space or accessibility restrictions, and "open" abatement is required, then Class I "negative air" containment, per Section 3.2, shall be established in that space prior to the abatement of ACM TSI.

C. All ACM TSI is to be wetted with amended water prior to abatement.

D. All glovebags containing abated ACM TSI are to be sealed and placed in a second 6-mil poly disposal bag, per Section 3.2 (K). All bags containing ACM TSI waste must be clearly marked as "friable asbestos waste" and have proper labels attached per Section 7.0 (I).

3.9 Abatement of ACM Plaster Ceilings.

The ceilings in two main level rooms contain single coat ACM plaster. Class I containment. To the extent abatement is required, such abatement must be done under Class I negative air containment.

A. Install critical barriers in the work area using two layers of 6-mil poly Install two layers on all walls, floor to ceiling, of 6-mil poly sheeting, and two layers of 6-mil poly sheeting on floor areas within containment. Wrap scaffold railings and planks with one layer of 6-mil poly sheeting.

B. Establish Class I "negative air" containment in the work area, per Section 3.2.

C. All ACM plaster is to be wetted with amended water prior to abatement, allowing adequate time for penetration prior to abatement.

D. Remove ACM plaster using hand tools, bag abated plaster per Section 3.2 (K). Also abate (remove) all underlying lath, to be wrapped per Section 3.2 (K). All waste bags or wraps containing ACM waste must be clearly marked as "friable asbestos waste" and have proper labels attached per Section 7.0 (I).

E. Clean remaining substrate materials using a HEPA vacuum and then wet wiping.

3.10 Abatement of ACM Linoleum.

A Place rooms to be abated under negative air containment.

B. Cut the linoleum into manageable strips. Wet the linoleum backing while peeling up the linoleum in strips.

C. If the linoleum is being removed from a concrete substrate, use a wetted wire brush to further wet clean the backing/glue from the wetted concrete substrate.

D. Any wood substrates contaminated with ACM mastic are to be removed and disposed as friable asbestos waste. For removal, wet all wood substrates and pry wood substrates free to the extent possible. If cutting is required, first remove all three dimensional mastic from lines of cut. Any power saws or tools must be equipped with operable HEPA filtered exhaust systems.

E. Bag or wrap wetted abated ACM debris per Section 3.2 (I).

F. HEPA vacuum any loose debris from drop cloths, lightly mist drop sheets, fold inwards, place in disposal bags, goose-necked for disposal as ACCM.

3.11 Abatement of ACM Roof Patching Compounds.

ACM Roof patching is found around vents, as roof-to-wall flashings, surface patches (including the entre lower east roof). Generally the ACM patch is black to grayed, and some has a coat of silver and/or green paint over the ACM patch.

A For abatement work, "Regulated Areas" are to be established on the roof sections where abatement work is being performed. Insure that any roof top HVAC components in the "Regulated Areas" are rendered inoperable and install critical seals over all penetration and vent openings with 6-mil poly sheeting and duct tape.

B. All metal flashings, caps, and vents and roofing to which ACM paint or patching compounds are adhered are to be removed as intact as possible.

C. Removable vents shall be wrapped prior to removal where possible, with 6-mil poly secured with duct tape.

D ACM surfaces/materials to be abated shall be lightly wetted prior to and during abatement to control airborne dust. Wetting can be by light misting with water spray.

E. Make cuts in the non-asbestos containing roof membrane around penetrations, vents, or components that contain ACM paint and/or patching with a sharp knife if that will allow removal of those contaminated components.

Sawing can be performed on any non-asbestos containing composition/asphalt roofing layers, provided that no ACM materials are disturbed by sawing operations. Any debris generated by sawing on non-asbestos roofing must be cleaned up prior to abatement of any ACM materials within a distance of twenty feet.

F. Secure 6-mil poly drop-sheets around components to be abated, unless such components have been pre-wrapped with 6-mil poly. Drop sheets shall extend out for a distance of at least five feet in all directions, or greater, if needed to contain loose ACM debris. Where possible, tuck the drop sheets under metal flashings, otherwise, secure drop clothes with duct tape as needed.

G. After the placement of drop clothes, remove any roofing and/or components that have ACM paint and/or patching adhered. Immediately place a critical barrier seal of 6-mil poly secured by duct tape over any openings left by removal of overlying components.

H. When abatement around a penetration or component is completed, clean the work area/drop clothes using a HEPA vacuum, followed by damp wiping. Cleaned drop clothes can then be moved to adjacent work areas within the same "Regulated Area:" for further use, or are to be misted, rolled up, and disposed with the ACM.

I. Bag or wrap all ACM debris per Section 3.2 (I). All waste bags must be gently lowered to the ground; dropping or throwing bags from roofs is not allowed.

3.12 Air Clearance Testing

A. Where required, air clearance testing will be performed by the Project Asbestos Consultant using the AHERA TEM protocols, which require the collection of five TEM samples with a clearance criteria that the average of the five samples cannot exceed 70 structures/mm^2.

B. Abatement contractor shall maintain all negative air conditions until results have been received and evaluated by the Project Asbestos Consultant.

C. In the event of test failure, the Abatement Contractor shall, at his expense, re-clean the tested area and pay all re-testing costs.

3.13 Alternative Procedures

A. If specified procedures cannot be utilized, a request shall be made in writing to the Owner, providing details of the problem encountered and recommended alternatives.

B. Alternative procedures shall provide equivalent or greater protection than procedures that are replaced.

C. Any alternative procedures must be approved in writing by the Owner or the Owner's Asbestos Consultant prior to implementation.

3.14 OSHA Personnel Air Monitoring For Asbestos

A. Air monitoring required by OSHA is the responsibility of the Asbestos Contractor. Unless an NEA is submitted and approved {per Section 2.2 (A) (2)}, the Asbestos Contractor is responsible for providing daily OSHA compliance monitoring as per 29 CFR 1926.1101

1. Asbestos Contractor shall conduct representative breathing zone personal air monitoring of its employees (at a minimum, ¼ of employees) once each shift, for one 8-hour TWA exposure analysis. Personal air sampling shall be required during each and all work shifts involving the disturbance of ACM in the "Regulated Areas", regardless of any Negative Exposure Assessment that may be provided by the Asbestos Contractor

   Monitoring results and appropriate laboratory analysis work shall be submitted to the Owner's Asbestos Consultant within three days of the monitoring work. Any results in excess of the PEL (0.1 f/cc) shall be brought to the immediate attention of the Owner or the Owner's Asbestos Consultant, and all work shall cease until cleared to proceed by the Owner or the Owner's Asbestos Consultant.

4.0 DISPOSAL OF ASBESTOS WASTE

A. All non-friable ACM waste, including all ACCM are to be deemed to be "non-friable" ACM waste and must be stored, transported and disposed of as "non-friable" asbestos waste.

Any friable ACM waste (not anticipated on this project) shall be disposed of as "friable ACM hazardous waste. Qualified non-friable waste shall not be mixed with "friable" hazardous ACM waste for disposal.

1. All ACM waste shall be placed and stored in sealed and labeled containers and transported to appropriate landfills or disposal facilities as approved by the Owner.

B. The Asbestos Contractor is fully responsible for identifying, collecting, bagging, containerizing and labeling all friable asbestos-containing wastes per the hazardous waste control regulations.

C. The Asbestos Contractor shall be responsible for compliance with all applicable Department of Transportation (DOT) regulations governing the transportation of hazardous materials and hazardous wastes.

D. If a hazardous waste hauler is utilized, the Asbestos Contractor shall submit to the Owner the name, addresses (both business and truck terminal), EPA ID#, California hazardous waste hauler registration number, and California 'CA' commercial transporter number of the firm that is intended to be utilized to transport for disposal of any asbestos wastes. The Owner may utilize this information to obtain a Management Information System Terminal Evaluation Report (MISTER) from the California Highway Patrol. The hazardous waste hauler must have no "Unsatisfactory" ratings in the report if the hauler is to be approved by the Owner.

E. If the Asbestos Contractor will be transporting "non-friable" asbestos wastes to the disposal sites, then the Asbestos Contractor must submit insurance coverage details to the Owner during the bid process. If the Asbestos Contractor subcontracts for the transportation of the waste, then it is the Asbestos Contractor's responsibility to ensure that the transporter/hauler is covered by the following minimum insurance coverage's.

1. Transporters shall maintain Transporter's Auto Liability with a combined and single limit (CSL) of not less than $500,000 per occurrence for bodily injury and property damage liability. The policy must also have a MCS-90 Endorsement and Sudden & Accidental Pollution Insurance Endorsement. The Sudden & Accidental Pollution Insurance must have minimum limits of $1,000,000 per occurrence, $1,000,000.00 total. A higher limit on the MCS-90 endorsement required by law must be matched by the Sudden & Accidental Pollution Insurance.

F. The Asbestos Contractor may only dispose of non-friable asbestos-containing waste at landfills approved by CAL/EPA for disposal of non-friable asbestos, and as approved by the Owner.

G. The Asbestos Contractor shall coordinate with the Owner to arrange a date and time for disposal shipments that is mutually convenient. The Asbestos Contractor shall prepare the Uniform Hazardous Waste Manifest. The Owner or his/her designee shall review and

complete the manifest (entering EPA ID no., etc.) and shall be the only individual authorized to sign the manifest on behalf of the Owner. No Asbestos Contractor employee shall sign the manifest on behalf of the Owner. All hazardous and non-hazardous waste manifests, weight tickets and Bills of Lading shall be sent to the Owner.

H. Handling of Bagged Friable (Hazardous) Asbestos Waste (if applicable): Containerize the asbestos-containing waste in doubled 6 mil plastic bags. If the bags of asbestos wastes are to be temporarily stored prior to being placed into a DOT approved shipping container, then each and every bag must be labeled in accordance with the California Hazardous Waste Control regulations, thus:

1. Hazardous Waste
2. Owner
3. Site Address:
4. Asbestos waste solid
5. Inhalation Hazard
6. Accumulation Start Date: (date that each bag is filled)

a. The Asbestos Contractor will be held financially responsible for any penalties (and associated costs) assessed against Owner as a result of violations cited by regulatory agencies where the violations are a direct result of the Asbestos Contractor's negligence to properly label, handle, store and/or transport the asbestos-containing hazardous wastes.

b. If the bags of Friable (Hazardous) asbestos wastes are to be removed from the containment area and then immediately placed into a DOT approved shipping container, e.g., fiber drums or roll-off bin, then each bag of waste does not need to meet the hazardous waste labeling requirement described above. However, each and every shipping container must be labeled according to the description above, including the following:

1) The EPA Manifest #
2) An OSHA warning label, as per 8CCR, 1529, k (8)(C)
3) The DOT material ID: RQ, ASBESTOS, 9, NA2212, (packaging group III)
4) A DOT diamond label with "9"

I. The approved hazardous waste hauler shall transport only asbestos wastes generated at this site. Wastes from any other generators are not allowed on the same transport load.

J. The Asbestos Contractor shall ensure that the hauler obtains a weight ticket at the disposal site and mails the weight ticket and manifests to the Owner's represntative.

Mr. Jake Johnson
1106 2nd Street
Eureka, CA 95501
Ofc: (707) 445-7493

K. The sealed asbestos containers shall be delivered to Abatement Asbestos Contractor's pre-designated approved Hazardous Waste Site for burial; in accordance with Title 22, CCR, EPA guidelines and 40 CFR 61.156 and local Air Pollution Control District Regulations. The waste must be wrapped in plastic of at least 6 mil thickness and taped

closed; if the waste is placed in a roll-off bin or dumpster, the bottom and sides of the dumpster must be double lined with plastic of at least 6 mil thickness and then once the bin is full, the plastic must be pulled completely over the top and taped closed prior to transportation and disposal.

L. All waste containers, e.g., bags, barrels, drums, dumpsters, bins, etc., must be properly labeled with the following:

DANGER: CONTAINS ASBESTOS FIBERS.
AVOID CREATING DUST. CANCER AND LUNG DISEASE HAZARD

M. Abatement Asbestos Contractor shall be responsible for safe handling and transportation of hazardous waste generated by the Contract to the designated Hazardous Waste Site (friable TSI).

N. Abatement Asbestos Contractor shall defend, indemnify, and hold harmless, Owner from any and all claims, damages, losses, and expenses against Owner or Project Environmental Consultant, including attorney's fees arising out of or resulting from asbestos spills on the site or spills en route to the disposal site.

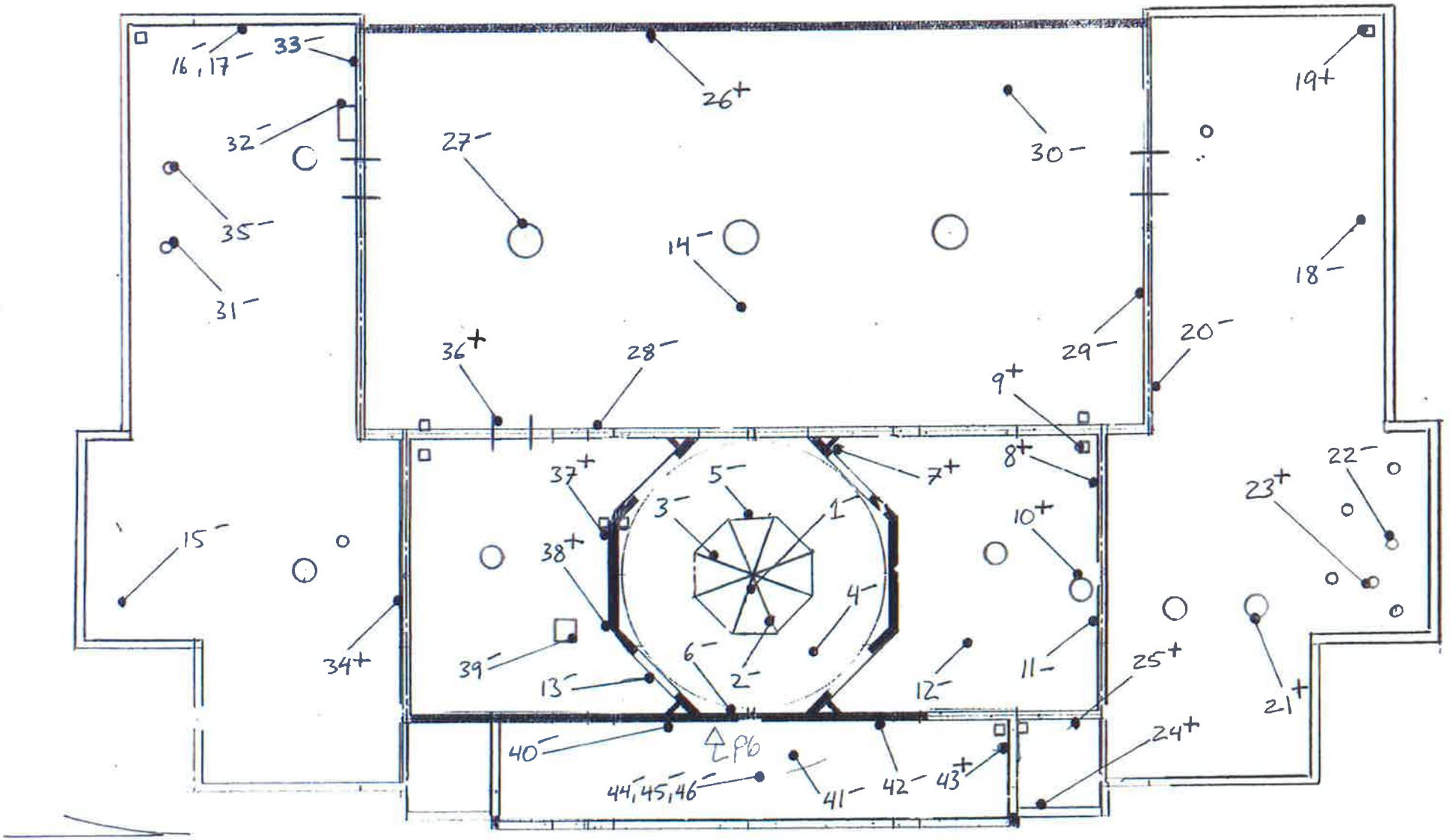
O. When loading ACM waste for disposal, establishes a "Regulated Area" restrict general access, and post warning signs meeting the specifications of CAL/OSHA General Industry Safety Order Section 5208 and/or Cal/OSHA 8CCR Section 1529 (k)(7) [federal 29 CFR 1926.1101] at perimeter/entry points to the "Regulated Area."

P. Asbestos Contractor and transporters shall maintain Worker's Compensation Insurance.

(End of Text)

PART 2 of 2

APPENDIX A
Figures



ROOF

1018 "H" STREET
EUREKA, CA

LEGEND

●← # Asbestos Sample Locations
(Prefixed 1018- #)
(-) is negative for asbestos, (+) is positive.

◁— # Paint Samples

BRUNELLE & CLARK CONSULTING
1636 Old Arcata Road
Bayside: California 95524

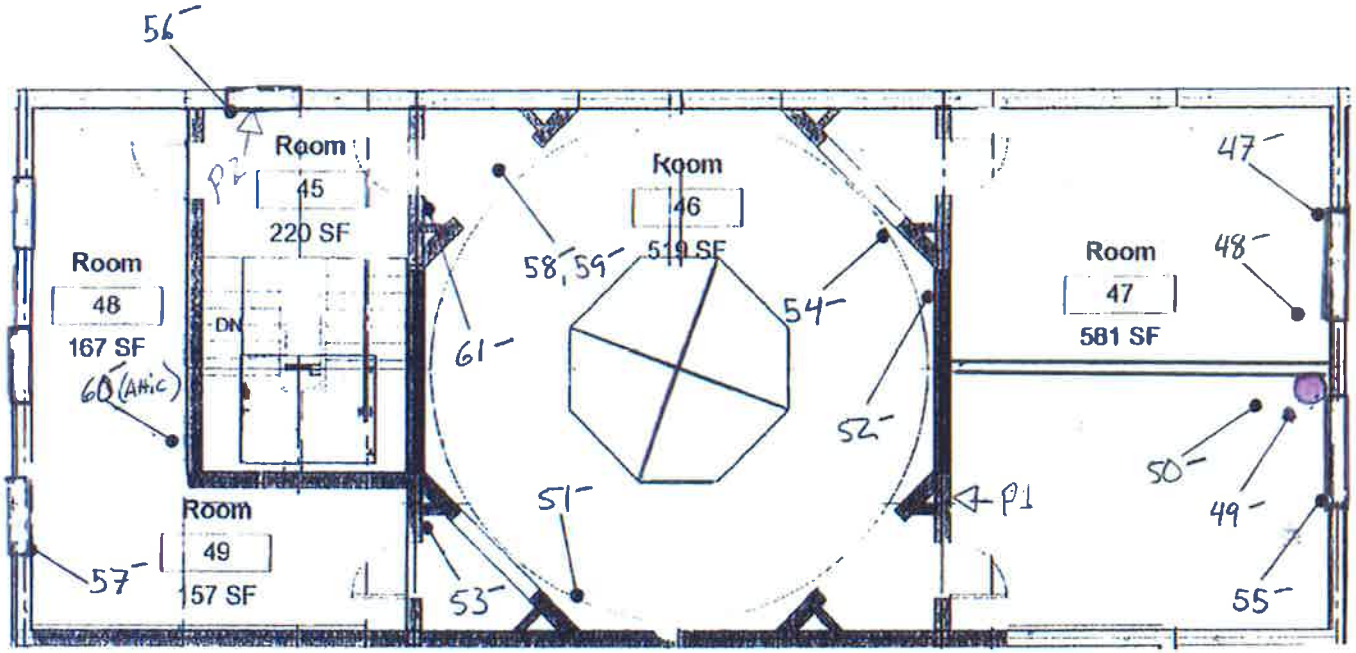
1400303 12/30/14

FIG 1

BRUNELLE & CLARK CONSULTING
1636 Old Arcata Road
Bayside, California 95524

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N



LEGEND

● # Asbestos Sample Locations
(Prefixed 1018- #)
(-) is negative for asbestos, (+) is positive.

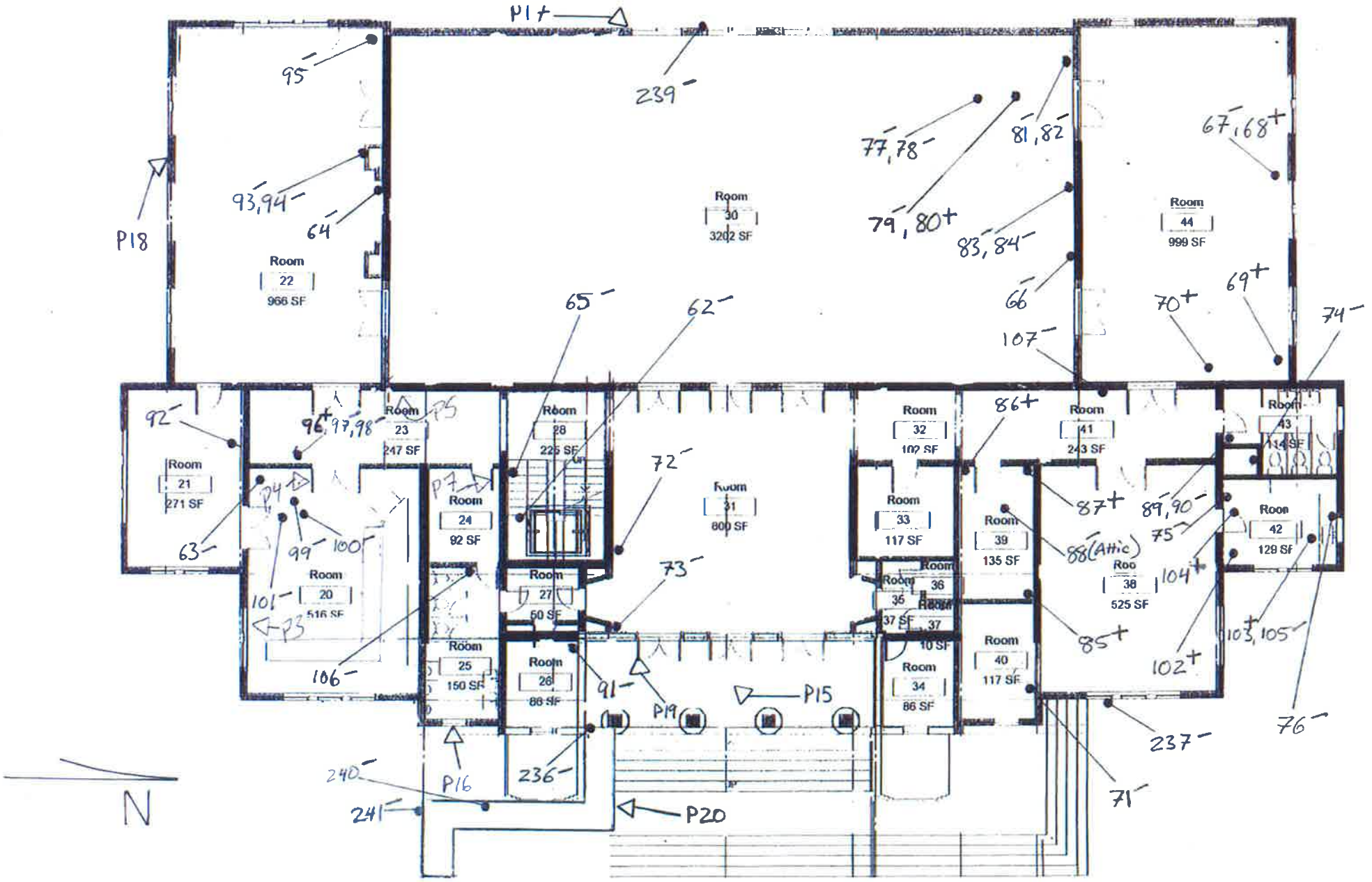
◁ # Paint Samples

ACM Transite pipe (8in.).

MEZZANINE LEVEL

1018 "H" STREET
EUREKA, CA

FIG 2



BRUNELLE & CLARK CONSULTING
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Bayside, California 95524

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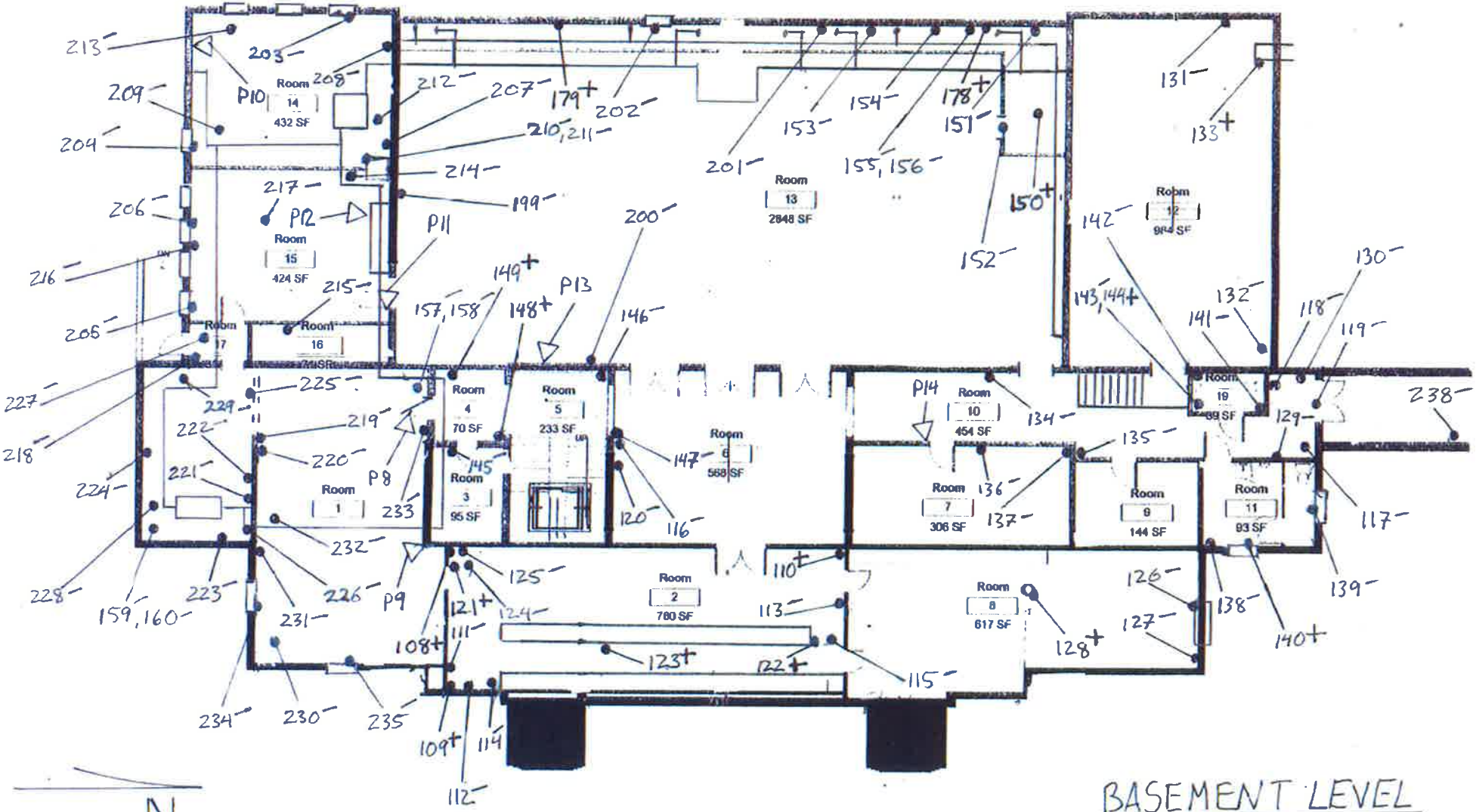
LEGEND

●—# Asbestos Sample Locations
(Prefixed 1018- #)
(-) is negative for asbestos, (+) is positive.

◁— # Paint Samples

MAIN LEVEL
1018 "H" STREET
EUREKA, CA

FIG 3



BASEMENT LEVEL

1018 "H" STREET
EUREKA, CA

LEGEND

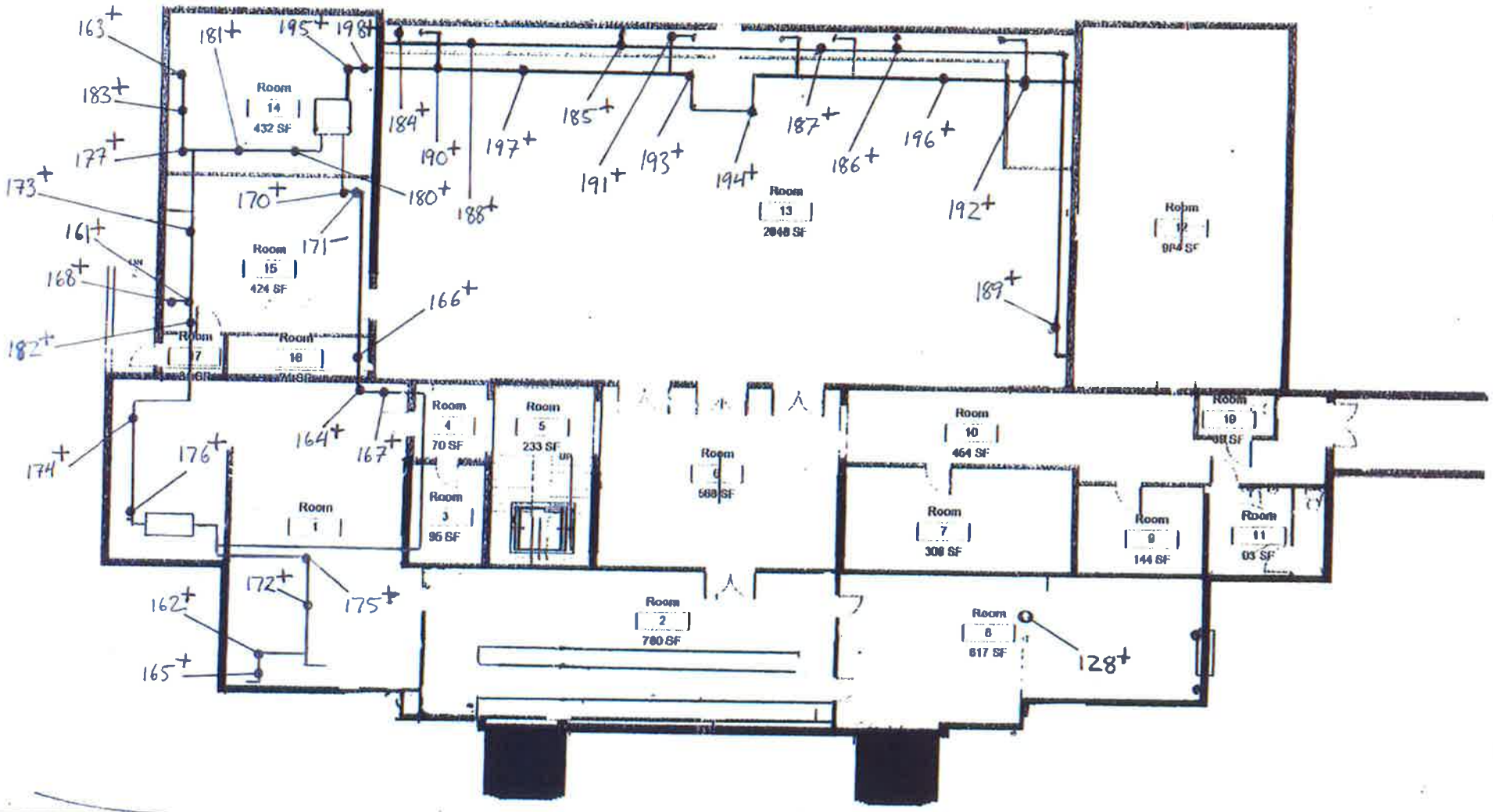
●—# Asbestos Sample Locations
(Prefixed 1018- #)
(-) is negative for asbestos, (+) is positive.

◁— # Paint Samples

BRUNELLE & CLARK CONSULTING
1636 Old Arcata Road
Bayside, California 95524

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FIG 4



BASEMENT LEVEL

1018 "H" STREET
EUREKA, CA

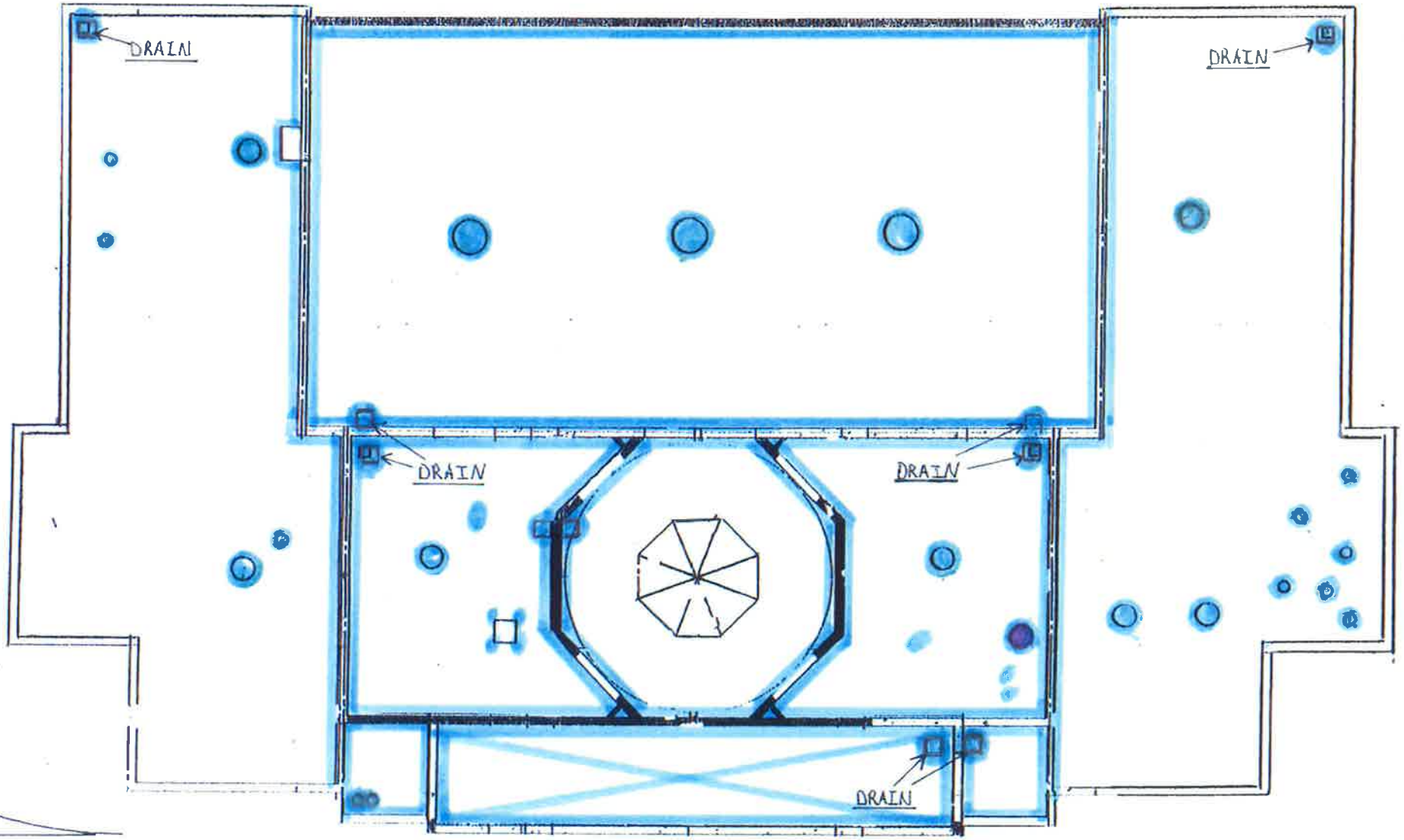
LEGEND

●— # Asbestos Sample Locations
(Prefixed 1018- #)
(-) is negative for asbestos, (+) is positive.

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Bayside, California 95524

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FIG 5



ROOF

1018 "H" STREET
EUREKA, CA

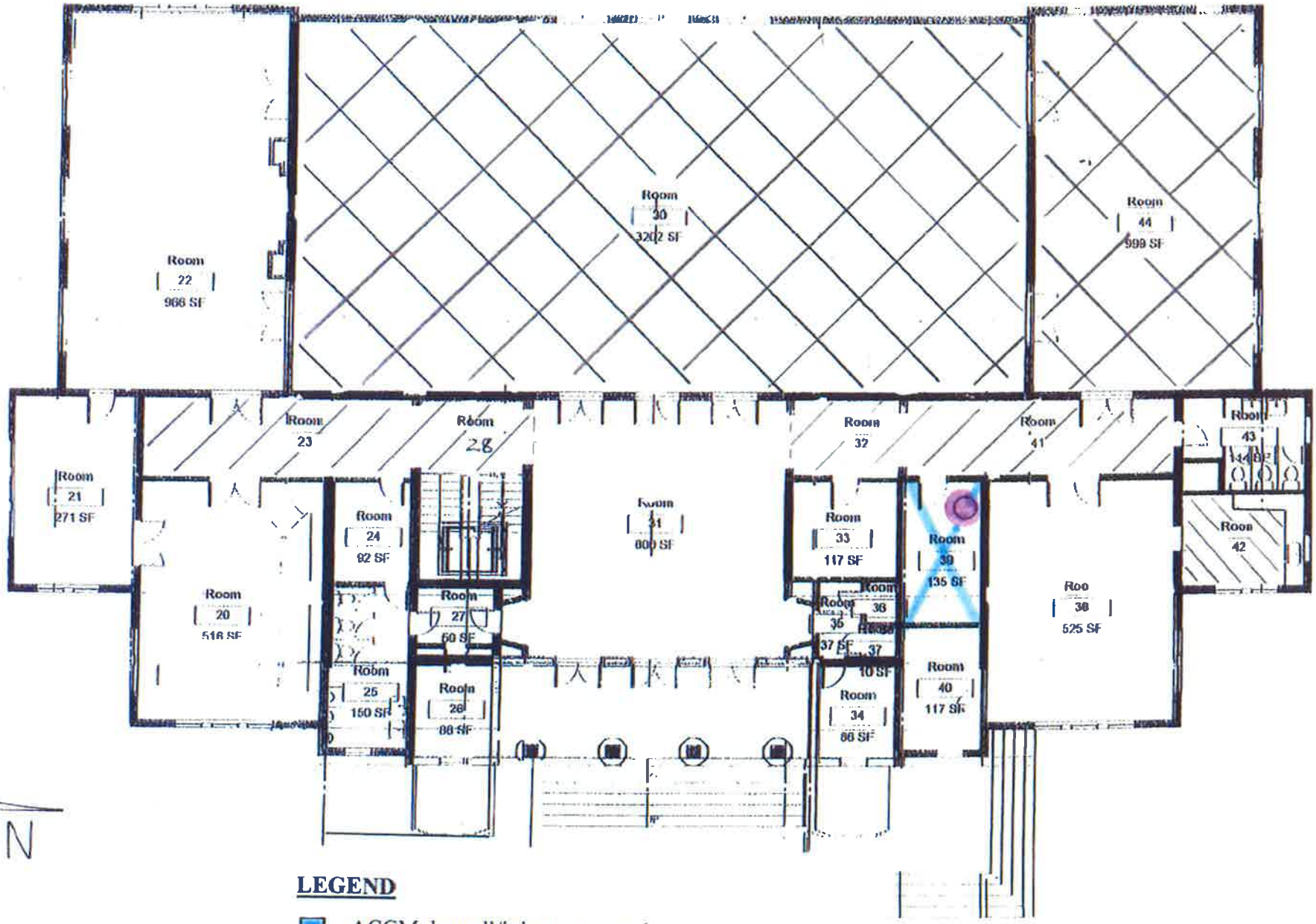
LEGEND

- ACM roof patching. (All roof patch is either ACM or contaminated by ACM roof patch.)
- ACM Transite pipe (8in.).

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FIG 6



LEGEND

- ACCM drywall/joint compound
- ACM VFT (12 x12), tan/ ACM black mastic
- ACM Sheet flooring, beige & white (Glue negative)
- ACM Plaster Top Coat, light gray and "punky" (Note: in Rm.30 plaster is under ceiling tile)
- ACM Transite pipe (8in.)

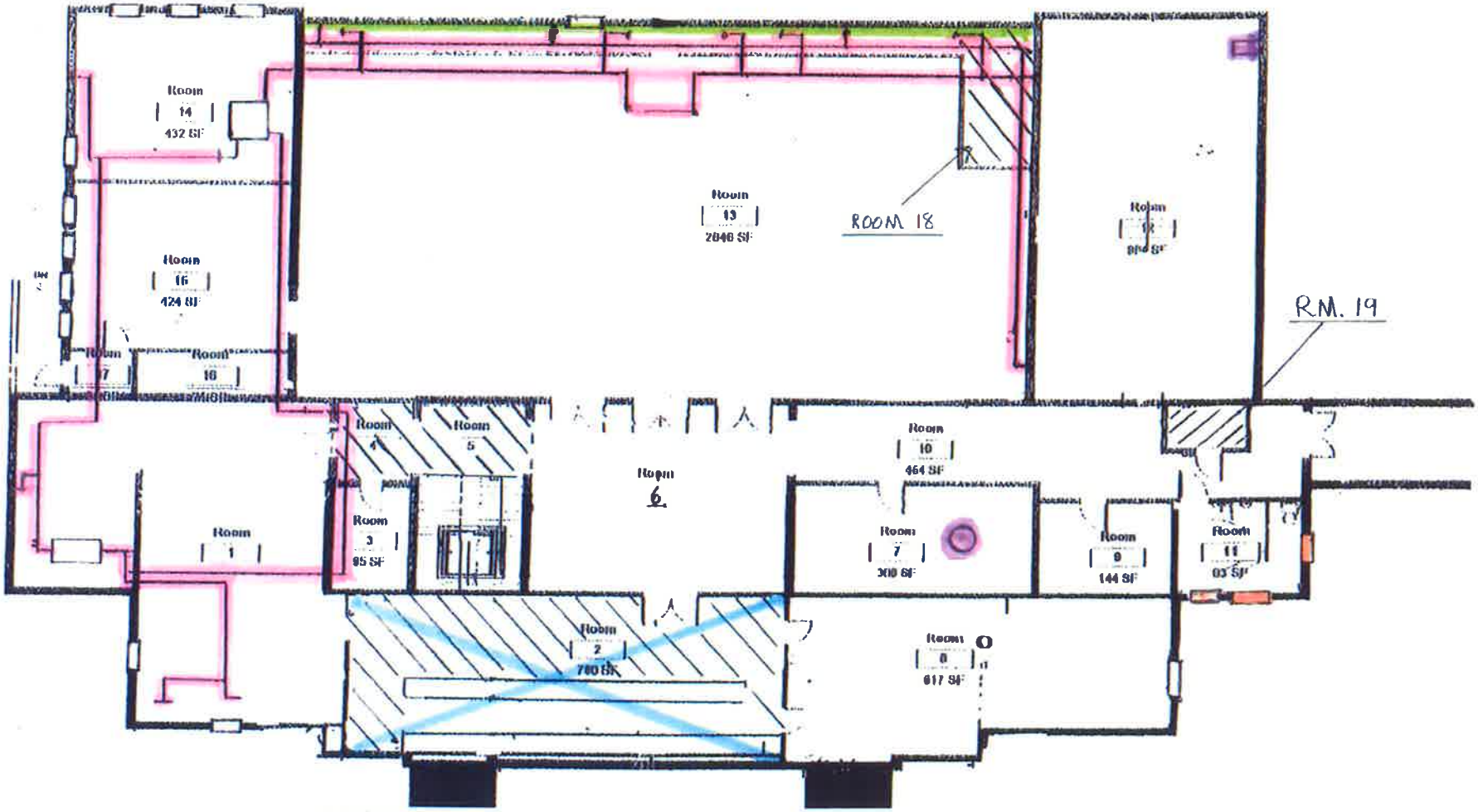
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Bayside, California 95524

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MAIN LEVEL

1018 "H" STREET
EUREKA, CA

FIG 7



LEGEND

- ACCM drywall/joint compound
- ACM VFT (9X9), green & brown/ACM black mastic
- ACM VFT (12 x12), tan w-streaks/ ACM black mastic
- ACM Sheet flooring, dark gray mosaic (Glue negative)
- ACCM Plaster surfacing on concrete wall
- ACM Window putty
- ACM Transite pipe (8in.)
- ACM TSI, Air-cell wrap & ACM TSI compound elbows

N

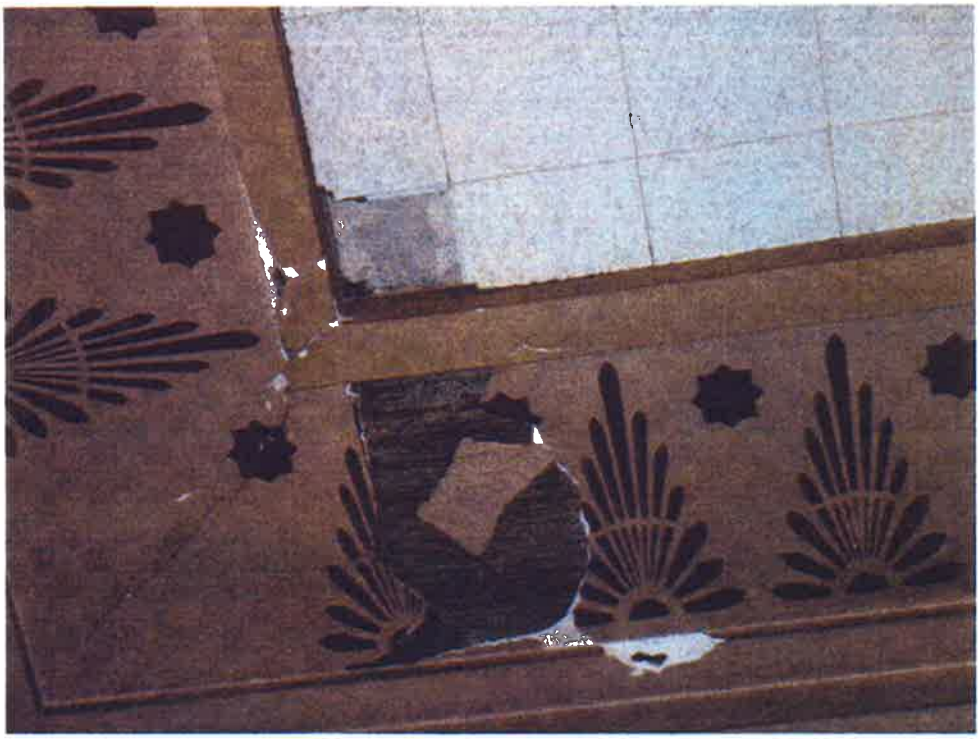
BASEMENT LEVEL

1018 "H" STREET
EUREKA, CA

BRUNELLE & CLARK CONSULTING
1636 Old Arcata Road
Bayside, California 95521

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FIG 8



TOP -- Room 30, ACM plaster ceiling material, gray & punky, under ceiling tiles. The painted plaster border is not ACM. Will also find same ACM ceiling plaster in Rm. 44.

BOTTOM— ACCM plaster surfacing, thick, on north concrete wall of Bsmt. Rm. 13, behind the closets along that wall. Note TSI pipe hidden just to left of closet front, and to the right (higher) as well. Also note plaster surfacing spalling from wall in both photos.

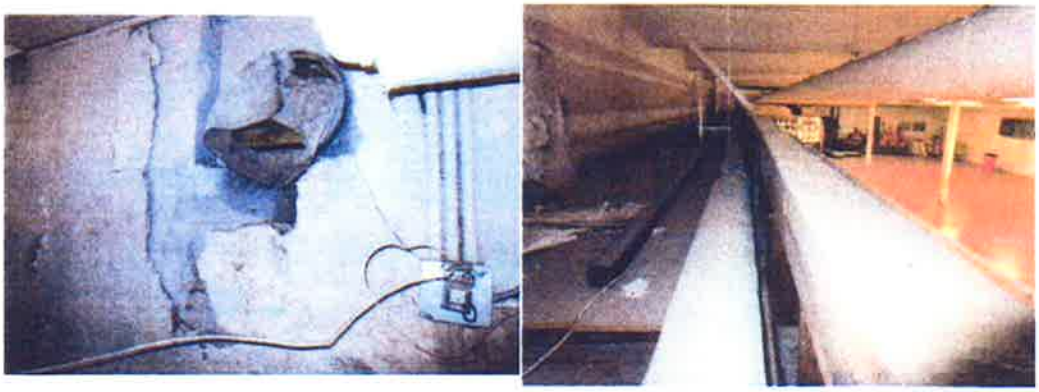


FIG. 9



LEFT—Lower east roof (front of bldg), abate entire membrane due to extensive ACM surface patching & flashing, the extent of which cannot be determined under silver paint.

RIGHT— ACM roof patching & flashing, grayed.





LEFT—ACM, grayed roof patching & flashing..

1400303 12/31/14

FIG. 10

APPENDIX B

Tables & Lab Reports

TABLE 1
ASBESTOS IDENTIFICATIONS & CLASSIFICATIONS
Eureka Veteran's Building, 1018 "H" Street, Eureka, CA

MATERIALS Containing Asbestos	LOCATION	QUANTITY	ASBESTOS CONTENT & TYPE	OSHA CLASSIFICATION	NESHAP CATEGORY	Waste Disposal Classification
2 sheet floorings (linoleum) dark gray mosaic & beige/white	Bsmt. Rm. 19 & top layer in Main floor hall, Rm. 23	47 SF & 600 SF	Dk gray mosaic=20% CH Beige/white = 3% CH	ACM, Class II abatement required where disturbed	Friable, RACM	"Friable" asbestos waste
Tar roof patching (some have silver surface paint and/or green paint)	All roofs	1,100 SF	2%-3% CH	ACM, Class II abatement required where disturbed	Category I Non-Friable. Not RACM*	Non-friable asbestos waste
Window Putty	Bsmt. Rm. 11	13.5 SF	2% CH	ACM, Class II abatement required where disturbed	Category II Non-friable Not RACM*	Non-friable asbestos waste
Transite piping	Bsmt. Rm. 12, 8" dia. & Bsmt Rm. 7 Main Flr. Rm. 39, thru Mezz. Rm. 47 to roof vent. 8" dia.	50 LF-	35% CH/5% CR & PACM	ACM, Class II abatement required where disturbed	Category II Non-Friable. Not RACM*	Non-friable asbestos waste

TABLE 1
ASBESTOS IDENTIFICATIONS & CLASSIFICATIONS
Eureka Veteran's Building, 1018 "H" Street, Eureka, CA

MATERIALS Containing Asbestos	LOCATION	QUANTITY	ASBESTOS CONTENT & TYPE	OSHA CLASSIFICATION	NESHAP CATEGORY	Waste Disposal Classification
TSI, "air-cell" wrap on pipe runs & white powdery compound on elbows	Bsmt. Rooms 8,13,14,15	3" dia. = 4 elbows (runs are fiberglass) 4" dia. air-cell= 225 LF & 28 elbows 5" dia. air-cell =150 LF & 20 elbows 6" dia. air-cell = 60 LF & 5 elbows 5" dia. white cmpd TSI = 14 LF	Air-cell TSI 35% - 40% CH TSI elbows are 10% - 20% CH with Some AM at 10% and CR at 3%	ACM, Class I abatement required where disturbed	"Friable" RACM	"Friable" asbestos waste

SF = Square Feet. LF = Lineal Feet
CH = Chrysotile asbestos CR = Crocidolite Asbestos AM = Amosite asbestos
ACM = Asbestos Containing Materials, containing >1% asbestos.
PACM = Presumed ACM.
ACCM = Asbestos Containing Construction Materials, asbestos content of 0.1% to 1.0%.
RACM =Regulated ACM under NESHAP regulations.
RACM* = Not considered as RACM if asbestos content is 1% or less, or if not made friable by disturbance.
TBD = Abatement quantity to be determined for actual remediation work.

TABLE 2
SUMMARY OF ANALYTIC DATA
Eureka Veterans Building
1018 "H" Street, Eureka, CA

BOLD TYPE used to highlight asbestos. Note: Some samples had multiple layers, as analyzed

Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
1018-1	Window glazing, brown	Exterior roof dome	None Detected	Non-Friable	
1018-2	Window glazing, white	Exterior roof dome	None Detected	Non-Friable	
1018-3	Window glazing, white	Exterior roof dome	None Detected	Non-Friable	
1018-4	Silver Paint	Exterior roof dome	None Detected	Non-Friable	
1018-5	Roof patch, black faded to gray	Exterior roof dome	None Detected	Non-Friable	
1018-6	Roof patch, black faded to gray	Exterior roof dome	None Detected	Non-Friable	
1018-7	**Roof patch, black faded to gray**	**Top roof, north**	**5%CH**	**Non-Friable**	
1018-8	**Surfacing, silver**	**Top roof, north**	**5%CH**	**Non-Friable**	
1018-9	**Roof patch, blk to gray**	**Top roof, north**	**5%CH**	**Non-Friable**	**Black to gray**
1018-10	**Caulking, green (see comment)**	**Top roof, north**	**2%CH**	**Non-Friable**	**Green paint on black roof patching**
1018-11	Concrete, gray	Top roof, north	None Detected	Non-Friable	
1018-12	Roofing, built-up, gray comp.	Top roof, north	None Detected	Non-Friable	
1018-13	Concrete, decorative	Top roof, south	None Detected	Non-Friable	
1018-14	Roofing, built-up, gray comp.	Middle roof	None Detected	Non-Friable	
1018-15	Roofing, built-up, gray comp.	Lower south roof	None Detected	Non-Friable	
1018-16	Fiberboard	Lower south roof	None Detected	Non-Friable	
1018-17	Tar, black	Lower south roof	None Detected	Non-Friable	
1018-18	Roofing, built-up, gray comp.	Lower north roof	None Detected	Non-Friable	

TABLE 2
SUMMARY OF ANALYTIC DATA
Eureka Veterans Building
1018 "H" Street, Eureka, CA

BOLD TYPE used to highlight asbestos. Note: Some samples had multiple layers, as analyzed

Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
1018-19	**Roof patch, black**	**Lower north roof**	**5% CH**	**Non-Friable**	
1018-20	Roof patch, gray	Lower north roof	None Detected	Non-Friable	
1018-21	**Roof patch, black and gray**	**Lower north roof**	**5% CH**	**Non-Friable**	
1018-22	Roof patch, brown	Lower north roof	None Detected	Non-Friable	
1018-23	**Tar, black**	**Lower north roof**	**3% CH**	**Non-Friable**	
1018-24	**Surfacing, silver-black tar**	**Lower north roof**	**5% CH**	**Non-Friable**	
1018-25	**Roof patch, dark gray**	**Lower north roof**	**5% CH**	**Non-Friable**	
1018-26	**Surfacing, silver-black tar**	**Middle roof**	**5% CH**	**Non-Friable**	
1018-27	Roof patch, brown	Middle roof	None Detected	Non-Friable	
1018-28	Roof patch, light gray	Middle roof	None Detected	Non-Friable	
1018-29	Roof patch, light gray	Middle roof	None Detected	Non-Friable	
1018-30	Silver paint	Middle roof	None Detected	Non-Friable	
1018-31	Roof patch, brown	Lower roof, south	None Detected	Non-Friable	
1018-32	Roof patch, light gray	Lower roof, south	None Detected	Non-Friable	
1018-33	Roof patch, gray	Lower roof, south	None Detected	Non-Friable	
1018-34	**Silver paint & black tar (see comment)**	**Lower roof, south**	**2% CH**	**Non-Friable**	**Black tar is positive, The silver paint is negative.**
1018-35	Tar, black	Lower roof, south	None Detected	Non-Friable	
1018-36	**Roof patch, black and gray**	**Lower roof, south**	**5% CH**	**Non-Friable**	
1018-37	**Roof patch, silver- gray**	**Top roof**	**5% CH**	**Non-Friable**	

TABLE 2
SUMMARY OF ANALYTIC DATA
Eureka Veterans Building
1018 "H" Street, Eureka, CA

BOLD TYPE used to highlight asbestos. Note: Some samples had multiple layers, as analyzed

Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
1018-38	**Roof patch, silver-gray with cloth mesh**	**Top roof**	**5% CH**	**Non-Friable**	
1018-39	Roof patch, black	Top roof	None Detected	Non-Friable	
1018-40	Roof patch, black	Lower roof, east	None Detected	Non-Friable	
1018-41	Roof patch, black	Lower roof, east	None Detected	Non-Friable	
1018-42	Roof patch, light gray	Lower roof, east	None Detected	Non-Friable	
1018-43	**Roof patch, silver- gray**	**Lower roof, east**	**3% CH**	**Non-Friable**	
1018-44	Silver paint	Lower roof, east	None Detected	Non-Friable	
2nd layer	Roofing, built-up, gray comp.	""	None Detected	Non-Friable	
1018-45	Fiberboard, brown	Lower roof, east	None Detected	Non-Friable	
1018-46	Tar, black	Lower roof, east	None Detected	Non-Friable	
1018-47	Ceiling tile Mastic, dark brown	Mezzanine, Rm.47	None Detected	Non-Friable	
1018-48	Ceiling tile Mastic, dark brown	Mezzanine, Rm.47	None Detected	Non-Friable	
1018-49	Ceiling tile, brown painted white	Mezzanine, Rm.47	None Detected	Non-Friable	
1018-50	Plaster; Top Coat, brown	Mezzanine, Rm.47	None Detected	Non-Friable	
2nd layer	Rough Coat, gray	""	None Detected	Non-Friable	
1018-51	Plaster; Top Coat, brown	Mezzanine, Rm.46	None Detected	Non-Friable	
2nd layer	Rough Coat, gray	""	None Detected	Non-Friable	
1018-52	Plaster; Top Coat, white	Mezzanine, Rm.46	None Detected	Non-Friable	
2nd layer	Middle Coat, brown	""	None Detected	Non-Friable	
3rd layer	Rough Coat, gray	""	None Detected	Non-Friable	
1018-53	Plaster; Top Coat, white	Mezzanine, Rm.46	None Detected	Non-Friable	

TABLE 2
SUMMARY OF ANALYTIC DATA
Eureka Veterans Building
1018 "H" Street, Eureka, CA

BOLD TYPE used to highlight asbestos. Note: Some samples had multiple layers, as analyzed

Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
2nd layer	Middle Coat, brown	""	None Detected	Non-Friable	
3rd layer	Rough Coat, gray	""	None Detected	Non-Friable	
1018-54	Plaster; Top Coat, white	Mezzanine, Rm.46	None Detected	Non-Friable	
2nd layer	Rough Coat, gray	""	None Detected	Non-Friable	
1018-55	Window glazing, gray	Mezzanine, Rm.47	None Detected	Non-Friable	
1018-56	Window glazing, gray	Mezzanine, Rm.45	None Detected	Non-Friable	
1018-57	Window glazing, gray	Mezzanine, Rm.48	None Detected	Non-Friable	
1018-58	"Battleship" linoleum, black marbled	Mezzanine, Rm.46	None Detected	Non-Friable	
1018-59	"Battleship" linoleum, red-brown	Mezzanine, Rm.46	None Detected	Non-Friable	
1018-60	Concrete	Mid-level (1-2) attic space, structural beam	None Detected	Non-Friable	
1018-61	Terrazzo tile baseboard	Mezzanine, Rm.46	None Detected	Non-Friable	
1018-62	"Battleship" linoleum, wood pattern	Stairway,1-2, treads	None Detected	Non-Friable	
1018-63	Plaster, white	Main floor, Rm.20, ceiling.	None Detected	Non-Friable	
1018-64	Plaster, single coat, gray	Main floor, Rm. 22, ceiling	None Detected	Non-Friable	
1018-65	Plaster, top coat, white	Stairway, between 1-2	None Detected	Non-Friable	
2nd layer	....rough coat, grey	""	None Detected	Non-Friable	
1018-66	Plaster, top coat, white	Main floor, Rm. 30	None Detected	Non-Friable	
2nd layer	....rough coat, grey	""	None Detected	Non-Friable	
1018-67	Plaster, single rough coat, gray	Main floor, Rm. 44	None Detected	Non-Friable	

TABLE 2
SUMMARY OF ANALYTIC DATA
Eureka Veterans Building
1018 "H" Street, Eureka, CA

BOLD TYPE used to highlight asbestos. Note: Some samples had multiple layers, as analyzed

Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
1018-68	**Plaster, top coat, "punky" light gray**	**Main floor, Rm. 44**	**8% CH**	**Non-Friable**	
1018-69	**Plaster, top coat, "punky" light gray**	**Main floor, Rm. 44**	**8% CH**	**Non-Friable**	
1018-70	**Plaster, top coat, "punky" light gray**	**Main floor, Rm. 44**	**8% CH**	**Non-Friable**	
1018-71	Plaster, top coat, brown	Main floor, Rm. 40	None Detected	Non-Friable	
2nd layer	....rough coat, grey	""	None Detected	Non-Friable	
1018-72	Plaster, top coat, brown	Main floor, Rm. 31	None Detected	Non-Friable	
2nd layer	....rough coat, grey	""	None Detected	Non-Friable	
1018-73	Plaster of Paris, w/stringy backing, decorative	Main floor, Rm. 31, frieze block	None Detected	Non-Friable	
1018-74	Plaster, top coat, white	Main floor, Rm. 43, closet	None Detected	Non-Friable	
2nd layer	....rough coat, grey	""	None Detected	Non-Friable	
1018-75	Plaster, top coat, white	Main floor, Rm. 42	None Detected	Non-Friable	
2nd layer	....rough coat, grey	""	None Detected	Non-Friable	
1018-76	Plaster, top coat, white	Main floor, Rm. 42	None Detected	Non-Friable	
2nd layer	....rough coat, grey	""	None Detected	Non-Friable	
1018-77	Ceiling tile, 1x1, white	Main floor, Rm. 30, ceiling	None Detected	Non-Friable	
1018-78	Mastic, brown	Main floor, Rm. 30, ceiling	None Detected	Non-Friable	
1018-79	Plaster, rough coat, gray	Main floor, Rm. 30, ceiling	None Detected	Non-Friable	

TABLE 2
SUMMARY OF ANALYTIC DATA
Eureka Veterans Building
1018 "H" Street, Eureka, CA

BOLD TYPE used to highlight asbestos. Note: Some samples had multiple layers, as analyzed

Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
1018-80	**Plaster, "punky" lt. gray**	**Main floor, Rm. 30, ceiling, above ceiling tile**	**8% CH**	**Non-Friable**	
1018-81	Plaster, white	Main floor, Rm. 30, frieze block	None Detected	Non-Friable	
1018-82	Plaster, white	Main floor, Rm. 30, frieze block	None Detected	Non-Friable	
1018-83	Ceiling tile, 1x1, white	Main floor, Rm. 30,wall	None Detected	Non-Friable	
1018-84	Mastic, brown	Main floor, Rm. 30, wall	None Detected	Non-Friable	
1018-85	**Gypsum board drywall**	**Main floor, Rm. 39**	**None Detected**	**Non-Friable**	
2nd layer	**....joint compound**	**""**	**2% CH**	**Non-Friable**	
400 Point Count	**On composite of GB/JC above**	**""**	**<0.25% CH**	**Non-Friable**	**By 400Point Count analysis**
1018-86	**Gypsum board drywall**	**Main floor, Rm. 39**	**None Detected**	**Non-Friable**	
2nd layer	**....joint compound**	**""**	**2% CH**	**Non-Friable**	
1018-87	**Gypsum board drywall**	**Main floor, Rm. 39**	**None Detected**	**Non-Friable**	
2nd layer	**....joint compound**	**""**	**2% CH**	**Non-Friable**	
1018-88	Surfacing, white	Attic space above Main floor, access from Rm. 39	None Detected	Non-Friable	
1018-89	Tile grout, white	Main floor, Rm. 43 (Women's RR)	None Detected	Non-Friable	
1018-90	Tile mortar, gray	Main floor, Main floor, Rm. 43 (Women's RR)	None Detected	Non-Friable	
1018-91	"Battleship" linoleum, wood pattern	Main floor, Rm. 26	None Detected	Non-Friable	

TABLE 2
SUMMARY OF ANALYTIC DATA
Eureka Veterans Building
1018 "H" Street, Eureka, CA

BOLD TYPE used to highlight asbestos. Note: Some samples had multiple layers, as analyzed

Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
1018-92	"Battleship" linoleum, green	Main floor, Rm. 21	None Detected	Non-Friable	
1018-93	Mortar, gray	Main floor, Rm. 22, chimney	None Detected	Non-Friable	
1018-94	Brick, red	Main floor, Rm. 22, chimney	None Detected	Non-Friable	
1018-95	Carpet glue, clear	Main floor, Rm. 22	None Detected	Non-Friable	
1018-96	**Sheet flooring, beige & white**	**Main floor, Rm. 23 (hall) top layer**	**3% CH**	**Non-Friable**	
2nd layer	.... Glue, tan	Main floor, Rm. 23 (hall) bottom layer	None Detected	Non-Friable	
1018-97	Floor sizing, white	Main floor, 23 (hall) below above SF	None Detected	Non-Friable	
1018-98	Sheet flooring, black w/ paper backing	Main floor, 23 (hall) bottom layer	None Detected	Non-Friable	
1018-99	VFT, 12x12, black & white	Main floor, Rm. 20	None Detected	Non-Friable	
2nd layer	....yellow mastic	""	None Detected	Non-Friable	
1018-100	VFT, 12x12, black & white	Main floor, Rm.20	None Detected	Non-Friable	
2nd layer	....yellow mastic	""	None Detected	Non-Friable	
1018-101	VFT, 12x12, beige w/ white streaks	Main floor, Rm. 20	None Detected	Non-Friable	
2nd layer	....yellow mastic	""	None Detected	Non-Friable	
1018-102	**VFT, 12x12, tan**	**Main floor, Rm. 42, top layer**	**3% CH**	**Non-Friable**	

TABLE 2
SUMMARY OF ANALYTIC DATA
Eureka Veterans Building
1018 "H" Street, Eureka, CA

BOLD TYPE used to highlight asbestos. Note: Some samples had multiple layers, as analyzed

Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
2nd layer	**....black mastic**	**""**	**5% CH**	**Non-Friable**	
1018-103	**VFT, 12x12, tan**	**Main floor, Rm. 42, top layer**	**PACM**	**Non-Friable**	**NA/PS**
2nd layer	**....black mastic**	**""**	**PACM**	**Non-Friable**	**NA/PS**
1018-104	**VFT, 12x12, tan**	**Main floor, Rm. 42, top layer**	**PACM**	**Non-Friable**	**NA/PS**
2nd layer	**....black mastic**	**""**	**PACM**	**Non-Friable**	**NA/PS**
1018-105	"Battleship" linoleum, green	Main floor, under particle board.	None Detected	Non-Friable	
1018-106	Terrazzo, gray multicolor	Main floor, Rm. 25	None Detected	Non-Friable	
1018-107	Felt gasket, green	Main floor, Rm. 41 (hall) heat register vent	None Detected	Non-Friable	
1018-108	**Gypsum board drywall**	**Bsmt level, Rm. 2**	**None Detected**	**Non-Friable**	
2nd layer	**....joint compound**	**""**	**2% CH**	**Non-Friable**	
1018-109	**Gypsum board drywall**	**Bsmt level, Rm. 2**	**None Detected**	**Non-Friable**	
2nd layer	**....joint compound**	**""**	**2% CH**	**Non-Friable**	
1018-110	**Gypsum board drywall**	**Bsmt level, Rm. 2**	**None Detected**	**Non-Friable**	
2nd layer	**....joint compound**	**""**	**2% CH**	**Non-Friable**	
1018-111	Wall paper, red velvet	Bsmt level, Rm. 2	None Detected	Non-Friable	
1018-112	Panel glue, cream	Bsmt, level, Rm. 2	None Detected	Non-Friable	
1018-113	Cardboard sheet, brown & corrugated	Bsmt, level, Rm. 8	None Detected	Non-Friable	
1018-114	VFT, 12x12, beige w/ dk gray streaks	Bsmt, level, Rm. 2	None Detected	Non-Friable	
2nd layer	....yellow mastic	""	None Detected	Non-Friable	

TABLE 2
SUMMARY OF ANALYTIC DATA
Eureka Veterans Building
1018 "H" Street, Eureka, CA

BOLD TYPE used to highlight asbestos. Note: Some samples had multiple layers, as analyzed

Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
1018-115	VFT, 12x12, beige w/ dk gray streaks	Bsmt, level, Rm. 2	None Detected	Non-Friable	
2nd layer	….yellow mastic	""	None Detected	Non-Friable	
1018-116	VFT, 12x12, beige w/ brown streaks	Bsmt, level, Rm. 6 (central lobby)	None Detected	Non-Friable	
2nd layer	….yellow mastic	""	None Detected	Non-Friable	
1018-117	VFT, 12x12, beige w/ brown streaks	Bsmt, level, Rm. 10 (hall)	None Detected	Non-Friable	
2nd layer	….yellow mastic	""	None Detected	Non-Friable	
1018-118	Baseboard mastic, cream	Bsmt, level, Rm. 10 (west hall)	None Detected	Non-Friable	
1018-119	Floor sizing & glue	Bsmt, level, Rm. 10 (west hall)	None Detected	Non-Friable	
1018-120	Baseboard mastic, cream	Bsmt, level, Rm. 6, (central lobby)	None Detected	Non-Friable	
1018-121	**VFT, 9x9,green & brown checks**	**Bsmt, level, Rm. 2, bottom layer**	**4% CH**	**Non-Friable**	
2nd layer	**….black mastic**	""	**5% CH**	**Non-Friable**	
1018-122	**VFT, 9x9,green & brown checks**	**Bsmt, level, Rm. 2, bottom layer**	**PACM**	**Non-Friable**	**NA/PS**
2nd layer	**….black mastic**	""	**PACM**	**Non-Friable**	**NA/PS**
1018-123	**VFT, 9x9,green & brown checks**	**Bsmt, level, Rm. 2, bottom layer**	**PACM**	**Non-Friable**	**NA/PS**
2nd layer	**….black mastic**	""	**PACM**	**Non-Friable**	**NA/PS**
1018-124	Carpet glue, yellow	Bsmt, level, Rm. 2	None Detected	Non-Friable	
1018-125	Baseboard mastic, cream	Bsmt, level, Rm. 2	None Detected	Non-Friable	

TABLE 2
SUMMARY OF ANALYTIC DATA
Eureka Veterans Building
1018 "H" Street, Eureka, CA

BOLD TYPE used to highlight asbestos. Note: Some samples had multiple layers, as analyzed

Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
1018-126	Window putty	Bsmt, level, Rm. 8	None Detected	Non-Friable	
1018-127	Concrete	Bsmt, level, Rm. 8	None Detected	Non-Friable	
1018-128	**TSI, papery brown under white jacket**	**Bsmt, level, Rm.8, pipe at ceiling**	**35% CH**	**Non-Friable**	
1018-129	Plaster, top coat, white	Bsmt, level, Rm. 10,ceiling	None Detected	Non-Friable	
2nd layer	....rough coat, grey	""	None Detected	Non-Friable	
1018-130	Plaster, top coat, white	Bsmt, level, Rm. 10, wall	None Detected	Non-Friable	
2nd layer	....rough coat, gray	""	None Detected	Non-Friable	
1018-131	Concrete	Bsmt, level, Rm. 12, wall	None Detected	Non-Friable	
1018-132	Black tar coating (water proofing)	Bsmt, level, Rm. 12, concrete floor beneath platform floor	None Detected	Non-Friable	
1018-133	**Transite, pipe**	**Bsmt, level, Rm. 12, short pipe, thru Exterior wall**	**35% CH 5% CR**	**Non-Friable**	**Appears to extent through wall to exterior, likely underground**
1018-134	Plaster, top coat, white	Bsmt, level, Rm. 10	None Detected	Non-Friable	
	....rough coat, grey0	""	None Detected	Non-Friable	
1018-135	Gypsum board drywall	Bsmt, level, Rm. 10	None Detected	Non-Friable	
2nd layer	....joint compound	""	None Detected	Non-Friable	
1018-136	Gypsum board drywall	Bsmt, level, Rm. 7	None Detected	Non-Friable	
2nd layer	....joint compound	""	None Detected	Non-Friable	
1018-137	Gypsum board drywall	Bsmt, level, Rm. 7	None Detected	Non-Friable	
2nd layer	....joint compound	""	None Detected	Non-Friable	

TABLE 2
SUMMARY OF ANALYTIC DATA
Eureka Veterans Building
1018 "H" Street, Eureka, CA

BOLD TYPE used to highlight asbestos. Note: Some samples had multiple layers, as analyzed

Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
1018-138	Plaster, gray, single coat	Bsmt, level, Rm. 11	None Detected	Non-Friable	
1018-139	Window caulking, white	Bsmt, level, Rm. 11	None Detected	Non-Friable	
1018-140	**Window putty**	**Bsmt, level, Rm. 11**	**2% CH**	**Non-Friable**	
1018-141	Gypsum board drywall	Bsmt, level, Rm. 19	None Detected	Non-Friable	
2nd layer	....joint compound	""	None Detected	Non-Friable	
1018-142	Plaster surfacing	Bsmt, level, Rm. 19,on concrete	None Detected	Non-Friable	
1018-143	Baseboard mastic, brown	Bsmt, level, Rm. 19	None Detected	Non-Friable	
1018-144	**Linoleum, dk. gray mosaic**	**Bsmt, level, Rm. 19**	**20% CH**	**Non-Friable**	
2nd layer	**....yellow mastic**	""	**None Detected (see comment)**	**Non-Friable**	**Likely contaminated by contact with above**
1018-145	Plaster, single coat, gray	Bsmt, level, Rm. 3	None Detected	Non-Friable	
1018-146	Plaster, top coat, brown	Bsmt, level, Rm. 6	None Detected	Non-Friable	
2nd layer	....gray rough coat	""	None Detected	Non-Friable	
1018-147	Plaster, gray rough coat	Bsmt, level, Rm. 5	None Detected	Non-Friable	
1018-148	**VFT,12x12, tan w/white streaks**	**Bsmt, level, Rm. 4**	**3% CH**	**Non-Friable**	
2nd layer	**.... black mastic**	""	**5% CH**	**Non-Friable**	
1018-149	**VFT,12x12, tan w/white streaks**	**Bsmt, level, Rm. 4**	**PACM**	**Non-Friable**	**NA/PS**
2nd layer	**.... black mastic**	""	**PACM**	**Non-Friable**	**NA/PS**
1018-150	**VFT,12x12, tan w/white streaks**	**Bsmt, level, Rm. 18**	**3% CH**	**Non-Friable**	
2nd layer	**.... black mastic**	""	**5% CH**	**Non-Friable**	

TABLE 2
SUMMARY OF ANALYTIC DATA
Eureka Veterans Building
1018 "H" Street, Eureka, CA

BOLD TYPE used to highlight asbestos. Note: Some samples had multiple layers, as analyzed

Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
1018-151	Plaster surfacing, lime green	Bsmt, level, Rm. 16	None Detected	Non-Friable	
1018-152	Cardboard door fill	Bsmt, level, Rm. 18	None Detected	Non-Friable	
1018-153	Plaster surfacing, gray	Bsmt, level, Rm. 15	None Detected	Non-Friable	
1018-154	Plaster surfacing, white top coat	Bsmt, level, Rm. 15	None Detected	Non-Friable	
1018-155	Plaster, gray rough coat	Bsmt, level, Rm. 15, closet #9	None Detected	Non-Friable	
1018-156	Tar, black	Bsmt, level, Rm. 15, closet #9, bottom layer	None Detected	Non-Friable	
1018-157	Carpet glue, brown	Bsmt, level, Rm. 1	None Detected	Non-Friable	
1018-158	Baseboard mastic, brown	Bsmt, level, Rm. 1	None Detected	Non-Friable	
1018-159	Baseboard mastic, gray, mixed with below…	Bsmt, level, Rm. 1	None Detected	Non-Friable	
2nd layer	…. white wall texture	""	None Detected	Non-Friable	
1018-160	Carpet glue, yellow brown, mixed w /below	Bsmt, level, Rm. 1	None Detected	Non-Friable	
2nd layer	….brown glue	""	None Detected	Friable	
1018-161	**TSI elbow, tan cmpd.**	**Bsmt, level, Rm. 15**	**10% CH**	**Friable**	
1018-162	**TSI elbow, tan cmpd.**	**Bsmt, level, Rm. 1**	**PACM**	**Friable**	**NA/PS**
1018-163	**TSI elbow, tan cmpd.**	**Bsmt, level, Rm. 15**	**PACM**	**Friable**	**NA/PS**
1018-164	**TSI elbow, tan cmpd.**	**Bsmt, level, Rm. 1**	**PACM**	**Friable**	**NA/PS**
1018-165	**TSI, brown air-cell paper under white jacketing**	**Bsmt, level, Rm. 1**	**40% CH**	**Friable**	

TABLE 2
SUMMARY OF ANALYTIC DATA
Eureka Veterans Building
1018 "H" Street, Eureka, CA

BOLD TYPE used to highlight asbestos. Note: Some samples had multiple layers, as analyzed

Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
1018-166	**TSI, brown air-cell paper under white jacketing**	**Bsmt, level, Rm. 15**	**PACM**	**Friable**	**NA/PS**
1018-167	**TSI, brown air-cell paper under white jacketing**	**Bsmt, level, Rm. 1**	**PACM**	**Friable**	**NA/PS**
1018-168	**TSI, brown air-cell paper under white jacketing**	**Bsmt, level, Rm. 15**	**PACM**	**Friable**	**NA/PS**
1018-169	No Sample				
1018-170	**TSI elbow, beige cmpd.**	**Bsmt, level, Rm. 15**	**10% AM CR 3%**	**Friable**	
1018-171	TSI, fiberglass like	Bsmt, level, Rm. 15	None Detected	Friable	
1018-172	**TSI, brown air-cell paper under white jacketing**	**Bsmt, level, Rm. 1**	**40% CH**	**Friable**	
1018-173	**TSI, brown air-cell paper under white jacketing**	**Bsmt, level, Rm. 15**	**PACM**	**Friable**	**NA/PS**
1018-174	**TSI, brown air-cell paper under white jacketing**	**Bsmt, level, Rm. 1**	**PACM**	**Friable**	**NA/PS**
1018-175	**TSI elbow, beige cmpd.**	**Bsmt, level, Rm. 1**	**20% CH**	**Friable**	
1018-176	**TSI elbow, beige cmpd.**	**Bsmt, level, Rm. 1**	**PACM**	**Friable**	**NA/PS**
1018-177	**TSI elbow, beige cmpd.**	**Bsmt, level, Rm. 15**	**PACM**	**Friable**	**NA/PS**

TABLE 2
SUMMARY OF ANALYTIC DATA
Eureka Veterans Building
1018 "H" Street, Eureka, CA

BOLD TYPE used to highlight asbestos. Note: Some samples had multiple layers, as analyzed

Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
1018-178	Plaster, grey, thick surfacing coat	Bsmt, level, Rm. 13, only on north concrete wall	<1% CH	Non-Friable	All along north wall of Rm.13
1,000 Point Count	On above sample	""	<0.1% CH	Non-Friable	By 1,000 Point Count analysis
1018-179	Plaster, grey, thick surfacing coat	Bsmt, level, Rm. 13	<1% CH	Non-Friable	See both comment boxes above
1018-180	TSI, white cmpd.	Bsmt, level, Rm. 14	10% AM 5% CH	Friable	
1018-181	TSI, end seal, white cmpd.	Bsmt, level, Rm. 14	PACM	Friable	NA/PS
1018-182	TSI, brown air-cell paper under white jacketing	Bsmt, level, Rm. 15	40% CH	Friable	
1018-183	TSI, brown air-cell paper under white jacketing	Bsmt, level, Rm. 15	40% CH	Friable	
1018-184	TSI elbow, beige cmpd.	Bsmt, level, Rm. 14	3% AM 10% CH	Friable	
1018-185	TSI elbow, beige cmpd.	Bsmt, level, Rm. 13	PACM	Friable	NA/PS
1018-186	TSI elbow, beige cmpd.	Bsmt, level, Rm. 13	PACM	Friable	NA/PS
1018-187	TSI, brown air-cell paper under jacketing	Bsmt, level, Rm. 13	40% CH	Friable	
1018-188	TSI, brown air-cell paper under jacketing	Bsmt, level, Rm. 13	PACM	Friable	NA/PS

TABLE 2
SUMMARY OF ANALYTIC DATA
Eureka Veterans Building
1018 "H" Street, Eureka, CA

BOLD TYPE used to highlight asbestos. Note: Some samples had multiple layers, as analyzed

Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
1018-189	**TSI, brown air-cell paper under jacketing**	**Bsmt level, Rm. 13**	**PACM**	**Friable**	**NA/PS**
1018-190	**TSI elbow, tan cmpd.**	**Bsmt level, Rm. 13**	**13% CH**	**Friable**	
1018-191	**TSI elbow, tan cmpd.**	**Bsmt level, Rm. 13**	**PACM**	**Friable**	**NA/PS**
1018-192	**TSI elbow, tan cmpd.**	**Bsmt level, Rm. 13**	**PACM**	**Friable**	**NA/PS**
1018-193	**TSI elbow, tan cmpd.**	**Bsmt level, Rm. 13**	**15% CH**	**Friable**	
1018-194	**TSI elbow, tan cmpd.**	**Bsmt level, Rm. 13**	**PACM**	**Friable**	**NA/PS**
1018-195	**TSI elbow, tan cmpd.**	**Bsmt level, Rm. 14**	**PACM**	**Friable**	**NA/PS**
1018-196	**TSI, brown air-cell paper under jacketing**	**Bsmt level, Rm. 13**	**40 % CH**	**Friable**	
1018-197	**TSI, brown air-cell paper under jacketing**	**Bsmt level, Rm. 13**	**40 % CH**	**Friable**	
1018-198	**TSI, brown air-cell paper under jacketing**	**Bsmt level, Rm. 13**	**PACM**	**Friable**	**NA/PS**
1018-199	Plaster, grey rough coat	Bsmt level, Rm. 13	None Detected	Non-Friable	Single coat
1018-200	Plaster, grey rough coat	Bsmt level, Rm. 13	None Detected	Non-Friable	"
1018-201	Concrete, red	Bsmt level, Rm. 13	None Detected	Non-Friable	
1018-202	Window putty, gray	Bsmt level, Rm. 13	None Detected	Non-Friable	
1018-203	Window putty, gray	Bsmt level, Rm. 14	None Detected	Non-Friable	
1018-204	Window putty, gray	Bsmt level, Rm. 14	None Detected	Non-Friable	
1018-205	Window putty, gray	Bsmt level, Rm. 15	None Detected	Non-Friable	
1018-206	Window putty, white	Bsmt level, Rm. 15	None Detected	Non-Friable	
1018-207	Plaster, single coat, gray	Bsmt level, Rm. 14	None Detected	Non-Friable	
1018-208	Plaster, single coat, gray	Bsmt level, Rm. 14	None Detected	Non-Friable	
1018-209	Plaster, Single coat, gray	Bsmt level, Rm. 14	None Detected	Non-Friable	
1018-210	Mortar, gray	Bsmt level, Rm. 14	None Detected	Non-Friable	

TABLE 2
SUMMARY OF ANALYTIC DATA
Eureka Veterans Building
1018 "H" Street, Eureka, CA

BOLD TYPE used to highlight asbestos. Note: Some samples had multiple layers, as analyzed

Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
1018-211	Brick, red	Bsmt level, Rm. 14	None Detected	Non-Friable	
1018-212	Concrete, gray	Bsmt level, Rm. 14	None Detected	Non-Friable	
1018-213	Concrete, gray	Bsmt level, Rm. 14	None Detected	Non-Friable	
1018-214	Plaster, white top, coat	Bsmt level, Rm. 15	None Detected	Non-Friable	
2nd layer	….plaster, grey	""	None Detected	Non-Friable	
1018-215	Plaster, single coat, gray	Bsmt level, Rm. 16	None Detected	Non-Friable	
1018-216	Particle board, brown	Bsmt level, Rm. 15	None Detected	Non-Friable	
1018-217	Plaster, white top, coat	Bsmt level, Rm. 15	None Detected	Non-Friable	
2nd layer	….plaster, grey	""	None Detected	Non-Friable	
1018-218	Plaster, white top, coat	Bsmt level, Rm. 17	None Detected	Non-Friable	
2nd layer	….plaster, grey	""	None Detected	Non-Friable	
1018-219	Gypsum board only	Bsmt level, Rm. 1	None Detected	Non-Friable	
1018-220	Plaster, brown block pattern	Bsmt level, Rm. 1	None Detected	Non-Friable	
1018-221	Plaster, brown block pattern	Bsmt level, Rm. 1	None Detected	Non-Friable	
1018-222	Plaster, brown block pattern	Bsmt level, Rm. 1	None Detected	Non-Friable	
1018-223	Plaster, white, heavy skip trowel	Bsmt level, Rm. 1	None Detected	Non-Friable	
1018-224	Plaster, white, heavy skip trowel	Bsmt level, Rm. 1	None Detected	Non-Friable	
1018-225	Plaster, white, heavy skip trowel	Bsmt level, Rm. 1	None Detected	Non-Friable	
1018-226	Baseboard mastic, cream	Bsmt level, Rm. 1	None Detected	Non-Friable	
1018-227	Floor sealant, white	Bsmt level, Rm. 1	None Detected	Non-Friable	

TABLE 2
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Eureka Veterans Building
1018 "H" Street, Eureka, CA

BOLD TYPE used to highlight asbestos. Note: Some samples had multiple layers, as analyzed

Sample Number	Sample Description (each layer)	Location	Asbestos % and Type	Friable vs. Non-Friable	Comments
1018-228	Carpet glue/cork flooring/dk brown glue	Bsmt level, Rm. 1	None Detected	Non-Friable	
1018-229	Carpet glue/cork flooring/dk brown glue	Bsmt level, Rm. 1	None Detected	Non-Friable	
1018-230	Carpet glue, mixed w/lt & dk brown mastics	Bsmt level, Rm. 1	None Detected	Non-Friable	
1018-231	Baseboard mastic, tan	Bsmt level, Rm. 1	None Detected	Non-Friable	
1018-232	Floor sizing, tan	Bsmt level, Rm. 1	None Detected	Non-Friable	
1018-233	Plaster, single coat gray	Bsmt level, Rm. 1	None Detected	Non-Friable	
1018-234	Window putty, cream	Bsmt level, Rm. 1	None Detected	Non-Friable	
1018-235	Window putty, tan	Bsmt level, Rm. 1	None Detected	Non-Friable	
1018-236	Concrete, gray	Exterior, front entry	None Detected	Non-Friable	
1018-237	Asphalt, black	Exterior, south parking lot	None Detected	Non-Friable	
1018-238	Concrete, gray	Exterior, N. entrance walk.	None Detected	Non-Friable	
1018-239	Concrete, gray	Exterior, west wall	None Detected	Non-Friable	
1018-240	Concrete, gray	Exterior, N. bsmt. ramp surfacing	None Detected	Non-Friable	
1018-241	Concrete, gray.	Exterior, N. bsmt ramp.	None Detected	Non-Friable	

CH = Chrysotile asbestos CR = Crocidolite asbestos. AM = Amosite asbestos

<1% CH* = Trace amount, less than 1% asbestos, as visually estimated by initial PLM. Requires verification by more accurate point count analyses.

ACM = Asbestos containing material.
PACM= Presumed ACM. See below.
NA/PS = Not analyzed, Positive stop: Stopped analysis after 1st positive test for identical material (see prev. sample).

TABLE 3

PAINT ANALYSES

Eureka Veterans Building, 1018 "H" Street, Eureka, CA

SAMPLE ID	LOCATION	MATERIAL	COLOR	SUBSTRATE	LEAD CONTENT by weight %	LEAD CONTENT parts per million (ppm) or mg/kg
1018-1P	2nd level, Rm. 47, wall	Paint	Yellow	Plaster	0.14	1,400
1018-2P	Stairway,mid level ldg, attic hatch door trim	Paint	Yellow	Wood	0.44	4,400
1018-3P	Gnd flr, Amer.Legion bar, Rm. 20, window trim	Paint	Beige	Wood	0.89	8,900
1018-4P	Gnd Flr, as above, interior entry door	Paint	Beige	Wood	057	5,700
1018-5P	Gnd Flr. so.hall, wall	Paint	Lt. Green	Plaster	0.13	1,300
1018-6P	Exterior, lower roof enclosure wall	Paint	White	Concrete	0.25	2,500
1018-7P	Gnd. Flr., custodial, Rm. 24, door	Stain	Brown	Wood	0.66	6,600
1018-8P	Bsmt., Rm. 1 , door	Paint	Red/peach/cream	Wood	0.20	2,000
1018-9P	Bsmt., Rm. 1, door jamb	Paint	Brown/cream	Wood	<0.01	<100
1018-10P	Bsmt., Rm. 14, wall	Paint	Green	Concrete	0.16	1,600
1018-11P	Bsmt., Rm 15, wall	Paint	White	Plaster	0.17	1,700
1018-12P	Bsmt., Rm. 15, cabinet	Paint	White/gray/tan	Wood	0.077	770
1018-13P	Bsmt., 13, baseboard	Paint	White/green./tan	Wood	0.47	4,700

1018-14P	Bsmt., Rm. 10, door trim	Paint	Brown/tan	Wood	0.072	720
1018-15P	Exterior, entry ceiling	Paint	Green/pink	Concrete	0.58	5,800
1018-16P	Exter., east window sill	Paint	Brown	Wood	1.8	18,000
1018-17P	Exter., west window sill	Paint	Brown	Wood	2.6	26,000
1018-18P	Exter., wall	Paint	Tan/pink	Concrete	0.29	2,900
1018-19P	Exter., front door	Paint	Brown	Wood	0.052	520
1018-20P	Exter., north side ramp railing	Paint	Black	Metal	<0.01	<100

Analysis by Lead in Paint USEPA Method 3050B/7000B

Parts per million (ppm) = milligrams per kilogram (mg/kg)

Lead content at 5,000 ppm (or 0.5% by wt.) or greater is defined as "Lead Based Paint", materials with lesser amounts of detectable lead over 600 ppm are described as "Lead Containing Surface Coatings" (LCSC).

APPENDIX B

HISTORIC RESOURCE EVALUATION TABLE

ADDENDUM TO HISTORIC BUILDING ANALYSIS - VETERAN'S MEMORIAL BUILDING

Project: Eureka Veterans Building Seismic Repair Project
1018 H Street, Eureka, California, 95501

COMPLETE FOR ALL FEATURES				COMPLETE ONLY IF PROJECT AFFECTS THE FEATURE		
Features that contribute to the building's historic significance		Current condition	Will the project affect this feature?	Description of proposed work & measures taken to avoid, minimize or mitigate impacts	Is the proposed work consistent with Secretary of the Interior Standards?	Will the project cause a substantial adverse effect on the feature?
Location	**Description**	**Bad - Good**	**(Y/N)**		**(Y/N)**	**(Y/N)**
Façade	Bold forms & strong geometric organization	Fair	N	-	-	-
	Recessed vestibule w/ fluted columns	Fair	N	-	-	-
	Brass front doors	Fair	N	-	-	-
	Polygonal dome	Fair	N	-	-	-
	Horizontal decorative panel & upper cornice decorative band	Fair	Y	All cast ornamentation to have a mold taken and to be replaced if damaged or demolished for structural repairs.	Y	N
	Blank circles	Fair	N	All cast ornamentation to have a mold taken and to be replaced if damaged or demolished for structural repairs. **Recreate original proposed military symbols if feasible.**	Y	N
	Decorative panels w/ geometric patterns & sun burst	Fair	N	All cast ornamentation to have a mold taken and to be replaced if damaged or demolished for structural repairs.	Y	N
	Light fixtures	Fair	N	-	-	-

Lobby	Terrazzo tile flooring	Fair	N	-	-	-
	Plaster cast Art Deco designs	Fair	N	-	-	-
	Fireplaces	Fair	Y	Fireplaces were removed previously & replaced with plug-in inserts. Inserts will be replaced with shelving.	Y	N
	Chandelier	Fair	N	-	-	-
	Drinking fountains	Fair	Y	Drinking fountains are required to be removed due to structural upgrades. They will be relocated w/ as much tile as possible. **Photograph in situ prior to relocation.**	Y	N
Memorial Hall	Cast plaster designs	Fair	N	All cast ornamentation to have a mold taken and to be replaced if damaged or demolished during construction.	Y	N
	Tiled ceiling	Fair	N	Ceiling tiles are being removed due to asbestos contamination. To be replaced w/ new plaster and acoustic panels. **Photograph in situ prior to removal.**	Y	N
	Cornice	Fair	N	-	-	-
	Fixed seating	Fair	N	All fixed seating to be protected during construction and replaced or repaired if damaged.	Y	N
	Pendant light fixtures	Fair	N	New glass covers to be replace missing and few remaining covers. **Photograph in situ prior to relocation & store remaining covers on site.**	Y	N
Men's Lounge	Wood & plaster coffered ceiling	Fair	N	-	-	-
	Light fixtures	Fair	N	-	-	-

Ladies' Lounge	Tiled counters	Fair	N	Kitchenette will be demolished to allow for required secondary exit. Backsplash tile to be relocated to new bathroom as much as possible. **Photograph in situ prior to relocation.**	Y	N
	Wood cabinets	Fair	Y	Kitchenette will be demolished to allow for required secondary exit. Due to accessibility constraints the wood cabinets are unable to be reused. **Photograph in situ prior to removal.**	Y	N
	Light fixtures	Fair	N	-	-	-
Mezzanine Level	Stylized iron railing	Fair	N	-	-	-
	Art deco wall decorations	Fair	N	-	-	-
	Arches, tympanums & foliate design	Fair	N	-	-	-
	Stained glass window	Fair	N	-	-	-

References

1. Historic Building Analysis (Jill Macdonald, March 12, 2015)
2. Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings (Weeks and Grimmer, 1995)

APPENDIX C

CONSTRUCTION WASTE MANAGEMENT DOCUMENTS

CHAPTER 8

COMPLIANCE FORMS AND WORKSHEETS

[BSC] Sample forms found in "A Guide to the California Green Building Standards Code (Nonresidential)" located at http://www.bsc.ca.gov/Home/CALGreen.aspx may be used to assist in documenting compliance with the waste management plan and other provisions of this code.

[HCD 1] Sample forms found in "A Guide to the California Green Building Standards Code (Residential)" located at www.hcd.ca.gov/CALGreen.html may be used to assist in documenting compliance with *CALGreen*.

WORKSHEET (WS-1)
BASELINE WATER USE

BASELINE WATER USE CALCULATION TABLE									
FIXTURE TYPE	FLOW RATE		DURATION		DAILY USES		OCCUPANTS[1,2]		GALLONS PER DAY
Showerheads	2.0 gpm	×	5 min.	×	1	×	Note 2a	=	
Showerheads residential	2.5 gpm	×	8 min.	×	1	×		=	
Lavatory faucets residential	2.2 gpm	×	.25 min.	×	3	×		=	
Lavatory faucets nonresidential	0.5 gpm	×	.25 min.	×	3			=	
Kitchen faucets	2.2 gpm	×	4 min.	×	1	×	Note 2b	=	
Replacement aerators	2.2 gpm	×		×		×		=	
Wash fountains	2.2 gpm	×		×		×		=	
Metering faucets	0.25 gal/cycle	×		×	3	×		=	
Metering faucets for wash fountains	2.2 gpm	×	.25 min.	×		×		=	
Gravity tank-type water closets	1.28 gal/flush	×	1 flush	×	1 male[3] 3 female	×		=	
Flushometer tank water closets	1.28 gal/flush	×	1 flush	×	1 male[3] 3 female	×		=	
Flushometer valve water closets	1.28 gal/flush	×	1 flush	×	1 male[3] 3 female	×		=	
Electromechanical hydraulic water closets	1.28 gal/flush	×	1 flush	×	1 male[3] 3 female	×		=	
Urinals	0.5 gal/flush	×	1 flush	×	2 male	×		=	
Total daily baseline water use (BWU)								=	
_____ (BWU) × .80 = _____ Allowable water use									

1. For residential occupancies, the number of occupants shall be based on two persons for the first bedroom, plus one additional person for each additional bedroom.
2. For nonresidential occupancies, refer to Table A, Chapter 4, 2013 *California Plumbing Code*, for occupant load factors.
   a. Shower use by occupants depends on the type of use of a building or portion of a building, e.g., total occupant load for a health club, but only a fraction of the occupants in an office building as determined by the anticipated number of users.
   b. Nonresidential kitchen faucet use is determined by the occupant load of the area served by the fixture.
3. The daily use number shall be increased to three if urinals are not installed in the room.

WORKSHEET (WS-2)
WATER USE REDUCTION

20-PERCENT REDUCTION WATER USE CALCULATION TABLE

FIXTURE TYPE	FLOW RATE[2]		DURATION		DAILY USES		OCCUPANTS[2,3]		GALLONS PER DAY
Showerheads		×	5 min.	×	1	×	Note 3a	=	
Showerheads residential		×	8 min.	×	1	×		=	
Lavatory faucets residential		×	.25 min.	×	3	×		=	
Lavatory faucets nonresidential[6]		×	.25 min.	×	3	×		=	
Kitchen faucets		×	4 min.	×	1	×	Note 3b	=	
Replacement aerators		×		×		×		=	
Wash fountains		×		×		×		=	
Metering faucets		×	.25 min.	×	3	×		=	
Metering faucets for wash fountains		×	.25 min.	×		×		=	
Gravity tank-type water closets		×	1 flush	×	1 male[5] 3 female	×		=	
HET[4] High-efficiency toilet	1.28 gal/flush	×	1 flush	×	1 male[5] 3 female	×		=	
Flushometer tank water closets		×	1 flush	×	1 male[5] 3 female	×		=	
Flushometer valve water closets		×	1 flush	×	1 male[5] 3 female	×		=	
Electromechanical hydraulic water closets		×	1 flush	×	1 male[5] 3 female	×		=	
Urinals		×	1 flush	×	2 male	×		=	
Urinals Nonwater supplied	0.0 gal/flush	×	1 flush	×	2 male	×		=	
Proposed water use								=	
_____ (BWU from WS-1) × .80 = _____ Allowable water use									

1. The flow rate values shall not exceed the baseline flow rates from the *California Code of Regulations*, Title 20, 2010 Appliance Efficiency Regulations (See Table 4.303.2.)
2. For residential occupancies, the number of occupants shall be based on two persons for the first bedroom, plus one additional person for each additional bedroom.
3. For nonresidential occupancies, refer to Table A, Chapter 4, 2013 *California Plumbing Code*, for occupant load factors.
   a. Shower use by occupants depends on the type of use of a building or portion of a building, e.g., total occupant load for a health club, but only a fraction of the occupants in an office building as determined by the anticipated number of users.
   b. Nonresidential kitchen faucet use is determined by the occupant load of the area served by the fixture.
4. Includes single and dual flush water closets with an effective flush of 1.28 gallons or less.
   Single flush toilets - The effective flush volume shall not exceed 1.28 gallons (4.8 liters). The effective flush volume is the average flush volume when tested in accordance with ASME A 112.19.2.
   Dual flush toilets - The effective flush volume shall not exceed 1.28 gallons (4.8 liters). The effective flush volume is defined as the composite, average flush volume of two reduced flushes and one full flush. Flush volumes will be tested in accordance with ASME A 112.19.2 and ASME A 112.19.14.
5. The daily use number shall be increased to three if urinals are not installed in the room.
6. Where complying faucets are unavailable, aerators rated at .35 gpm or other means may be used to achieve reduction.

WORKSHEET (WS-3)
WATER USE REDUCTION

30-, 35- OR 40-PERCENT REDUCTION WATER USE CALCULATION TABLE

FIXTURE TYPE	FLOW RATE[2]		DURATION		DAILY USES		OCCUPANTS[2,3]		GALLONS PER DAY
Showerheads		×	5 min.	×	1	×	Note 3a	=	
Showerheads residential		×	8 min.	×	1	×		=	
Lavatory faucets residential		×	.25 min.	×	3	×		=	
Lavatory faucets nonresidential[6]		×	.25 min.	×	3	×		=	
Kitchen faucets		×	4 min.	×	1	×	Note 3b	=	
Replacement aerators		×		×		×		=	
Wash fountains		×		×		×		=	
Metering faucets		×	.25 min.	×	3	×		=	
Metering faucets for wash fountains		×	.25 min.	×		×		=	
Gravity tank type water closets		×	1 flush	×	1 male[5] 3 female	×		=	
HET[4] High-efficiency toilet	1.12 gal/flush	×	1 flush	×	1 male[5] 3 female	×		=	
Flushometer tank water closets		×	1 flush	×	1 male[5] 3 female	×		=	
Flushometer valve water closets		×	1 flush	×	1 male[5] 3 female	×		=	
Electromechanical hydraulic water closets		×	1 flush	×	1 male[5] 3 female	×		=	
Urinals		×	1 flush	×	2 male	×		=	
Urinals Nonwater supplied	0.0 gal/flush	×	1 flush	×	2 male	×		=	
Proposed water use								=	

30% Reduction_____ (BWU from WS-1) × .70 = _____ Allowable water use
35% Reduction_____ (BWU from WS-1) × .65 = _____ Allowable water use
40% Reduction_____ (BWU from WS-1) × .60 = _____ Allowable water use

1. The flow rate values shall not exceed the baseline flow rates from the 2013 *California Code of Regulations*, Title 20, Appliance Efficiency Regulations (See Table 4.303.2.)
2. For residential occupancies, the number of occupants shall be based on two persons for the first bedroom, plus one additional person for each additional bedroom.
3. For nonresidential occupancies, refer to Table A, Chapter 4, 2013 *California Plumbing Code*, for occupant load factors.
   a. Shower use by occupants depends on the type of use of a building or portion of a building, e.g., total occupant load for a health club, but only a fraction of the occupants in an office building as determined by the anticipated number of users.
   b. Nonresidential kitchen faucet use is determined by the occupant load of the area served by the fixture.
4. Includes single and dual flush water closets with an effective flush of 1.28 gallons or less.
   Single flush toilets - The effective flush volume shall not exceed 1.28 gallons (4.8 liters). The effective flush volume is the average flush volume when tested in accordance with ASME A112.19.233.2.
   Dual flush toilets - The effective flush volume shall not exceed 1.28 gallons (4.8 liters). The effective flush volume is defined as the composite, average flush volume of two reduced flushes and one full flush. Flush volumes will be tested in accordance with ASME A112.19.2 and ASME A112.19.14.
5. The daily use number shall be increased to three if urinals are not installed in the room.
6. Where complying faucets are unavailable, aerators rated at .35 gpm or other means may be used to achieve reduction.

Construction Waste Management (CWM) Plan

Note: This sample form may be used to assist in documenting compliance with the waste management plan.

Project Name: _____

Job #: _____

Project Manager: _____

Waste Hauling Company: _____

Contact Name: _____

All Subcontractors shall comply with the project's Construction Waste Management Plan.
All Subcontractor foremen shall sign the CWM Plan Acknowledgment Sheet.

Subcontractors who fail to comply with the Waste Management Plan will be subject to backcharges or withholding of payment, as deemed appropriate. For instance, Subcontractors who contaminate debris boxes that have been designated for a single material type will be subject to backcharge or withheld payment, as deemed appropriate.

1. The project's overall rate of waste diversion will be ____ %.
2. This project shall generate the least amount of waste possible by planning and ordering carefully, following all proper storage and handling procedures to reduce broken and damaged materials and reusing materials whenever possible. The majority of the waste that is generated on this jobsite will be diverted from the landfill and recycled for other use.
3. Spreadsheet 1, enclosed, identifies the waste materials that will be generated on this project, the diversion strategy for each waste type and the anticipated diversion rate.
4. Waste prevention and recycling activities will be discussed at the beginning of weekly subcontractor meetings. As each new subcontractor comes on-site, the WMP Coordinator will present him/her with a copy of the CWM Plan and provide a tour of the jobsite to identify materials to be salvaged and the procedures for handling jobsite debris. All Subcontractor foremen will acknowledge in writing that they have read and will abide by the CWM Plan. Subcontractor Acknowledgment Sheet enclosed. The CWM Plan will be posted at the jobsite trailer.
5. Salvage: Excess materials that cannot be used in the project, nor returned to the vendor, will be offered to site workers, the owner, or donated to charity if feasible.
6. [HAULING COMPANY] will provide a commingled drop box at the jobsite for most of the construction waste. These commingled drop boxes will be taken to [Sorting Facility Name and Location]. The average diversion rate for commingled waste will be ____%. As site conditions permit, additional drop boxes will be used for particular phases of construction (e.g., concrete and wood waste) to ensure the highest waste diversion rate possible.
7. In the event that the waste diversion rate achievable via the strategy described in (6) above, is projected to be lower than what is required , then a strategy of source-separated waste diversion and/or waste stream reduction will be implemented. Source separated waste refers to jobsite waste that is not commingled but is instead allocated to a debris box designated for a single material type, such as clean wood or metal.

   Notes:

   1. Waste stream reduction refers to efforts taken by the builder to reduce the amount of waste generated by the project to below four (4) pounds per square foot of building area.
   2. When using waste stream reduction measures, the gross weight of the product is subtracted from a base weight of four (4) pounds per square foot of building area. This reduction is considered additional diversion and can be used in the waste reduction percentage calculations.
8. [HAULING COMPANY] will track and calculate the quantity (in tons) of all waste leaving the project and calculate the waste diversion rate for the project. [HAULING COMPANY] will provide Project Manager with an updated monthly report on gross weight hauled and the waste diversion rate being achieved on the project. [HAULING COMPANY's] monthly report will track separately the gross weights and diversion rates for commingled debris and for each source-separated waste stream leaving the project. In the event that [HAULING COMPANY] does not service any or all of the debris boxes on the project, the [HAULING COMPANY] will work with the responsible parties to track the material type and weight (in tons) in such debris boxes in order to determine waste diversion rates for these materials.
9. In the event that Subcontractors furnish their own debris boxes as part of their scope of work, such Subcontractors shall not be excluded from complying with the CWM Plan and will provide [HAULING COMPANY] weight and waste diversion data for their debris boxes.
10. In the event that site use constraints (such as limited space) restrict the number of debris boxes that can be used for collection of designated waste the project Superintendent will, as deemed appropriate, allocate specific areas onsite where individual material types are to be consolidated. These collection points are not to be contaminated with non-designated waste types.
11. Debris from jobsite office and meeting rooms will be collected by [DISPOSAL SERVICE COMPANY]. [DISPOSAL SERVICE COMPANY] will, at a minimum, recycle office paper, plastic, metal and cardboard.

Construction Waste Management (CWM) Worksheet

Note: This sample form may be used to assist in documenting compliance with the waste management plan.

Project Name: _____

Job Number: _____

Project Manager: _____

Waste Hauling Company: _____

Construction Waste Management (CWM) Plan

WASTE MATERIAL TYPE	DIVERSION METHOD:		PROJECTED DIVERSION RATE
	COMMINGLED AND SORTED OFF SITE	SOURCE SEPARATED ON SITE	
Asphalt			
Concrete			
Shotcrete			
Metals			
Wood			
Rigid insulation			
Fiberglass insulation			
Acoustic ceiling tile			
Gypsum drywall			
Carpet/carpet pad			
Plastic pipe			
Plastic buckets			
Plastic			
Hardiplank siding and boards			
Glass			
Cardboard			
Pallets			
Job office trash, paper, glass & plastic bottles, cans, plastic			
Alkaline and rechargeable batteries, toner cartridges, and electronic devices			
Other:			
Other:			
Other:			
Other:			

Construction Waste Management (CWM) Acknowledgment

Note: This sample form may be used to assist in documenting compliance with the waste management plan.

Project Name: _____

Job Number: _____

Project Manager: _____

Waste Hauling Company: _____

CWM Plan Acknowledgment

The Foreman for each new Subcontractor that comes on site is to receive a copy of the Construction Waste Management Plan and complete this Acknowledgment Form.

I have read the Waste Management Plan for the project; I understand the goals of this plan and agree to follow the procedures described in this plan.

DATE	SUBCONTRACTOR COMPANY NAME	FOREMAN NAME	SIGNATURE

APPENDIX D

GEOTECHNICAL REPORT

Veterans Memorial Hall Geotechnical Report

1020 H Street
Eureka, California 95502

July 16, 2015

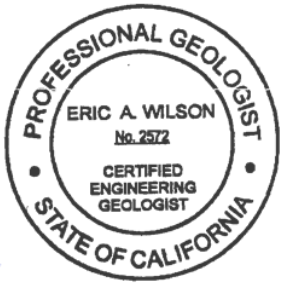
Prepared For:
The County of Humboldt

Prepared By:
LACO Associates, Inc.
21 W. 4th Street
Eureka, California 95501
707 443-5054

Project No. 7451.11



J. Erich Rauber
GE 2887, Exp 9/30/15



Eric Wilson
CEG 2572, Exp 8/31/15

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FIGURES

Figure 1 Location Map
Figure 2 Site Plan
Figure 3 Vicinity Geologic Map
Figure 4 Description of Map Units

ATTACHMENT 1

ASFE Brochure

ATTACHMENT 2

Soil Profile Logs

ATTACHMENT 3

Laboratory Test Results

1.0 INTRODUCTION

This report presents the results of a Geotechnical Exploration performed by LACO Associates (LACO) to support the design and construction of improvements to the Veterans Memorial Building at 1020 H Street in Eureka, California (see Location Map, Figure 1). The existing Veterans Memorial Building is a two-story, reinforced concrete structure supported on shallow foundations within a partial basement. The proposed building area will hereafter be referred to in this report as "the Site."

In accordance with the LACO agreement dated April 22, 2015, LACO performed the following services:

- Reviewing existing published geologic maps pertinent to the Site and available unpublished soils and geologic reports within the LACO database
- Completing a field exploration program that included:
  - Geologic and geomorphic mapping of the proposed project site and nearby vicinity
  - Subsurface exploration consisting of a series of geotechnical borings in the area of the proposed improvements.
  - Collecting soil samples for laboratory analysis.
- Conducting a laboratory testing program of selected soil samples to characterize relevant soil properties.
- Preparing this Geotechnical Report in compliance with the requirements of the 2013 California Building Code (CBC 2013).

2.0 PROJECT DESCRIPTION

Pertinent project location information is listed in Table 1.

Table 1. Project Location Information

Latitude and Longitude	40.797672° North and -124.163107° West
Assessor Parcel Number	APN 005-023-002-000
United States Geologic Survey Quadrangle (USGS)	Eureka 7.5-minute topographic quadrangle

*Latitude and longitude are based on coordinates provided by Humboldt County Planning and Building GIS Portal for the Site centroid.

Based on our review of project plans dated June 17, 2013 prepared by KPFF Consulting Engineers, Inc., we understand Humboldt County (the County) proposes to construct seismic upgrade improvements to the existing building. These improvements consist of a series of new interior strip footings supporting new shear walls. The new footings will be constructed within the approximately 5-6 foot deep partial basement of the approximately 2-story reinforced concrete building.

3.0 FIELD EXPLORATION AND LABORATORY TESTING

A preliminary site reconnaissance and engineering geologic mapping was performed on April 22, 2015, by our project engineering geologist. Our primary subsurface exploration was performed on May 4, 2015, and

included the excavation, sampling, and logging of 4 exploratory borings in the vicinity of the proposed site improvements as shown on Figure 2 – Site Plan. Borings were advanced to a depth of up to 26.5 feet using a GeoProbe 6600 rig equipped with 6-inch diameter hollow-stem augers. Soil samples were collected with split-spoon samplers that were driven with a 140-pound auto-trip hammer repeatedly dropped from a height of 30 inches. The samplers included a 2-inch outside diameter (OD) Standard Penetration Test (SPT) sampler, as well as the 3-inch OD Modified California sampler. The sampler types used are indicated on the logs. The number of hammer blows required to drive the samplers was recorded for each 6-inch increment, and the sum of the second and third 6-inch increments is recorded on the logs. The blow count data presented on the logs has not been corrected for sampler type or hammer efficiency. The logs of our borings are presented in Appendix 2 as Figures B-1 through B-4. Also included in Appendix 2 is Figure B-5 Key to Boring Logs. Soils were logged in general accordance with the American Society for Testing and Materials (ASTM) Test Procedure D2488 Visual-Manual Procedures. The boring locations were approximately determined by measuring distances from existing structures using a tape measure and should be considered accurate only to the degree implied by the mapping technique used.

3.1 Laboratory Testing

Undisturbed and disturbed soil samples collected during the field exploration were submitted to LACO's materials testing laboratory for analysis. Laboratory analysis was performed to determine pertinent index properties of the soils encountered during the field exploration. The laboratory tests conducted for this exploration included:

- Particle Size Analysis – Finer than #200 (ASTM 1140)
- In-Place Density and Moisture Content (ASTM D2216 and D2937)
- R-Value (CT-301)

Laboratory test results are included as Attachment 3 and are summarized in Table 2.

Table 2. Laboratory Test Results

Boring	Depth (feet bgs)	Unified Soil Classification System Soil Type	ASTM D1140	ASTM D2216/2937		CT-301
			Fines Content (% finer than No. 200 sieve)	Dry Density (pounds per cubic foot)	Moisture Content (%)	R-Value Exudation Pressure At 300 psi
B-1	5.0-8.0	SP				49
B-2	5.5-6.0	SM	24.0	115.1	15.3	
B-3	10.0-11.5	SP	5.4			
B-4	2.0-2.5	SM	43.6	107.1	20.3	
B-4	15.0-16.5	SP-SM	10.2			

LACO will archive the soil samples collected for this project for 60 days following the issuance of this Report. Unless directed otherwise by the Client, all samples will be discarded after the 60 day archive period.

4.0 SITE AND SUBSURFACE CONDITIONS

4.1 Site Conditions

The existing Veterans Memorial Building is located on an approximately 245 foot wide by 115 foot deep, approximately 0.610 acre, roughly rectangular lot off the west side of H Street in a residential neighborhood in Eureka, California. The Site is relatively flat, descending very gently from an elevation of approximately 82 feet at the southwestern corner to approximately 76 feet at the northwestern corner. The existing two-story building is centrally located on the pad with a parking area to the south, landscaping to the north, and a stepped and columned entrance structure extending from the east side of the building. The building was built in the 1930s. The exterior shows some signs of distress including closed cracks extending near vertically up the exterior and concrete spalling around the windows exposing the underlying reinforcing. The lower story is set into the site grades by 5-6 feet with an entrance ramp cut into grade, extending from the north side of the building, and steps and a light well extending from the south side of the building.

4.2 Geologic Setting

Based on a review of our new and previous nearby soil boring logs, along with published geologic maps (California Department of Mines and Geology, CDMG, 1980; McLaughlin et al., 2000), the Site is underlain by Quaternary aged (approximately 2.6 million to 11,700 years old) none-marine terrace deposits (map symbol Qt). Published mapping (CDMG 1980) indicates these terrace deposits consist of Hookton Formation sediments composed of shallow marine and non-marine sands and gravel. A copy of the relevant portion of this map is presented as Figure 3 – Vicinity Geologic Map.

4.3 Seismicity

The Site is located within a seismically active region subject to frequent moderate to large earthquakes. The regional tectonic framework is controlled by the Cascadia subduction zone (CSZ), wherein oceanic crust of the Juan de Fuca/Gorda plate is being actively subducted beneath the leading edge of the North American plate. The CSZ in its entirety extends from the southern Humboldt County coast to British Columbia. Plate convergence along the Gorda segment of the CSZ is occurring at a rate of approximately 30 to 40 millimeters per year (mm/yr) (Heaton & Kanamori, 1984). Rupture along the entire CSZ boundary may produce an earthquake with a maximum moment magnitude (M_w) of 9.0 or greater (Satake, 2003).

Upper plate crustal deformation associated with the subduction of the Gorda plate is expressed as a 90-kilometer (km) wide fold and thrust belt that comprises the accretionary complex along the North American plate margin (Carver, 1987). Faults associated with the offshore and onshore portions of the CSZ fold and thrust belt include the Little Salmon and Mad River fault zones.

The Little Salmon Fault and Fickle Hill faults are the closest recognized active fault traces to the Site and are located a distance of 4.3 miles and 6.1 miles, respectively, from the Site (CDMG, 1983; CDMG, 1991; CGS, 2010). Both faults are northwest-striking, northeast-dipping, low-angle thrust faults. The upper-bound earthquakes considered likely to occur on the Little Salmon and Fickle Hill faults have an estimated maximum moment magnitude (M_w) of 7.1 and 6.9, respectively (ICBO-CDMG, 1998).

Based on the record of historical earthquakes (approximately 150 years), faults within the plate boundary zone and internally deforming Gorda Plate have produced numerous small-magnitude and several moderate to large (i.e., magnitude greater than 6) earthquakes affecting the local area. Several active regional seismic sources in addition to those mentioned above are proximal to the Site and have the potential to produce strong ground motions. These seismic sources include:

- The northern segment of the San Andreas transform fault that represents the boundary between the stable North American plate and the northwest-migrating Pacific plate.
- The Mendocino fault, an offshore, high-angle, east-west-trending, right-lateral strike-slip fault that forms the boundary between the Gorda and Pacific plates.
- Faults within the internally-deforming Gorda plate consisting of high-angle, northeast-trending, left-lateral, strike-slip faults.

4.4 Subsurface Conditions

The soils encountered during the subsurface exploration were consistent with those anticipated based on our review of published geologic maps of the area. In general, borings encountered a surficial layer of fill overlying terrace deposits which persisted to the depth explored of 26.5 feet. The fill is between 0.5 and 3 feet thick and typically consists of loose to very loose silty sands (SM) and poorly graded sands (SP), locally containing rounded gravels, and organics. The upper 3 to 10 feet of the terrace deposits typically consist of interbedded loose, poorly graded sands (SP) and clayey and silty sands (SC, SM). Below this upper unit, the terrace deposits consist of medium dense to dense, poorly graded sands (SP). Detailed descriptions of the soils encountered in the geotechnical borings drilled for this exploration are provided on the soil logs included as Attachment 2.

4.5 Groundwater Conditions

Free groundwater was encountered in our borings at a depth of between 9.5 and 12 feet below ground surface (bgs). We note that fluctuations in the level of groundwater can occur due to variations in rainfall, temperature, landscaping, and other factors that may not have been evident at the time our observations were made.

A review of nearby wells on Geotracker, a monitoring well for the MCCREA Nissan Car Lot (located approximately 830 feet north and 25 feet lower in elevation than the site) encountered groundwater at a depth of between 5 and 8 feet below ground surface in 2005.

5.0 GEOLOGIC AND SOIL HAZARDS

Potential geologic and soil hazards assessed for the Site include seismic ground shaking, surface fault rupture, liquefaction and related phenomena, settlement, flooding and high groundwater, and swelling or shrinking soils. An evaluation for these potential hazards is presented below.

5.1 Seismic Ground Shaking

As noted in Section 4.3, the Site is situated within a seismically active area proximal to multiple seismic sources capable of generating moderate to large ground motions. Given the proximity of the new building to active seismic sources (Little Salmon Fault and the Fickle Hill Fault), as well as other active faults within and offshore of northern California including the Cascadia subduction zone, there is high probability that the Site will experience strong ground shaking during the economic life span of the proposed development. As prescribed by the 2013 CBC, the spectral response accelerations for seismic analysis and design of the proposed structure is presented in Section 7.3.

5.2 Surface Fault Rupture

The Site is not located within an Alquist-Priolo earthquake fault zone and, as such, does not require a trench-based fault rupture hazard evaluation (CDMG, 1983). Based on the distance between the Site and the closest active fault, the potential for surface fault rupture to occur within the Site is negligible.

5.3 Liquefaction

A state of 'soil liquefaction' occurs when, as a result of cyclic fluctuations in pore fluid pressure, sediment grains lose contact with one another, causing a momentary loss of effective stress and consequently of shear strength. Liquefaction is most commonly initiated by earthquake ground motions. Soils in a saturated, loose state and less than approximately 50 feet bgs are the most likely to liquefy. Liquefaction is more likely to occur in sandy or non-plastic silty soils but may, in rare cases, occur in gravels and sensitive clays. Deposits most susceptible to liquefaction are young (Holocene-age, deposited within the last 10,000 years) sands and silts of similar grain size (well-sorted), in beds at least a meter in thickness, and saturated with water.

Based on our review of the seismic hazards map presented in the Division of Mines and Geology, Special Publication 115, Humboldt and Del Norte Counties, Planning Scenario for a great earthquake on the Cascadia Subduction Zone, the site is not located within a liquefaction hazard zone.

5.4 Settlement

Static settlement is the result of compressive deformation of soil beneath an applied load. The compressive deformation generally results from a reduction in voids within the soil. In dry or granular soils, the compression of the soil occurs relatively rapidly. Conversely, the compressive deformation in soft, fine-grain soils usually occurs very slowly.

Based on our review of project plans dated June 17, 2013 prepared by KPFF Consulting Engineers, the proposed foundation improvements consist of a series of strip footings up to 30 feet long and 6 feet wide. Although no foundation loads were available at the time this report was generated, the proposed new foundation elements will be supporting new, two-story shear-walls of steel-frame or concrete masonry unit construction. As such, we anticipated the foundations to be relatively lightly- to moderately-loaded, with footing pressures on the order of 0.25 tsf and in part supported by the new walls' structural connection to the existing building. As such, total building foundation settlement is estimated to be on the order of 0.2 inches and to occur relatively quickly over the course of the project construction. Provided the load-

bearing foundations are supported on either relatively uniformly dense/firm native and/or properly compacted fill soils, differential settlement should be less than approximately one-quarter of an inch between adjacent footings or along a continuous strip footing.

KPFF Consulting Engineers requested that an additional static settlement estimates be performed assuming foundation loading approaching the maximum allowable bearing pressure presented in recommendations section 7.1.1 below of 3,000 psf, or 1.5 tsf. Based on a load of 1.5 tsf, total foundation settlement is estimated to be on the order of 1.3 inches.

5.5 Slope Instability/Landsliding

Surface gradients within the site are relatively uniform and slope less than 5 percent to the northeast. In addition, the site is situated well away (greater than 100 feet) from significant sloping ground. As such, we consider the potential for slope instability to adversely affect the site to be negligible.

5.6 Flooding, Tsunami, and High Groundwater

5.6.1 *Flooding*

According to the FEMA Flood Insurance Rate Map, Map Number 0600620005C, effective June 17, 1986, the Site is not located within an area designated as a flood hazard zone, indicating an area of minimal flooding (FEMA, 1986). On the basis of this mapping and the Site elevation, the risk of flooding to occur at the Site is considered negligible.

5.6.2 *Tsunami Inundation*

According to the CGS Tsunami inundation hazard map (CGS, 2009) for the Eureka quadrangle, the site is not located in an area anticipated to experience inundation during/following a tsunami event. On the basis of this mapping, the risk of Tsunami inundation is considered to be negligible.

5.6.3 *High Groundwater*

As noted in Section 5.5 of this Report, groundwater was not observed during our recent field exploration above a depth of 9.5 feet bgs but has been previously observed at depths as shallow as 5 feet bgs at other sites within the Site vicinity. Therefore, we judge that the risk of excavations encountering groundwater during footing installation is moderate.

5.7 Soil Swelling or Shrinkage Potential

Expansive soils have a tendency to undergo volume changes with changes in moisture content. They are generally cohesive, fine-grained clay soils that represent a significant structural hazard to buildings founded on them. The soils encountered during our field exploration consist primarily of granular soils (sands). As

such, we conclude that the risk of expansive soils detrimentally affecting the proposed development at the Site is negligible.

6.0 CONCLUSIONS

Based on the results of investigation, we judge the Site to be suitable for the proposed development, provided the recommendations presented in this Report are incorporated into the project design and construction. The main geologic/geotechnical engineering considerations affecting design and construction of the proposed development are the potential for strong seismic shaking occurring at the Site, including the potential for liquefaction of the underlying soils; and the potential for shallow groundwater.

7.0 RECOMENDATIONS

7.1 Foundations

7.1.1 *Spread Footings Foundations*

The proposed spread footings should bear on medium dense native soils underlying the building. Footings should extend at least 12 inches below finish grade, be at least 18 inches wide, and designed using the maximum allowable bearing pressures presented in Table 4.

Table 4. Maximum Allowable Bearing Pressures for Shallow Spread footings on Compacted Fill

Loading Condition	Maximum Allowable Bearing Pressure (psf)
Dead plus Live Loads	3,000
Total, including Wind or Seismic	4,000

Lateral load resistance may be developed via (1) friction between the footing bottoms and underlying soil, and (2) passive resistance between the vertical faces of footings. For design, use an allowable friction coefficient of 0.30 and a uniform passive soil pressure of 1,500 psf. Passive pressure should be neglected in the upper 1 foot of soil unless the adjacent surface is confined by concrete slabs or pavements. If friction and passive resistances are to be combined, reduce the lesser value by 50 percent.

7.1.2 *Modulus of Subgrade Reaction*

We understand that an estimate of the modulus of subgrade reaction (k) is desired to assist in the foundation design. Modulus of subgrade reaction is a measure of the stiffness of the subgrade represented as a load per unit area causing a unit deflection.

Due to the location of the proposed foundation improvements, within a partial basement 5-6 feet below exterior grade, direct measurement of the modulus of subgrade reaction was impractical. An R-Value test was performed on a bulk composite sample taken from boring B-1 from a depth of 5-8 feet bgs. This test

indicates that the soil has an R-Value of 49 (Appendix 3). Using this value, the moisture content of the soil and information outlined in Technical Manual No.5-809-12, Air Force Manual No. 88-3, Chapter 15, Headquarters, Departments of the Army and the Air Force, Washington, D.C., 25 August 1987. we recommend using a modulus of subgrade of 200 psi/in.

7.2 Concrete Slab-on-Grade Floors

Concrete slab-on-grade floors should be a minimum thickness of 4 inches and reinforced and underlain by at least 4 inches of clean, ¾-inch gravel (termed slab base rock) to act as a capillary moisture break. The gravel should be overlain by a vapor barrier (plastic membrane, such as Stego Wrap) to reduce the possibility of moisture migration through the concrete floor. The vapor barrier should be placed on the slab base rock and overlain with at least 2 inches of clean sand to reduce the risk of membrane puncture during steel and concrete placement and provide for a better concrete finish. Joints between membrane sheets and utility piping openings should be lapped and taped. Care should be taken during slab construction to protect the plastic membrane against punctures. Prior to placement of the slab underlayment, slab subgrade should be scarified to a depth of 6 inches, moisture conditioned as necessary, and then re-compacted in accordance with the recommendations presented below.

7.3 Seismic Design Parameters

Earthquake design parameters presented herein are based on the 2013 CBC which, in turn, is based on the 2009 International Building Code (IBC, 2009), and the standard 'Minimum Design Loads for Buildings and Other Structures', ASCE 7-10 (ASCE, 2010). The 2010 ASCE 7 (with March 2013 errata) is based upon a maximum considered earthquake ground motion, defined as the motion caused by an event with a 2 percent probability of exceedance within a 50-year period (recurrence interval of approximately 2,500 years).

At the request of KPFF Consulting Engineers, the project structural engineers, we are also providing seismic design parameters under the CBC, 'Seismic Evaluation and Retrofit of Existing Buildings' guidelines governed by the provisions of ASCE-41-13 (which utilizes 2008 USGS hazard data), at the BSE-1E seismic hazard level, which is based on a maximum considered earthquake ground motion defined as the motion caused by an event with a 20 percent probability of exceedance within a 50-year period.

New and previous field and laboratory test data indicate that the site and proximity can be assigned a Site Class D based on average soil properties in the top 100 feet and Table 1613.5.2 of the 2013 CBC. Site Class D is defined as a profile consisting of a stiff soil with a shear wave velocity between 600 and 1,200 feet per second; a Standard Penetration Test, N (blows/foot), between 15 and 50; and undrained shear strength between 1,000 and 2,000 psf.

Based on the above and the "Ground Motion Parameter Calculator" provided on the United States Geologic Survey (USGS, 2014 web site (http://earthquake.usgs.gov/research/hazmaps/design/), we recommend the seismic design criteria presented as follows:

*Table 5. Summary of ASCE 7-10 Seismic Design Factors**

Site Class	F_a	F_v	S_s	S_1	S_{MS}	S_{M1}	S_{DS}	S_{D1}
D	1.0	1.5	3.093	1.208	3.093	1.812	2.062	1.208

*Latitude and longitude are 40.797672° North and -124.163107° West, respectively.

These design spectral response accelerations are further defined as follows:

- F_a Short period coefficient to modify 0.2-second period of mapped spectral response accelerations for Site Class D.
- F_v Long period coefficient to modify 1.0-second period of mapped spectral response accelerations for Site Class D.
- S_s Mapped spectral response acceleration, 5 percent damped, at 0.2-second period for Site Class D (%g).
- S_1 Mapped spectral response acceleration, 5 percent damped, at 1.0-second period for Site Class D (%g).
- S_{MS} Maximum considered earthquake spectral response acceleration, 5 percent damped, at 0.2-second for Site Class effects (%g).
- S_{M1} Maximum considered earthquake spectral response acceleration, 5 percent damped, at 1.0-second period for Site Class effects (%g).
- S_{DS} Design spectral response acceleration, 5 percent damped, at 0.2-second period (%g).
- S_{D1} Design spectral response acceleration, 5 percent damped, at 1.0-second period (%g).

*Table 6. Summary of ASCE-41-13 Seismic Design Factors**

Site Class	F_a	F_v	$S_{s\ 20/50}$	$S_{1\ 20/50}$	$S_{xs\ BSE\text{-}1E}$	$S_{x1\ BSE\text{-}1E}$
D	1.168	1.782	0.830	0.309	0.969	0.551

*Latitude and longitude are 40.797672° North and -124.163107° West, respectively.

These design spectral response accelerations are further defined as follows:

- F_a Short period coefficient to modify 0.2-second period of mapped spectral response accelerations for Site Class D.
- F_v Long period coefficient to modify 1.0-second period of mapped spectral response accelerations for Site Class D.
- $S_{s\ 20/50}$ Mapped spectral response acceleration, 5 percent damped, at 0.2-second period for Site Class D (%g).
- $S_{1\ 20/50}$ Mapped spectral response acceleration, 5 percent damped, at 1.0-second period for Site Class D (%g).
- $S_{XS\ BES\text{-}1E}$ Maximum considered earthquake spectral response acceleration, 5 percent damped, at 0.2-second for Site Class effects (%g).
- $S_{X1\ BES\text{-}1E}$ Maximum considered earthquake spectral response acceleration, 5 percent damped, at 1.0-second period for Site Class effects (%g).

7.4 Retaining Walls

Walls, where needed, will be subjected to lateral loads from the adjacent soil. Where walls are unrestrained and free to deflect at the top, they may be designed for active soil pressures. If walls are restrained from movement at the top, use at-rest pressures. Use the values presented on Table 6 for design. These values

assume a drainage system is constructed as recommended below. Undrained walls should be designed using the earth pressures presented in Table 6 plus hydrostatic water forces of 62.4 pcf. In addition, if vehicle surcharges are anticipated adjacent to the walls, equivalent 2 feet of retained height should be added to the actual retained height during design.

Table 7. Retaining Wall Loads

Load Condition	**Equivalent Fluid Densities[1] for Drained Native or Imported Granular Material (pounds per cubic foot, pcf)**		
Slope Above Wall	Slope Inclination 4H:1V or less	Slope Inclination 3H:1V	Slope Inclination 2H:1V
Restrained (at-rest)	50	58	65
Unrestrained (active)	35	43	50

[1]For other horizontal to vertical (H:V) slope inclinations, equivalent fluid densities may be interpolated from the presented values.

The drainage system behind the wall should consist of a 1-foot-wide zone of drain rock extending from the base of the wall to at least 2 feet below the top of the wall backfill. The wall backfill can consist of either native soil or imported granular material; the upper 12 inches (minimum) of the wall backfill should consist of compacted native soil to reduce the potential for surface water to infiltrate into the granular backfill or back drain. A 4-inch-diameter, perforated, rigid PVC drainage pipe should be installed at the base of the wall back drain. The pipe should drain by gravity to a suitable drainage swale or site storm drain system. Rock for the back drain should meet the requirements of the Caltrans Standard Specifications (Section 68) for Class 2 Permeable Material or, alternatively, consist of clean, free-draining, ¾-inch gravel wrapped in non-woven filter fabric (Mirafi 140 or equivalent). In lieu of the 12-inch-wide back drain, a prefabricated wall drain board (Tensar DCF100 or equivalent) may be used.

Recommendations for calculating lateral resistance, and for designing wall foundations, are presented in section 7.1.1 above.

California Building Code, 2013 CBC Section 1803.5.12, and ASCE 7-05, requires a determination of lateral pressures on retaining walls due to earthquake motions for structures in Seismic Design Categories D, E, and F. We understand that some jurisdictions are not requiring seismic loads to be applied to isolated retaining structures that are not connected to buildings. The seismic lateral force presented herein, if needed, was estimated using guidelines presented in SEAOC, 2010. Using a total dynamic earth pressure coefficient ΔK_{AE} of 0.6, calculated from a PGA of 1.28 determined using ASCE 7-10, the seismic lateral pressure increment is 70 pounds per cubic foot equivalent fluid pressure. This pressure should be added to the static lateral earth pressure for retaining wall design.

8.0 EARTHWORK

Based on our review of project plans, we anticipate only a minor amount of earthwork, consisting of the excavation of the proposed foundation improvements within the existing partial basement. Any proposed earthwork should be performed in accordance with the following recommendations.

8.1 Site Preparation

At the locations of new foundation elements, existing utilities, slab-on-grade floors, and foundations (where encountered) should be demolished. Excavations that extend below grade resulting from the removal of underground obstructions should be backfilled with engineered fill placed and compacted in accordance with the recommendations presented below. We anticipate the potential for pumping of soils within the basement footing excavations under compactive effort as a result of shallow groundwater and silty fine sand soils. If pumping conditions are encountered, we recommend demolition excavations be backfilled using controlled density fill (CDF) consisting of a lean cement-sand slurry.

8.2 Structural Fill

In general, fill material should not contain rocks or pieces larger than 3 inches in greatest dimension and should contain no more than 15 percent larger than 2.5 inches. Structural fill material should be placed on a prepared grade as specified above. Additionally, the material should meet the following specifications:

Plasticity Index:	15% or less
Liquid Limit:	40% or less

In general, on-site soil free of detritus and organic material should be suitable for use as structural fill.

8.3 Compaction Standard

Prior to fill placement, the surface to receive the fill should be scarified to a depth of 6 inches, as necessary, and then re-compacted in accordance with the recommendations presented below. Any proposed engineered fill should be compacted in uniform lifts no thicker than 8 inches in loose thickness, conditioned to the appropriate moisture content, and compacted to the specifications presented in Table 7 below. The relative compaction and moisture content specified is relative to ASTM D 1557, latest edition. Compacted lifts should be firm and non-yielding under the weight of compaction equipment prior to the placement of subsequent lifts. A qualified field technician should be present to observe fill placement operations and to perform field density tests (per ASTM D6938) at random locations throughout the fill to check that the specified relative compaction is being achieved by the Contractor.

Table 8. Compaction Recommendations

Fill Element	Relative Compaction*	Moisture Content**
General fill - raising of site grades, retaining wall backfill	90 percent	Near Optimum
Slab-on-grade subgrade	90 percent	Near Optimum
Backfill of utility trenches and demolition excavations using on-site soils	90 percent	Near Optimum

*****Relative compaction refers to the ratio of the in place dry density of the soil to the maximum dry density as described in the latest addition of the ASTM D1557 compaction test procedure.
**Optimum moisture content is the water content as a percentage of the dry weight of the soil corresponding to the maximum dry density.

8.4 Temporary Slopes and Trench Excavations

The contractor should be responsible for the stability of all temporary slopes and trenches excavated at the site and the design and construction of any required shoring. Shoring and bracing should be provided in accordance with all applicable local, state, and federal safety regulations, including the current OSHA excavation and trench safety standards. Because of the potential for variable soil conditions, field modifications of temporary cut slopes may be required. Unstable materials encountered on the slopes during the excavation should be trimmed off, even if this requires cutting the slope back at flatter inclinations.

8.5 Utility Trenches

Trench backfill quality and compaction should generally conform to the requirements of Sections 9.3 and 9.4 of this Report. Where trenches closely parallel a footing and the trench bottom is within a two horizontal to one vertical plane projected outward and downward from the footing, concrete slurry (2-sack minimum) should be utilized to backfill that portion of the trench below this plane. The use of slurry backfill is not required where a narrow trench crosses a footing at or near a right angle.

9.0 LIMITATIONS

This report has been prepared for the exclusive use of Humboldt County, their contractors and consultants, and appropriate public authorities for specific application to the proposed Site improvements. LACO has exercised a standard of care equal to that generated for this industry to ensure that the information contained in this report is current and accurate. The opinions presented in this memorandum are based upon information obtained from subsurface excavations, a site reconnaissance, review of geologic maps and data available to us, and upon local experience and engineering judgment, and have been formulated in accordance with generally accepted geotechnical engineering practices that exist in California at the time this report was prepared. In addition, geotechnical issues may arise that are not apparent at this time. No other warranty, expressed or implied, is made or should be inferred.

Data generated for this report represent information gathered at that time and at the widely spaced locations indicated. Subsurface conditions may be highly variable and difficult to predict. As such, the recommendations included in this report are based, in part, on assumptions about subsurface conditions that may only be observed and/or tested during subsequent project earthwork. Accordingly, the validity of these recommendations is contingent upon review of the subsurface conditions exposed during construction in order to check that they are consistent with those characterized in this report. Upon request, LACO can discuss the extent of (and fee for) observations and tests required to check the validity of the recommendations presented herein.

The opinions presented in this report are valid as of the present date for the property evaluated. Changes in the condition of the property can occur over time, whether due to natural processes or the works of man, on this or adjacent properties. In addition, changes in applicable standards of practice can occur, whether from legislation or the broadening of knowledge. Accordingly, the opinions presented in this report may be invalidated, wholly or partially, by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of three years, nor should it be used, or is it applicable, for any property other than that evaluated. This report is valid solely for the purpose, site, and project

described in this document. Any alteration, unauthorized distribution, or deviation from this description will invalidate this report. LACO assumes no responsibility for any third-party reliance on the data presented. Additionally, the data presented should not be utilized by any third-party to represent data for any other time or location.

10.0 FUTURE GEOTECHNICAL SERVICES

10.1 Plan Review

To better assure conformance of the final design documents with the recommendations contained in this report, LACO must review the completed project plans prior to construction. The plans should be made available for our review as soon as possible after completion so that we can better assist in keeping your project schedule on track.

10.2 Construction Observation and Testing

LACO should be retained to observe and test the earthwork and foundation installation phases of construction in order to a) confirm that subsurface conditions exposed during construction are substantially the same as those interpolated from our limited subsurface exploration, on which the analysis and design were based; b) observe compliance with the geotechnical aspects and specifications presented in the approved plans and c) allow design changes in the event that subsurface conditions differ from those anticipated. The recommendations in this report are based on limited subsurface information. The nature and extent of variation across the site may not become evident until construction. If variations are then exposed, it will be necessary to re-evaluate our recommendations.

11.0 REFERENCES

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FIGURES

Figure 1 Location Map

Figure 2 Site Plan

Figure 3 Geologic Map

Figure 4 Description of Map Units

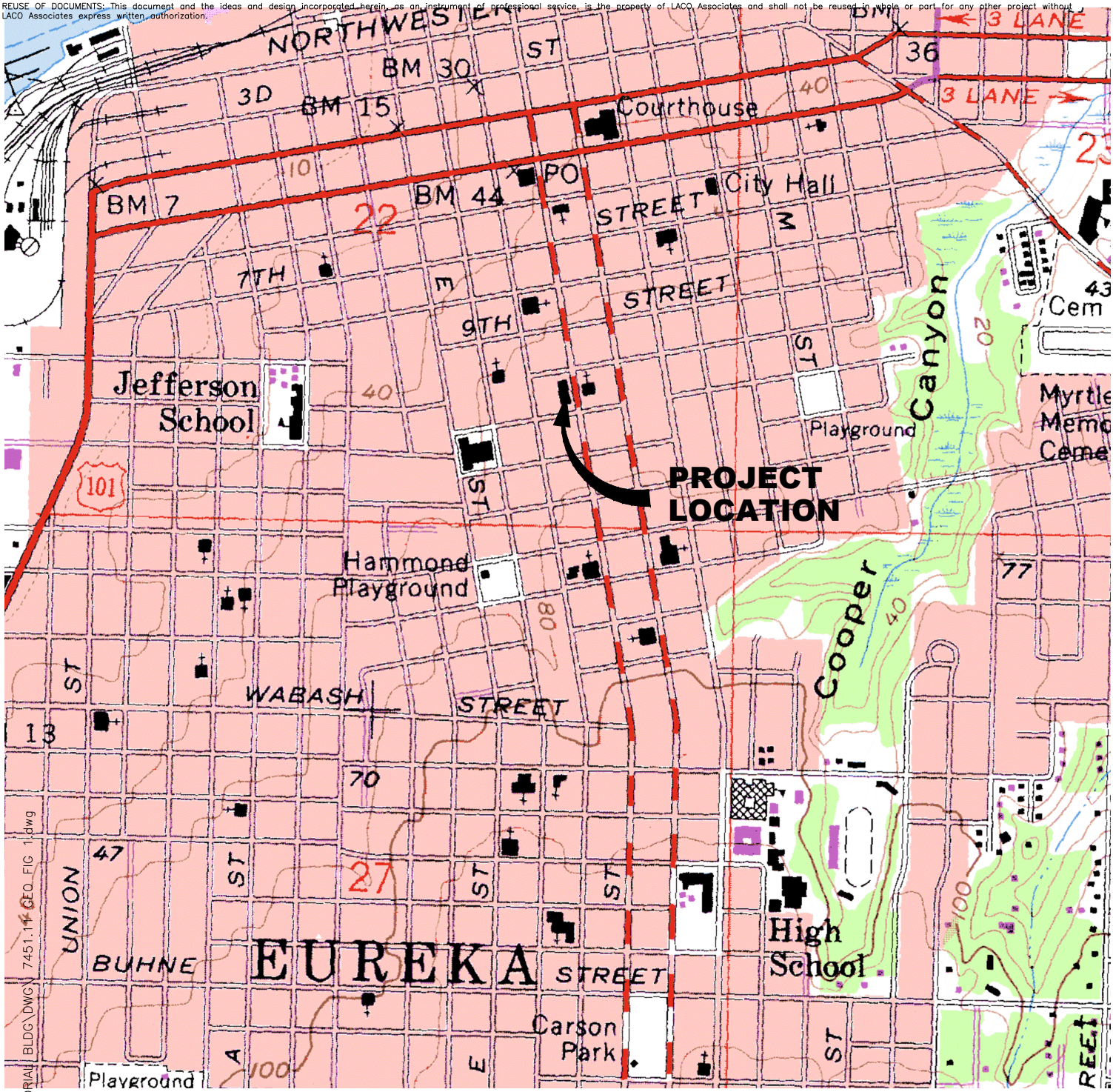
LACO

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PROJECT	VETERAN'S BUILDING SEISMIC UPGRADE	BY JDB	FIGURE 1
CLIENT	HUMBOLDT COUNTY	DATE 5/22/15	
LOCATION	EUREKA, CA	CHECK EW	JOB NO. 7451.11
	VICINITY MAP	SCALE AS SHOWN	

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0 1000' 2000'

SCALE: 1"=2000'

May 27,2015–11:25am
T:\Cadfiles\7400\7451.11 VET MEMORIAL BLDG\DWG\ 7451.11 GEO FIG 1.dwg

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H STREET

10th STREET

11th STREET

B1

B2

B3

B4

SSCO

APPROXIMATE LAYOUT
OF PROPOSED FOOTINGS

LEGEND:

BX LACO BORING 5/4/15

0' 10' 20'

SCALE: 1"=20'

LACO
EUREKA • UKIAH • SANTA ROSA
1-800-515-5054 www.lacoassociates.com

NO.	HISTORY / REVISION	BY	CHK.	DATE

VETERAN'S BUILDING SEISMIC UPGRADE
SITE PLAN

HUMBOLDT COUNTY
EUREKA, CA

DRAWN	JDB
CHECK	EW
APPROVED	EW
DATE	5/22/15
JOB NUMBER	7451.11
FIGURE	2

May 27,2015-11:26am
T:\Cadfiles\7400\7451.11 VET MEMORIAL BLDG\DWG\ 7451.11 GEO FIG 2.dwg

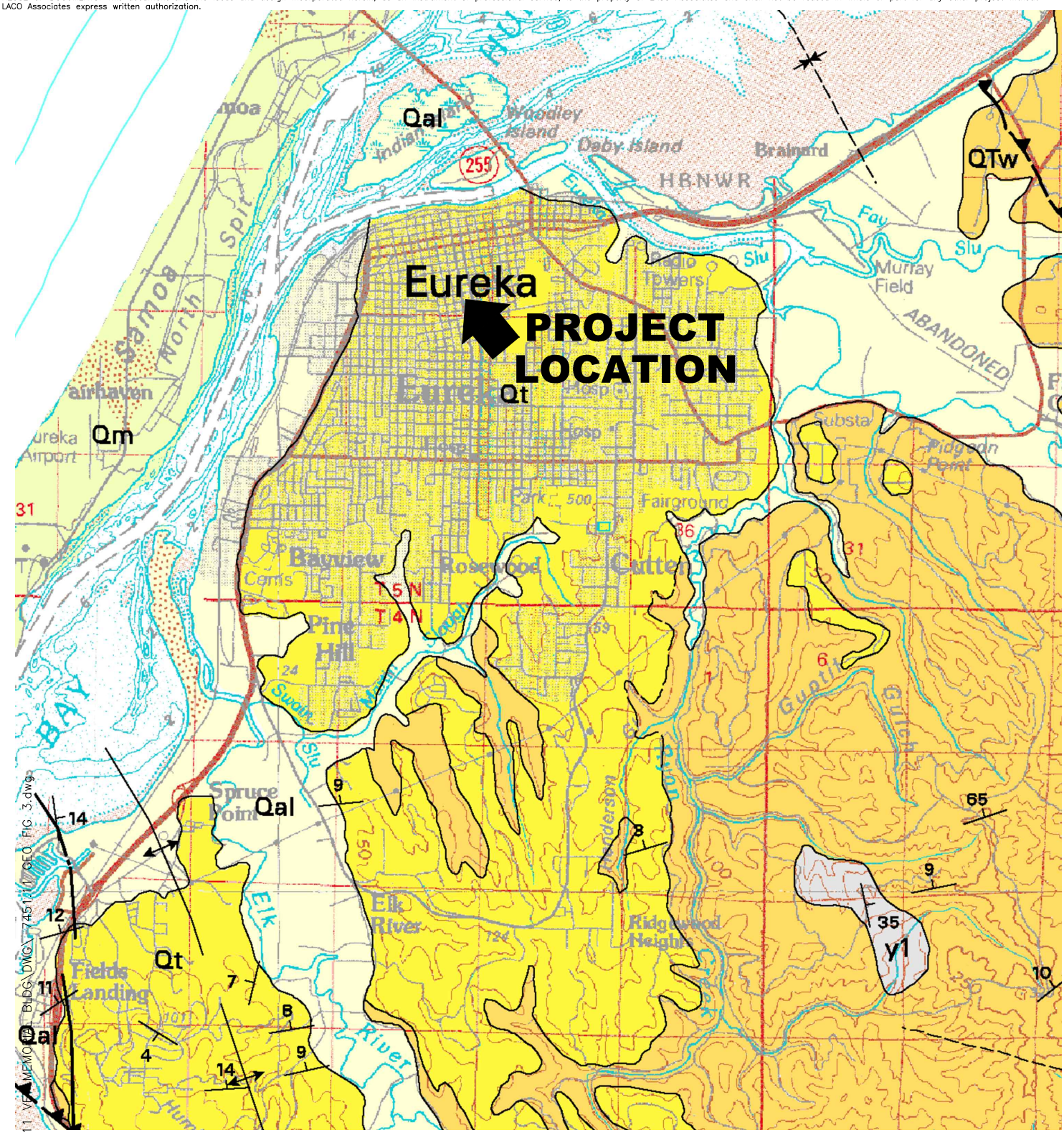
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PROJECT	VETERAN'S BUILDING SEISMIC UPGRADE	BY JDB	FIGURE 3
CLIENT	HUMBOLDT COUNTY	DATE 5/22/15	
LOCATION	EUREKA, CA	CHECK EW	JOB NO. 7451.11
	GEOLOGIC MAP	SCALE AS SHOWN	

REUSE OF DOCUMENTS: This document and the ideas and design incorporated herein, as an instrument of professional service, is the property of LACO Associates and shall not be reused in whole or part for any other project without LACO Associates express written authorization.



0 2,500' 5000'

SCALE: 1"=5,000'

May 27,2015–11:27am T:\Cadfiles\7400\7451.11 VETERANS MEMORIAL BLDG\DWG\7451.11 GEO FIG 3.dwg

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PROJECT	VETERAN'S BUILDING SEISMIC UPGRADE	BY JDB	FIGURE 4
CLIENT	HUMBOLDT COUNTY	DATE 5/22/15	
LOCATION	EUREKA, CA	CHECK EW	JOB NO. 7451.11
	GEOLOGIC MAP	SCALE AS SHOWN	

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DESCRIPTION OF MAP UNITS

QUATERNARY AND TERTIARY OVERLAP DEPOSITS

- Qal — Alluvial deposits (Holocene and late Pleistocene?)
- Qm — Undeformed marine shoreline and aolian deposits (Holocene and late Pleistocene)
- Qt — Undifferentiated nonmarine terrace deposits (Holocene and Pleistocene)
- Qls — Landslide deposits (Holocene and Pleistocene)
- QTog — Older alluvium (Pleistocene and [or] Pliocene)
- QTw — Marine and nonmarine overlap deposits (late Pleistocene to middle Miocene)
- Ti — Volcanic rocks of Fickle Hill (Oligocene)

COAST RANGES PROVINCE

FRANCISCAN COMPLEX

-- Coastal Belt --

Coastal terrane(Pliocene to Late Cretaceous)

Sedimentary, igneous, and metamorphic rocks of the Coastal terrane (Pliocene to Late Cretaceous):

- co1 — Melange
- co2 — Melange
- co3 — Broken sandstone and argillite
- co4 — Intact sandstone and argillite
- cob — Basaltic Rocks (Late Cretaceous)
- cols — Limestone (Late Cretaceous)
- m — Undivided blueschist (Jurassic?)

King Range terrane (Miocene to Late Cretaceous)

- Krp — Igneous and sedimentary rocks of Point Delgada (Late Cretaceous)
- m — Undivided blueschist blocks (Jurassic?)

Sandstone and argillite of King Peak (middle Miocene to Paleocene[?]):

- krk1 — Melange and (or) folded argillite
- krk2 — Highly folded broken formation
- krk3 — Highly folded, largely unbroken rocks
- krl — Limestone
- krc — Chert
- krb — Basalt

False Cape terrane (Miocene? to Oligocene?)

- fc — Sedimentary rocks of the False Cape terrane (Miocene? to Oligocene?)

Yager terrane (Eocene to Paleocene?)

Sedimentary rocks of the Yager terrane (Eocene to Paleocene?):

- y1 — Sheared and highly folded mudstone
- y2 — Highly folded broken mudstone, sandstone, and conglomeratic sandstone
- y3 — Highly folded, little-broken sandstone, conglomerate, and mudstone
- Ycgl — Conglomerate

-- Central belt --

Melange of the Central belt (early Tertiary to Late Cretaceous):

Unnamed Metasandstone and meta-argillite (Late Cretaceous to Late Jurassic):

- cm1 — Melange
- cm2 — Melange
- cb1 — Broken formation
- cb2 — Broken formation
- cwr — White Rock metasandstone of Jayko and others (1989) (Paleogene and [or] Late Cretaceous)
- chr — Haman Ridge graywacke of Jayko and others (1989) (Cretaceous?)
- cfs — Fort Seward metasandstone (age unknown)
- cls — Limestone (Late to Early Cretaceous)
- cc — Chert (Late Cretaceous to Early Jurassic)
- bs — Basaltic rocks (Cretaceous and Jurassic)
- m — Undivided blueschist blocks (Jurassic?)
- gs — Greenstone
- c — Metachert
- yb — Metasandstone of Yolla Bolly terrane, undivided
- b — Melange block, lithology unknown

-- Eastern Belt --

Pickett Peak terrane (Early Cretaceous or older)

Metasedimentary and metavolcanic rocks of the Pickett Peak terrane (Early Cretaceous or older):

- ppsm — South Fork Mountain Schist
- mb — Chinquapin Metabasalt Member (Irwin and others, 1974)
- ppv — Valentine Springs Formation
- mv — Metabasalt and minor metachert

Yolla Bolly terrane (Early Cretaceous to Middle Jurassic?)

Metasedimentary and metaigneous rocks of the Yolla Bolly terrane (Early Cretaceous to Middle Jurassic?):

- ybt — Taliaferro Metamorphic Complex of Suppe and Armstrong (1972) (Early Cretaceous to Middle Jurassic?)
- ybc — Chicago Rock melange of Blake and Jayko (1983) (Early Cretaceous to Middle Jurassic)
- gs — Greenstone
- c — Metachert
- ybh — Metagraywacke of Hammerhorn Ridge (Late Jurassic to Middle Jurassic)
- c — Metachert
- gs — Greenstone
- sp — Serpentinite
- ybd — Devils Hole Ridge broken formation of Blake and Jayko (1983) (Early Cretaceous to Middle Jurassic)
- c — Radiolarian chert
- ybi — Little Indian Valley argillite of McLaughlin and Ohlin (1984) (Early Cretaceous to Late Jurassic)

Yolla Bolly terrane

- yb — Rocks of the Yolla Bolly terrane, undivided

GREAT VALLEY SEQUENCE AND COAST RANGE OPHIOLITE

Elder Creek(?) terrane

- ecms — Mudstone (Early Cretaceous)

Coast Range ophiolite (Middle and Late Jurassic):

- ecg — Layered gabbro
- ecsp — Serpentinite melange

Del Puerto(?) terrane

Rocks of the Del Puerto(?) terrane:

- dpms — Mudstone (Late Jurassic)

Coast Range ophiolite (Middle and Late Jurassic):

- dpt — Tuffaceous chert (Late Jurassic)
- dpb — Basaltic flows and keratophyric tuff (Jurassic?)
- dpd — Diabase (Jurassic?)
- dpsp — Serpentinite melange (Jurassic?)
- sp — Undivided Serpentinized peridotite (Jurassic?)

KLAMATH MOUNTAINS PROVINCE

Undivided Great Valley Sequence:

- Ks — Sedimentary rocks (Lower Cretaceous)

GREAT VALLEY SEQUENCE OVERLAP ASSEMBLAGE

Hayfork terrane

Eastern Hayfork subterrane:

- eh — Melange and broken formation (early? Middle Jurassic)
- ehls — Limestone
- ehsp — Serpentinite

Western Hayfork subterrane:

- whu — Hayfork Bally Meta-andesite of Irwin (1985), undivided (Middle Jurassic)
- whwg — Wildwood (Chanchelulla Peak of Wright and Fahan, 1988) pluton (Middle Jurassic)
- whwp — Clinopyroxenite
- whji — Diorite and gabbro plutons (Middle? Jurassic)

Rattlesnake Creek terrane

- rcm — Melange (Jurassic and older)
- rcls — Limestone
- rcc — Radiolarian chert
- rcis — Volcanic Rocks (Jurassic or Triassic)
- rcic — Intrusive complex (Early Jurassic or Late Triassic)
- rcp — Plutonic rocks (Early Jurassic or Late Triassic)
- rcum — Ultramafic rocks (age uncertain)
- rcpd — Blocky peridotite

Western Klamath terrane

Smith River subterrane:

- srs — Galice? formation (Late Jurassic)
- srv — Pyroclastic andesite
- srgb — Glen Creek gabbro-ultramafic complex of Irwin and others (1974)
- srpd — Serpentinized peridotite

MAP SYMBOLS

- Contact
- Fault
- Thrust fault
- Trace of the San Andreas fault associated with 1906 earthquake rupture

Strike and dip of bedding:

- Inclined
- Vertical
- Horizontal
- Overturned
- Approximate
- Joint
- Strike and dip of cleavage

Shear foliation:

- Inclined
- Vertical

Folds:

- Synclinal or synformal axis
- Anticlinal or antiformal axis
- Overturned syncline
- Landslide (Qls)

Melange Blocks:

- Serpentinite
- Chert
- Blueschist
- Greenstone
- Fossil locality and number

GEOLOGY OF THE CAPE MENDOCINO, EUREKA, GARBERVILLE, AND SOUTHWESTERN PART OF THE HAYFORK 30 X 60 MINUTE QUADRANGLES AND ADJACENT OFFSHORE AREA, NORTHERN CALIFORNIA (McLaughlin et al., 2000)

May 27,2015—11:27am T:\Cadfiles\7400\7451.11 VET MEMORIAL BLDG\DWG\ 7451.11 GEO FIG 4.dwg

ATTACHMENT 1

ASFE Brochure

Important Information About Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you —* should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely, on Your ASFE-Member Geotechncial Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you ASFE-member geotechnical engineer for more information.

ASFE
The Best People on Earth

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733 Facsimile: 301/589-2017
e-mail: info@asfe.org www.asfe.org

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ATTACHMENT 2

Soil Profile Logs

LACO

CLIENT Humboldt County Public Works
PROJECT NAME Humboldt County Veterans Memorial Seismic Retrofit
PROJECT NUMBER 7451.11
PROJECT LOCATION Eureka, CA
DATE STARTED 5/4/15 **COMPLETED** 5/4/15
GROUND ELEVATION _____ **HOLE SIZE** 8 inches
DRILLING CONTRACTOR Fisch Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
▽ **AT TIME OF DRILLING** 10.00 feet
LOGGED BY BAV **CHECKED BY** EAW
AT END OF DRILLING ---
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0			SM		(SM) Silty Sand with Organics, very dark brown, moist, non-plastic fines, fine sand, fine roots, sod on top
					3.0
					(SM) Silty Sand, yellowish brown, moist to wet, loose, fine sand
5	SPT S13	2-5-5 (10)	SM		
10	SPT S14	1-2-3 (5)	SC		10.0 ▽ (SC) Clayey Sand, light gray with reddish yellow mottling, wet, loose, medium plasticity fines, fine sand
					13.0
15	SPT S15	5-8-12 (20)	SP		(SP) Poorly graded Sand, light grayish brown with reddish yellow mottling, saturated, medium dense, trace fines, fine sand
20	SPT S16	4-12-12 (24)			21.5
					Bottom of borehole at 21.5 feet.

GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 5/12/15 14:55 - P:\GINT FILES\PROJECTS\7451.11 EUREKA VETERANS HALL GEOTECH.GPJ

LACO

CLIENT Humboldt County Public Works
PROJECT NAME Humboldt County Veterans Memorial Seismic Retrofit
PROJECT NUMBER 7451.11
PROJECT LOCATION Eureka, CA
DATE STARTED 5/4/15 **COMPLETED** 5/4/15
GROUND ELEVATION _____ **HOLE SIZE** 8 inches
DRILLING CONTRACTOR Fisch Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
▽ **AT TIME OF DRILLING** 12.00 feet
LOGGED BY BAV **CHECKED BY** EAW
AT END OF DRILLING ---
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0			SP		(SP) Poorly graded Sand with Silt and Organics, dark brown, fine sand, moist, fine roots, sod on top
					1.5
	SPT S1	0-1-1 (2)	SP		(SP) Poorly graded Sand with Silt, light brownish gray, moist, very loose, non-plastic fines, fine sand
					4.0
5			SM		(SM) Silty Sand, very dark brown, moist, non-plastic fines, fine sand
	MC C1	2-10-12 (22)			5.5 (SP) Poorly graded Sand with Silt, yellowish gray with reddish yellow mottling, moist, medium dense, non-plastic fines, fine sand
					⇩ Becomes Silty Sand
10	SPT S2	2-6-11 (17)			⇩ Becomes Poorly graded Sand with Silt, wet
					▽ ⇩ Becomes Silty Sand
					Some charcoal fragments
15	SPT S3	8-14-17 (31)	SP		⇩ Becomes Poorly graded Sand with Silt, dense
20	SPT S4	1-3-11 (14)			⇩ Becomes medium dense
25	SPT S5	3-5-8 (13)			26.5

Bottom of borehole at 26.5 feet.

GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 5/12/15 14:55 - P:\GINT FILES\PROJECTS\7451.11 EUREKA VETERANS HALL GEOTECH.GPJ

LACO

CLIENT Humboldt County Public Works
PROJECT NAME Humboldt County Veterans Memorial Seismic Retrofit
PROJECT NUMBER 7451.11
PROJECT LOCATION Eureka, CA
DATE STARTED 5/4/15 **COMPLETED** 5/4/15
GROUND ELEVATION _____ **HOLE SIZE** 8 inches
DRILLING CONTRACTOR Fisch Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
▽ **AT TIME OF DRILLING** 9.50 feet
LOGGED BY BAV **CHECKED BY** EAW
AT END OF DRILLING ---
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					(SM) Silty Sand, yellowish brown, moist, non-plastic fines, fine sand, river run gravel and sod on top
5	SPT S6	4-9-5 (14)	SM		⇩ Medium dense
10				10.0 ▽	
	SPT S7	4-11-15 (26)	SP		(SP) Poorly graded Sand with Silt, medium grayish brown, saturated, medium dense, non-plastic fines, fine sand
15				15.0	⇩ Fines drop out Refusal from heaving sand
					Bottom of borehole at 15.0 feet.

GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 5/12/15 14:55 - P:\GINT FILES\PROJECTS\7451.11 EUREKA VETERANS HALL GEOTECH.GPJ

LACO

CLIENT Humboldt County Public Works
PROJECT NAME Humboldt County Veterans Memorial Seismic Retrofit
PROJECT NUMBER 7451.11
PROJECT LOCATION Eureka, CA
DATE STARTED 5/4/15 **COMPLETED** 5/4/15
GROUND ELEVATION _____ **HOLE SIZE** 8 inches
DRILLING CONTRACTOR Fisch Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
▽ **AT TIME OF DRILLING** 5.00 feet
LOGGED BY BAV **CHECKED BY** EAW
AT END OF DRILLING ---
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0			SM		(SM) Silty Sand with Gravel and Organics, medium brown, moist, non-plastic fines, fine to coarse sand, fine subrounded gravel
	MC C2	1-2-3 (5)			2.0 (SM) Silty Sand, yellowish brown with reddish yellow mottling, moist to wet, very loose, non-plastic fines
			SM		
5					5.0 ▽
	SPT S8	4-3-5 (8)			(SP) Poorly graded Sand, light gray with reddish yellow mottling, wet, loose, fine sand
10	SPT S9	2-9-12 (21)			⇩ Becomes saturated, medium dense, has reddish yellow laminations
15	SPT S10	6-10-13 (23)	SP		
20	SPT S11	7-8-9 (17)			⇩ Becomes Poorly graded Sand with Silt
25	SPT S12	2-3-8 (11)			26.5
					Bottom of borehole at 26.5 feet.

GENERAL BH / TP / WELL - GINT STD US LAB.GDT - 5/12/15 14:55 - P:\GINT FILES\PROJECTS\7451.11 EUREKA VETERANS HALL GEOTECH.GPJ

B-5 BORING LOG LEGEND

CLIENT Humbolt County Public Works

PROJECT NAME Humboldt County Veterans Memorial Seismic Retrofit

PROJECT NUMBER 7451.11

PROJECT LOCATION Eureka, CA

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS				TYPICAL NAMES
COARSE GRAINED SOILS More than Half > #200 sieve	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES
			GP	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES
		GRAVELS WITH OVER 15% FINES	GM	SILTY GRAVELS, POORLY GRADED GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, POORLY GRADED GRAVEL-SAND-CLAY MIXTURES
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS
			SP	POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH OVER 15% FINES	SM	SILTY SANDS, POOORLY GRADED SAND-SILT MIXTURES
			SC	CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES
FINE GRAINED SOILS More than Half < #200 sieve	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACIOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

KEY TO TEST DATA

⊠	Modified California (MC)	RV	R-Value
⊠	Standard Penetration Test (SPT)	SA	Sieve Analysis
■	Pushed Shelby Tube (ST)	SW	Swell Test
◧	Auger Cuttings	TC	Cyclic Triaxial
	Grab Sample (GB)	DS	Direct Shear
	Continous Core Sample (CC)	CP	Compaction
c	Cohesion	UC	Unconfined Compression
ϕ	Friction Angle	CN	Consolidation
MC	Moisture Content	τ	Shear Strength
DD	Dry Density	▽	Water Level at Time of Drilling
PP	Pocket Penetrometer	▼	Water Level after Drilling

NOTES: The lines separating soil layers are approximate boundaries.
Blow counts represent the number of blows of a 140-pound hammer falling 30 inches to drive an 18-inch sampler the final 12 inches.
Modified California Sampler blow counts have been converted to standard N-value blow counts using Burmister's energy input factor of 0.65.

LACO LEGEND - GINT STD US LAB.GDT - 4/1/14 14:52 - P:\GINT FILES\PROJECTS\7979.01 MWI, LLC.GPJ

ATTACHMENT 3

Laboratory Test Results

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FINER THAN #200 SIEVE
ASTM C117

PROJECT	EUREKA VETERANS MEMORIAL			JOB NO. 7451.11	SHEET 1 of 1
CLIENT	HCDPW			SAMPLE ID 15-036EK	
LOCATION	EUREKA	TEST BY	DLR	DATE	5/13/15
SOIL TYPE	VARIOUS	CHECKED BY		CHECK DATE	

B2 at 5.5'-6.0'

(B)	Net sample (Dry)	808.4	gms
(C)	Dry sample after washing	614.3	gms
	Total Material finer than 200 sieve	194.1	gms
(A)	% Material finer than 200 sieve	**24.01%**	
	A=[(B-C)/B]X100		

B3 at 10.0'-11.5'

(B)	Net sample (Dry)	454.0	gms
(C)	Dry sample after washing	429.6	gms
	Total Material finer than 200 sieve	24.4	gms
(A)	% Material finer than 200 sieve	**5.37%**	
	A=[(B-C)/B]X100		

B4 at 2.0'-2.5'

(B)	Net sample (Dry)	744.3	gms
(C)	Dry sample after washing	419.8	gms
	Total Material finer than 200 sieve	324.5	gms
(A)	% Material finer than 200 sieve	**43.60%**	
	A=[(B-C)/B]X100		

B4 at 15.0'-16.5'

(B)	Net sample (Dry)	579.2	gms
(C)	Dry sample after washing	520.0	gms
	Total Material finer than 200 sieve	59.2	gms
(A)	% Material finer than 200 sieve	**10.22%**	
	A=[(B-C)/B]X100		

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MOISTURE / DENSITY

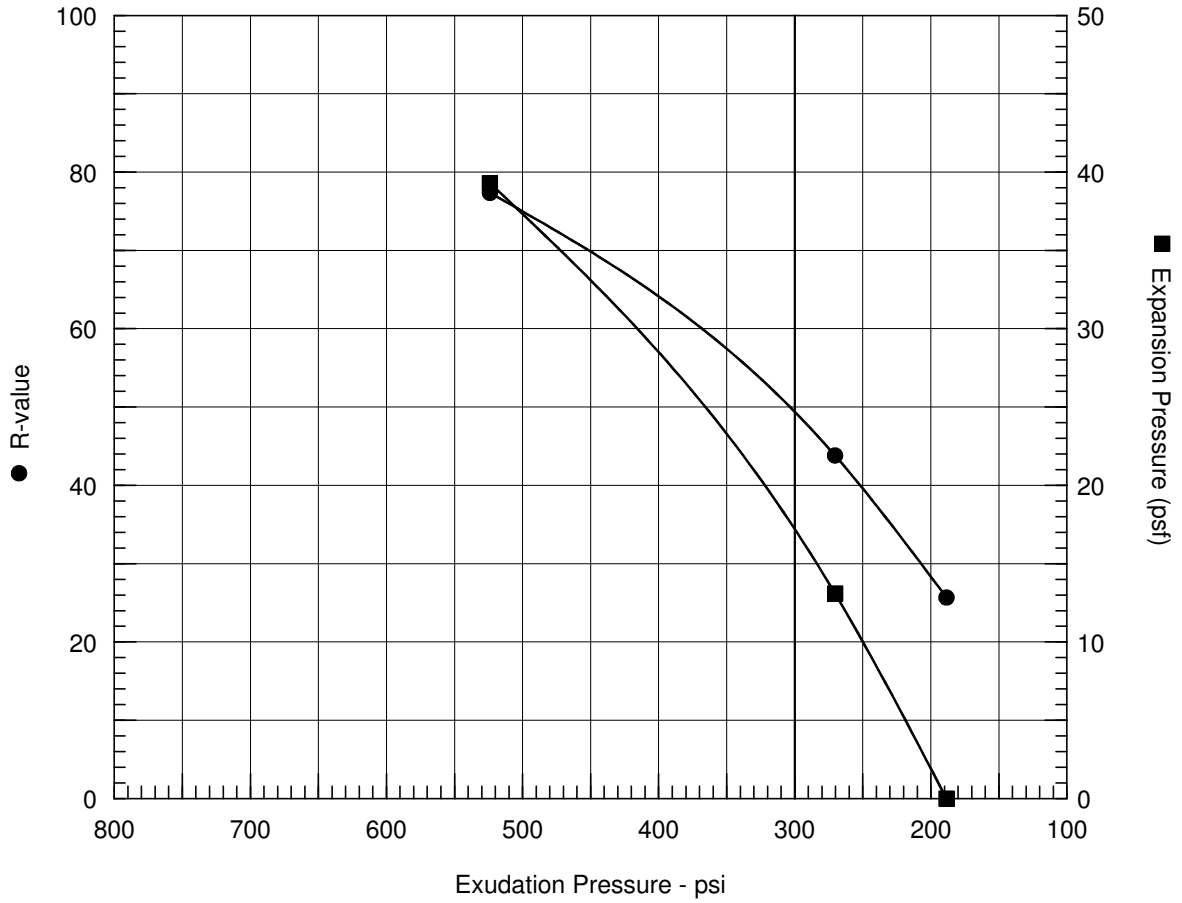
ASTM D-2216 / 2937

PROJECT	EUREKA VETERANS MEMORIAL		JOB NO. 7451.11		SHEET 1 of 1
CLIENT	HCDPW		LAB ID 15-036EK		
LOCATION	EUREKA	TEST BY DLR	DATE 5/12/15		
SOIL TYPE	VARIOUS	CHECKED BY	CHECK DATE		

Sample Location	B2	B4						
Sample Depth (ft bgs)	5.5'-6.0'	2.0'-2.5'						
Soil Type (USCS)	0	0						
Moisture Content (%)	15.3	20.3						
Wet Density (pcf)	132.6	128.8						
Dry Density (pcf)	115.1	107.1						
Void Ratio*	0.4	0.5						
% Saturation	92.2	98.3						

*Void ratio calculation assumes a specific gravity of 2.65

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - Cal Test 301

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psf	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	350	123.8	9.5	39	24	2.47	524	77	77
2	350	124.7	11.4	13	67	2.47	270	44	44
3	255	125.2	12.3	0	97	2.48	189	26	26

Test Results	Material Description
R-value at 300 psi exudation pressure = 49 **Exp. pressure at 300 psi exudation pressure =** 17 psf	Orange/ Brn Sand W/ Clay (SP-SC)

Project No.: 7451.11
Project: Eureka Vets Hall
Source of Sample: Bulk **Depth:** 5'-8'
Date: 5/18/2015

Tested by: SEF
Checked by: GEF
Remarks:

R-VALUE TEST REPORT

RGH CONSULTANTS, INC.

Figure _____

RESISTANCE R-VALUE TESTING RESULTS
(Cal Test 301)

Date: 5/18/2015
Project No.: 7451.11
Project: Eureka Vets Hall
Location: Bulk
Depth: 5'-8'
Material Description: Orange/ Brn Sand W/ Clay (SP-SC)
Tested by: SEF
Checked by: GEF
Remarks:

Test specimen number	1	2	3
Compaction pressure (psi):	350	350	255
Wet weight (gms):	989.5	1059.8	1076.7
Dry weight (gms):	912.3	962.2	969.7
Tare weight (gms):	103.0	103.2	100.2
% Moisture:	9.5	11.4	12.3
Exudation load (lbs.):	6584	3398	2369
Exudation pressure (psi):	524	270	189
Total weight (gms.):	3076.0	3090.0	3112.0
Mold weight (gms.):	1971.0	1959.0	1962.0
Sample weight (gms.):	1105.0	1131.0	1150.0
Initial expansion (x10,000):	0	0	0
Final expansion (x10,000):	9	3	0
Expansion pressure (psf):	39	13	0
Ph at 2000 lbs.:	24	67	97
D turns:	4.15	4.45	4.70
R:	77	44	26
Height (in.):	2.47	2.47	2.48
Dry density (pcf):	123.8	124.7	125.2
Corrected R:	77	44	26

R-Value at 300 psi exudation pressure = 49
Expansion pressure at 300 psi = 17 psf