INVITATION FOR BID

PROJECT
KITCHEN AND LATRINE MODERNIZATION
A0545

LOCATION
BURBANK ARMORY
BURBANK, CALIFORNIA

MANDATORY JOB WALK
FEBRUARY 29, 2012 at 11:00 AM

BID OPENING DATE
MARCH 15, 2012 at 2:00 pm

Issue Date
FEBRUARY 17, 2012

Issued By
STATE OF CALIFORNIA
OFFICE OF THE ADJUTANT GENERAL
STATE MILITARY DEPARTMENT
Purchasing and Contracting Branch
9800 Goethe Road
Sacramento, California 95827-3563

KITCHEN AND LATRINE MODERIZATION
CALIFORNIA ARMY NATIONAL GUARD ARMORY
BURBANK, CALIFORNIA
PROJECT A0545

TABLE OF CONTENTS

SECTION 1

NOTICE TO CONTRACTORS

1-01. The State of California Military Department will **accept sealed bids until 2:00 p.m. on March 15, 2012** from qualified bidders, who attended the **Mandatory Job Walk on February 29, 2012 at 11:00 AM**, offering to provide equipment, materials, labor, licenses, bonds and insurance required for the **Burbank Armory Kitchen and Latrine Modernization located at 3800 Valhalla Drive, Burbank, California 91505-1128** in accordance with the terms, conditions, and requirements of this Invitation for Bid (IFB). The contracting officer's representative (COR) for this project is Mr. Kingsley Vanduzer, (562) 842-5563. The Project Manager (PM) is CPT Garth Page (916) 854-3528 or (916) 952-9525.

a. At **2:00 p.m.,** on **March 15, 2012** all bids received will be publicly opened and read at the Office of the Adjutant General, 9800 Goethe Road, Sacramento, California, 95827-3563. Bid results will not be divulged by telephone or available via facsimile. **Official bid results will be posted on BidSync. (WWW.BIDSYNC.COM)**

b. Basis of award of this contract will be lowest responsive bid from a qualified, responsible bidder; taking into account the Small Business (SB) and Disabled Veteran's Business Enterprise Preference (DVBE).

c. **To be considered a responsive bidder all prime contractors with the exception of a certified DVBE must subcontract work to DVBEs a minimum of 10% to meet the DVBE participation goal. Failure to do so will render your bid non-responsive. As of July 28, 2009, The Good Faith Effort is no longer an option per Assembly Bill 21. The sub-contractible work must be directly related to the project. The Contracting Officer will make the final determination if a bidder has met this requirement.**

d. **The Contractor understands and agrees that should award of this contract be based in part on their commitment to use the Disabled Veteran Business Enterprise (DVBE) subcontractor(s) identified in their bid or offer, per Military and Veterans Code 999.5 (e), a DVBE subcontractor may only be replaced by another DVBE subcontractor and must be approved by the Contracting Officer. Changes to the scope of work that impact the DVBE subcontractor(s) identified in the bid or offer and approved DVBE substitutions will be documented by contract amendment**

Failure of the Contractor to seek substitution and adhere to the DVBE participation level identified in the bid or offer may be cause for contract termination, recovery of damages under rights and remedies due to the State, and penalties as outlined in M&VC § 999.9; Public Contract Code (PCC) § 10115.10, or PCC § 4110 (applies to public works only).

e. Disabled Veteran Business Enterprise Participation: Preference will be granted to bidders properly approved as a "Disabled Veteran's Enterprise Businesses (DVBE)" in accordance with Government Code 14600, 14615, 14838, California Military and Veteran's Code 999 and California Code of Regulations 1896.98 ET SEQ. The rules and regulations of this law, and applications for preference, should be obtained from Department of General Services, Small Business and DVBE Services, telephone number (916) 375-4339.

f. **Bidders certified as a "Disabled Veteran's Enterprise Businesses" in accordance with Government Code 14600, 14615, 14838, California Military and Veteran's Code 999 and California Code of Regulations 1896.98 et seq. shall be granted up to five percent (5%) bid preference when a responsible non-Disabled Veteran's Enterprise Business has submitted the lowest-priced, responsive bid.**

g. Prospective bidders **must attend the mandatory job walk** on **February 29, 2012, at 11:00 A.M. at the California National Guard facility located at 3800 Valhalla Drive, Burbank, California 91505-1128,** to be considered responsive to the bidding requirements of this IFB. Prospective bidders may obtain directions to the job walk site by calling CPT Garth Page, at (916) 952-9525. **Prospective bidders must sign-in prior to the start of the job walk, attend the entire job walk and be present for roll call at the conclusion of the job walk. Bidders who do not remain for the entire job walk will be considered non-responsive and will not be allowed to bid on this project.**

h. Bidders are required to submit proposals based solely on the contract documents i.e. (drawings, specifications and any addendums applicable). Any additions, deletions or changes to the contract documents must be incorporated in an addendum to be applicable. Any information provided on a job walk that conflicts or is in addition/deletion to the contract documents is only applicable if an addendum is issued.

i. During the bid opening in the event of a tie, the Military Department Contracting Officer shall conduct a coin toss to determine award. The coin toss shall be witnessed by a minimum of two personnel whose signatures and titles shall be posted to the bid results.

j. Bidder will be required to certify that his firm will comply with the Drug-Free Workplace Act of 1990 (Government Code Section 8350 et seq.), which will be included in any contract. (See paragraph 1-11).

k. Bidders must also complete the Non-collusion Affidavit (Attachment 4) and return with the bid documents. Bids received without the Non-collusion Affidavit may be rejected as non-responsive.

l. 20-DAY PRELIMINARY NOTICE: In the event a 20-Day Preliminary Notice is filed on behalf of any subcontractors, material men/suppliers, or other non-contractor claimants providing services and/or materials for the primary contractor in conjunction with this project, a signed release by the person or firm filing said notice must be furnished the Military Department before final payment will be made.

1-02. If awarded the contract, contractor agrees to sign the contract, to furnish the bonds called for herein, and to commence work within ten (10) days of notification by the Military Department Contracting Officer's Representative.

a. A PAYMENT BOND, Standard Form 807, in the amount of 100% of the contract amount must be submitted by the successful bidder at the time signed contracts are returned to the Military Department **if the contract exceeds $25,000.00.**

b. A PERFORMANCE BOND in the amount of 100% of the contract amount must be submitted by the successful bidder at the time signed contracts are returned to the Military Department **if the contract exceeds $25,000.00.**

c. A BID BOND in the amount of at least 10% of the bid amount must be submitted by the contractor with the Proposal Form **if the contract exceeds $25,000.00** utilizing a bond form provided by the Surety.

1-03. The State is seeking a single not to exceed quotation to be inclusive of all contractors' costs involved in performing the full scope of this service.

a. Bids must be submitted for the entire work described therein. Any deviation from the specification will not be considered and will be cause for rejection of bid.

b. The Military Department reserves the right to reject any or all bids.

c. The contractor/bidder must be licensed by the State of California, Contractors State License Board (CSLB) in compliance with the following to perform services identified in the Technical Specifications:

- **Possess a "B" General Contractor's License. All listed subcontractors must provide the required licenses/certificates listed above and in Section 4 (Scope of Work) upon bid opening; failure to comply with this requirement may be considered non-responsive and may lead to the rejection of your bid.**

d. All subcontractors must be licensed by the CSLB for the trade in which they will be performing. Bidders must list all subcontractors and subcontractor license numbers on page A-3 of the bidder's proposal form.

e. Progress payments are at the sole discretion of the Contracting Officer. **Contractor may request (2) two progress payment during the**

performance of work. If authorized by the Military Department Contracting Officer, progress payments shall not exceed 90% of the value of the completed work and of materials delivered to the work site. The Contractor's request for progress payments must be presented to the COR 30 days prior to submitting an invoice for payment.

f. Contractor will be allowed **60 working days** to complete this project. The Start date will be established by a Job Start Meeting in which the Contractor and the COR shall conduct within 7 days after receipt of the fully executed contract and issuance of the Notice to Proceed. The Notice to Proceed will not be issued until the Contractor has completed the submittal process. The start date of the project established by the job start meeting must be within 10 days of the job start meeting.

g. All subcontractors utilized in the performance of this specification must be licensed appropriately in accordance with Title 16, Contractors License Law.

h. Contractors bidding on this project will be required to furnish license number and date of expiration of said license for themselves and any subcontractors used in the performance of this specification. Failure to provide such information on the Proposal Form may result in bid being rejected [Reference B. &P. Code 7028.15(e)].

i. In accordance with the provisions of Section 1773 of the Labor Code, the Director of the Department of Industrial Relations has ascertained the generally prevailing rate of wages applicable to the County in which the work is to be done. Included therein are employer payments for health and welfare, vacation, pension, apprenticeship or other authorized training programs, and similar purposes. Holidays shall be as defined in the collective bargaining agreement applicable to the classification(s) employed on the project.

j. Copies of the General Prevailing Wage rate for the applicable labor classification(s) are available at the web site for the State of California, Department of Industrial Relations-Division of Labor Statistics and Research at www.dir.ca.gov/DLSR.

k. Pursuant to Labor Code, Section 1773.2, the Military Department has access to copies of the General Prevailing Wage Rate for the applicable labor classification(s) and will make such available to any interested party upon request.

l. Requests for prevailing wage determinations must be made in writing and submitted by facsimile to the Military Department at (916) 854-4229, attention: Contracting Section. The Military Department will not respond to requests submitted within five (5) working days of the bid opening.

m. Faxed requests must identify the geographical location for the basic trade and the appropriate determination(s) for the work to be performed.

1-04. Contractor must provide qualified, licensed and trained personnel during the contract period.

a. Specific schedule and definition of level of service will be found in Section 4 – Technical Specifications - of this IFB.

b. All services called for in this IFB and the resulting contract will be performed in accordance with the specific requirements and schedule of performance found in Section 4.

c. Costs of developing and submitting proposals are entirely the responsibility of bidding individuals/firm and shall not be chargeable to or paid by the State of California.

1-05. Questions regarding this IFB should be directed as follows:

a. Technical Specifications, worksite conditions and contractor responsibilities, contact the Military Department PM, **CPT Garth Page at (916) 854-3528**.

b. Contract administration, contractor qualifications and rules of bidding, contact the Contracting Officer, **Chief Warrant Officer Four Tom Clarke, at (916) 854-3690.**

1-06. The use of the proposal forms provided in this IFB is mandatory (or a photocopy of the attached forms).

1-07. Bidders requesting small business preference must check and sign the appropriate area on the bid proposal forms.

1-08. Contract Standard Clauses. Bidder awarded a contact pursuant to this IFB will be required to sign contract documents containing the following provisions:

a. The Contractor agrees to indemnify and save harmless the State, its officers, agents and employees from any and all claims and losses accruing or resulting to any and all contractors, subcontractors, material men, laborers and any other person, firm or corporation furnishing or supplying work, services, materials or supplies in connection with the performance of this contract, and from any and all claims and losses accruing or resulting to any person, firm or corporation who may be injured or damaged by the contractor in the performance of this contract.

b. The Contractor, and the agents and employees of Contractor, in the performance of this agreement, shall act in an independent capacity and not as officers or employees or agents of the State of California.

c. The State may terminate this agreement and be relieved of the payment of and consideration to Contractor should Contractor fail to perform the covenants herein contained at the time and in the manner herein

provided. In the event of such termination the State may proceed with the work in any manner deemed proper by the State. The cost to the State shall be deducted from any sum due the contractor under this agreement and the balance, if any, shall be paid the Contractor upon demand.

d. Without the written consent of the State, This agreement is not assignable by Contractor either in whole or in part.

e. Time is of the essence in this agreement.

f. No alteration or variation of the terms of this contract shall be valid unless made in writing and signed by the parties hereto, and no oral understanding or agreement not incorporated herein, shall be binding on any of the parties hereto.

g. The consideration to be paid Contractor, as provided herein, shall be in compensation for all of Contractor's expenses incurred in the performance hereof, including travel and per diem, unless otherwise expressly provided.

h. Contractor swears 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 the National Labor Relations Board.

i. This contract may be amended during the period of contract performance, subject to the mutual agreement of parties.

j. This contract shall be subject to and construed in accordance with the laws of the State of California, whether or not specifically cited herein.

k. This agreement contains all the terms and conditions agreed to by all parties. No other understanding, oral or otherwise, regarding the subject matter of this agreement, shall be deemed to exist or to bind any of the parties hereto.

l. The contractor agrees to recognize the mandatory standards and policies relating to the energy efficiency in the State Energy Conservation Plan Title 23, California Code of Regulations, as required by the U.S. Energy Policy and Conservation Act (Public Law 94-165).

m. Contractor shall not enter into any subcontracts for the performance of the principle services to be rendered under this agreement without the express consent in writing of the State. Any subcontractors authorized to provide such services must meet and comply with all requirements set forth in this agreement.

n. All Contracting parties shall be subject to the examination and audit of the Auditor General for a period of three years after final payment under the

contract (Government Code Section 10532) should the contract amount exceed $10,000.

o. Contractor agrees that the Military Department or its designee will have the right to review, obtain, and copy all records pertaining to performance of the contract. Contractor agrees to provide the Military Department with any relevant information requested and shall permit the Military Department access to its premises, upon reasonable notice, during normal business hours for the purpose of interviewing employees and inspecting and copying such books, records, accounts, and other material that may be relevant to a matter under investigation for the purpose of determining compliance with Public Contract Code Section 10115 et. seq. and Title 2, California Code of Regulations, Section 1896.60 et. seq. and for the purpose of determining compliance with the State requirements. Contractor further agrees to maintain such records for a period of three (3) years after final payment under the contract.

p. This agreement is valid and enforceable only if sufficient funds are made available by the Budget Acts for those state fiscal years as represented under this contract. This contract is further subject to any additional restrictions, limitations, or conditions enacted by the Legislature and contained in the above Budget Bills or any statute enacted by the Legislature which may effect the provisions, terms, or funding of this or any subsidiary contract in any manner.

1-09. Contracts resulting from this IFB will be inclusive of the provisions of the standard clauses above, Section 2 (General Conditions), Section 3 (Insurance Liability Requirements), and Section 4 (Technical Specifications) as fully set out in this solicitation.

1-10. Cancellation, Modification, and Waiver: The Military Department reserves the right to cancel or modify this IFB, in whole or in part. The Military Department may reject any or all bids or proposals for cause, and may waive any immaterial deviation or defect in a bid or proposal. The Military Department's waiver of a deviation or defect shall in no way modify the IFB documents, or excuse the contractor from full compliance with the IFB specifications if awarded the contract.

1-11. Drug-Free Workplace Certification: Senate Bill 1120, Chapter 1170, Statutes of 1990, requires state contractors to maintain a "drug-free workplace". By signing this contract, the contractor or grantee hereby certifies under penalty of perjury under the laws of the State of California that the contractor or grantee will comply with the requirements of the Drug-Free Workplace Act of 1990 (Government Code Section 8350 et seq.) and will provide a drug-free workplace by taking the following actions:

a. Every contractor must comply with the following:

(1) Publish a statement notifying employees that unlawful manufacture, distribution, dispensation, possession, or use of a controlled substance is

prohibited and specifying actions to be taken against employees for violations, as required by Government Code Section 8355(a).

(2) Establish a Drug-Free Awareness Program as required by Government Code Section 8355(b) to inform employees about all of the following:

a) the dangers of drug abuse in the workplace;
b) the person's or organization's policy of maintaining a drug- free workplace;
c) any available counseling, rehabilitation and employee assistance programs; and,
d) penalties that may be imposed upon employees for drug abuse violations.

(3) Provide, as required by Government Code Section 8355(c), that every employee who works on the proposed contract:

a) will receive a copy of the company's drug-free statement; and,
b) will agree to abide by the terms of the company's statement as a condition of employment on the contract.

b. Failure to comply with these requirements may result in suspension of payments under the contract or termination of the contract or both and the contractor or grantee may be ineligible for award of any future state contracts if the department determines that any of the following has occurred: (1) the contractor or grantee has made false certification, or (2) violates the certification by failing to carry out the requirements as noted above.

1-12. **Bidders certified as a "Small Business" in accordance with Title 2, California Code of Regulations, Section 1896, et seq. shall be granted a five percent (5%) cost bid preference when a responsible non-small business has submitted the lowest-priced, responsive bid.**

a. The rules and regulations of this law and applications for the State of California Small Business preference may be obtained from:

State Department of General Services, Procurement Division, Office of Small Business and DVBE Certification, 707 Third Street, 1st Floor, Room 400, West Sacramento, California 95605 - (916) 375-4940 voice, (916) 375-4950 24 hour recording, (916) 375-4950 facsimile

b. Bidder's small business status and disabled veteran business enterprise status shall be verified with the Office of Small Business and DVBE Certification. Bidders claiming small business and/or DVBE status must be certified prior to bid opening.

1-13. **Non-small business bidders shall be granted a five percent (5%) non-small business preference on a bid proposal when a responsible non-small business has submitted the lowest-priced responsive bid. To be**

considered for the 5% cost bid preference non-small business bidders must meet the following conditions at the time of their bid submission:

a. **Submit written certification with their bid cost bid package that states the firm commits to subcontract at least twenty-five percent (25%) of the firm's net bid price with one or more State of California certified Small Business (es).**

b. **Submit a list of the certified Small Business (es) with their cost bid package that the bidding firm commits to subcontract with for a commercially useful function in the performance of the contract. The bidder's list of subcontractors shall include the subcontractor's name, address, voice telephone number, description of the work to be performed and the dollar amount or percentage per subcontractor.**

c. Commercially useful function is defined as:

(1) The contractor or subcontractor is responsible for the execution of a distinct element of the work of the contract; carrying out its obligation by actually performing, managing or supervising the work involved; and performing work that is normal for its business services and functions; and

(2) The contractor or subcontractor is not further subcontracting a greater portion of the work than would be expected by normal industry practices.

(3) The contractor or subcontractor is responsible, with respect to materials and supplies provided on the subcontract, for negotiating price, determining quality and quantity, ordering the material, installing (when applicable), and paying for the material itself.

(4) A contractor or subcontractor will not be considered as performing a commercially useful function if its role is limited to that of an extra participant in a transaction, contract, or project through which funds are passed in order to achieve the appearance of small business participation.

(5) In the event of a precise tie a contract award shall be made as follows:

Tie between a:	Award to:
Certified Small Business and certified DVBE who is a certified Small Business	Certified DVBE
Certified Small Business and a non-small business who is eligible for the Small Business preference	Certified Small Business

1-14. A certified Small Business (SB) shall receive a 5% preference on a bid proposal when a responsible non-small business has submitted the lowest priced responsive bid.

A certified Disabled Veterans Business Enterprise (DVBE) shall receive a 5% preference on a bid proposal when a responsible non-DVBE has submitted the lowest priced responsive bid.

A firm that is certified as both a SB and DVBE shall receive a 10% preference on a bid proposal when a responsible non-small business and non-DVBE has submitted the lowest priced responsive bid.

If the low bidder is a SB then a 5% preference will be given to a firm that is certified as both a SB and DVBE.

Non-SB bidders claiming SB preference may be granted up to 5% incentive percentage on a bid proposal when a responsible Non-SB/DVBE has submitted the lowest priced responsive bid (Please see 1-13 for SB preference requirements).

A non-SB/DVBE which qualifies for this preference may not take an award away from a certified SB or DVBE.

The value of these SB/DVBE preferences are limited to $100,000 when a contract award is based upon award to the lowest compliant bid.

1-15. The California Taxpayer and Shareholder Protection Act of 2003, Public Contract Code section 10286, et seq., which prohibits state agencies from contracting with expatriate companies, unless they satisfy minimum requirements related to shareholder rights, or obtain a waiver, effective April 1, 2004. An expatriate company is a United States company that has moved, in name and on paper only, to a tax haven country (typically Bermuda or the Bahamas) and has no substantial business activities in the country of reincorporation.

1-16. All bids must have reached the Purchasing and Contracting Branch prior to bid opening time. Proof of receipt prior to the deadline is a Military Department Purchasing and Contracting Branch Date Stamp. Bidders are cautioned that internal State handling of mail can add up to 24 hours to delivery time within the Department prior to date stamping.

END OF SECTION 1

SECTION 2
GENERAL CONDITIONS OF PUBLIC WORKS CONTRACT

2-01. GENERAL

The following general conditions apply to Standard Agreements and informal Contracts alike. They refer briefly to provisions of the State of California Labor Code, Business and Professions Code, and the State Contract Act, all provisions of which are applicable in full.

2-02. BIDDING REQUIREMENTS AND CONDITIONS

A. Examination of Plans, Specifications and Site of the Work:

1. Contractor's Responsibility: The bidder shall carefully examine the work site and the plans and specifications. The bidder shall investigate and become satisfied with the site conditions to be encountered, the character, quality and quantity of surface, and subsurface materials or other obstacles to be overcome, the work to be performed, materials to be furnished, and as to all requirements of the proposal, plans, and specifications of the contract.

2. Responsibility for Utilities: The contractor shall be responsible for payment of all costs of the work required by the existence or proximity of utilities encountered in performing the work, including without limitation, repair of any damage hand or exploratory excavation required. If during the course of the work the contractor encounters utility installations which are not shown or indicated in the plans or in the specifications, or which are found in a location substantially different from that shown in the contract documents, the contractor must promptly notify the State in writing. When necessary for the execution of the contract, the Military Department shall issue a written order to the contractor to make such adjustment, rearrangement, repair, removal, alteration, or special handling of such utility, including repair of damaged utility. The contractor shall perform the work described in such written order and compensation will be made in accordance with Article 2-06A relating to changes in the work. Except for the items of cost specified in such articles, the contractor shall not receive compensation for any other costs or delays associated with the utility. If the contractor fails to give the notice specified above and thereafter acts without instructions from the State, then all cost, expenses, and damages to the utilities or other work of the contract which arises from the contractor's operations shall be the contractor's responsibility.

B. Discrepancies or Errors: If omissions, discrepancies, or apparent errors are found in the plan and specifications prior to the date of bid opening, bidders shall submit a written request for clarification to the State. Any clarification will be given in the form of addendum to all bidders if time permits. Otherwise, in figuring the work, bidders shall consider that any discrepancies or conflict between drawings and specifications shall be governed by Article 2-05E.

C. Proposal Forms: The Military Department will furnish to each bidder a standard proposal form which, when filled out and executed, shall be submitted as the bid. Bids not presented on forms so furnished may be disregarded. All proposals shall give the prices proposed, both in writing and figures, and shall be signed by the bidder or a duly authorized representative, with his address. Proposals made by an individual, shall include the bidder's name and post office/mailing address; if made by partnership, the name and post office/mailing address of the partnership, and the signature of one or more partners must be shown: if made by a corporation, the proposal shall show the name of the state of incorporation, the name of the corporation and the title of the person who signs on behalf of the corporation.

D. List of Subcontractors: Each proposal shall have listed therein the name and address of each subcontractor to whom the bidder proposes to subcontract portions of the work in an amount in excess of one-half of one percent (1/2 of 1%) of the total bid, in accordance with Chapter 2, Division 5, Title 1, of the Government Code.

E. Rejection of Irregular Proposals: Proposals may be rejected if they show any alterations of form, additions not called for, conditional bids, incomplete bids, erasures, or irregularities of any kind.

F. Withdrawal of Proposals: Any bid may be withdrawn at any time prior to the time fixed in the public notice for the opening of bids, provided that a request in writing, executed by the bidder or his duly authorized representative, for the withdrawal of such bid is filed with the Military Department. A telegraphic request is not acceptable. The withdrawal of a bid shall not prejudice the right of a bidder to file a new bid within the time specified. This article does not authorize the withdrawal of any bid after the time fixed in the public notice for the opening of bids.

G. Public Opening of Proposals: Proposals will be opened publicly and read at the time and place indicated in the Notice to Contractors. Bidders or their authorized agents and the general public are invited to be present.

H. Competitive Bidding:

1. If more than one proposal is offered by an individual, partnership, corporation, association, or any combination thereof, under the same or different names, all such proposals may be rejected. A party who has quoted prices on materials or work to a bidder as a supplier or subcontractor is not thereby disqualified from quoting prices to other bidders.

2. All bidders are put on notice that any collusive agreement fixing the prices to be bid so as to control or affect the awarding of this contract is in violation of the competitive bidding requirements of the State Contract Act and may render void any contract let under such circumstances.

2-03. AWARDS AND EXECUTION OF CONTRACT

A. Award of Contract: The right is reserved to reject any and all proposals. The award of the contract, if awarded, will be to the lowest responsible bidder whose proposal complies with all the requirements prescribed. If the lowest responsible bidder refuses or fails to execute the contract, the Military Department may award the contract to the second lowest responsible bidder. If the second lowest responsible bidder refuses or fails to execute the contract, the Military Department may award the contract to the third lowest responsible bidder. The Military Department will make the award of the contract on the date of the determination of the successful bidder.

B. Contract Bonds:

1. Prior to the commencement of performance, the contractor must obtain and provide to the State, a payment bond, on Standard Form 807, when the contract involves a public works expenditure (labor/installation costs) in excess of $24,999.99. Such bond shall be in a sum not less than one hundred percent (100%) of the contract price. Forms shall be provided to the contractor. The contractor shall ensure the payment bond remains in full force and effect during execution of the contracted work, the guarantee period and through such time that all subcontractors and suppliers are paid in full by the contractor.

2. If the contract amount is less than $25,000, and a subsequent change order or contract amendment causes the total amount of the contract to exceed $24,999.99 then a payment bond will be required in the amount of one hundred percent (100%) of the new contract total amount.

3. If the contract amount exceeds $24,999.99, a performance bond in the amount of 100% of the contract amount must be submitted by the successful bidder at the time signed contracts are returned to the Military Department. The contractor shall ensure the performance bond remains in full force and effect during execution of the contracted work and guarantee period.

4. If the proposed bid amount exceeds $24,999.99, the contractor must submit a bid bond in the amount of at least 10% of the bid amount with the Proposal Form utilizing a bond form provided by the Surety.

C. Execution of Contract:

1. The contract shall be signed by the successful bidder and returned within 10 days of receipt, not including Saturdays, Sundays and legal holidays, together with the contract bonds. No contract shall be binding upon the State until the contractor receives a fully executed contract signed and approved by the Military Department, and Department of General Services, when required.

2. The Contract is not valid until approved by the Department of General Services, Office of Legal Service, if such approval is required by law. See PCC §§ 10335 and 10360. If the contractor begins work prior to contract approval and receipt of the "Notice to Proceed", the contractor may need to seek payment by filing with the Victim Compensation Board. The state has no legal obligation to the contractor until the contract is approved.

D. Failure to Execute Contract: Failure to sign a contract and file acceptable bonds as provided herein within the required time mentioned above in paragraph C-1, shall be just cause for the annulment of the award. If the successful bidder refuses or fails to sign the contract, the Military Department may award the contract to second lowest responsible bidder. If the second lowest responsible bidder refuses or fails to execute the contract, the Military Department may award the contract to the third lowest bidder. Bidder who refuses to execute the contract may be held liable for additional costs to the State and/or claims against any bid bond.

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

2-04. LEGAL, RELATIONS, AND RESPONSIBILITY

A. Regulations and Protection:

1. The contractor shall keep informed of and comply with and cause all of his agents and employees to observe and comply with all prevailing Federal and State laws, and all rules and regulations issued made pursuant to said Federal and State laws, which in any way affect the conduct of the work of this contract.

2. The contractor shall obtain and pay for all permits and licenses required for excavating or other work on or in public streets, road or sidewalks, and shall comply with all laws in connection therewith. If any conflict arises between provisions of the plans and specifications and any such law the contractor shall notify the State at once in writing. The contractor shall protect and indemnity the State or any of its officers, agents, and servants against any claim or liability arising from or based on the violation of any such law or regulation by the contractor or its agents or employees.

3. Neither the State nor the contractor is subject to municipal, county, or district laws, rules or regulations pertaining to building permits or regulating the design or construction of buildings upon State property.

4. The contractor shall be responsible for and provide and maintain all proper temporary walks, roads, guards, railings, lights, warning signs, and take precaution at all times to avoid injury or damage to any person or any property, and upon completion of the work, or at proper times as directed, shall restore the premises and adjacent property to proper condition.

5. The contractor shall protect adjoining property and nearby buildings, including State buildings, State roads, and public streets or roads, from dust, dirt, debris, or other nuisance arising out of the contractor's operations or storage practices. Sprinkling or other effective methods acceptable to the

State shall control dust.

6. No advertising by the contractor will be permitted in or about the work except by order of the State.

B. Laws to be Observed:

1. Labor Discrimination: Attention is directed to Section 1735 of the Labor Code, which reads as follows: "No discrimination shall be made in the employment of persons upon public works because of race, color, or religion of such persons and every contractor for public works violating this section is subject to all the penalties for violation of this chapter.

2. Labor Code Certifications:

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

b. **It is hereby mutually agreed that the contractor shall forfeit to the state a penalty of fifty dollars for each calendar day, or portion thereof, for each worker paid by him or her, or subcontractor under him or her, less than the prevailing wage so stipulated and in addition the contractor further agree to pay to each worker the difference between the actual amount paid for each calendar day, or portion thereof, and the stipulated prevailing wage rate for the same. This provision shall not apply to properly, registered apprentices.**

c. **It is further agreed that the maximum hours a worker is to be employed is limited to eight hours a day and 40 hours a week and the contractor shall forfeit, as a penalty to the state, twenty-five dollars for each worker employed in the execution of the contract for each calendar day during which a worker is required or permitted to labor more than eight hours in any calendar day or more than 40 hours in any calendar week, in violation of Labor Code Sections 1810-1815, inclusive.** Work performed by employees of contractors in excess of 8 hours per day, and 40 hours during any one week, shall be permitted upon compensation for all hours worked in excess of 8 hours per day at not less than one and one-half times the basic rate of pay, as provided in Labor Code Section 1815.

d. The wage rates set forth are the minimum that may be paid by the contractor. Nothing herein contained shall be construed as preventing the contractor from paying more than the minimum rates set forth. No extra compensation whatever will be allowed by the State due to inability of the contractor to hire labor at the minimum rates, nor for any necessity for payment by the contractor of subsistence, travel time, overtime or other added compensations, all of which possibilities are elements to be considered and ascertained to the contractor's own satisfaction in preparing his bid.

e. Travel and subsistence payments shall be paid to each worker needed to execute the work, as such travel and subsistence payments are defined in the applicable collective bargaining agreements filed in accordance with Labor Code Section 1773.8.

f. **Each contractor and subcontractor shall comply with the Labor Code section 1776 regarding record keeping.**

g. In accordance with the provisions of Section 1773 of the Labor Code, the Director of the Department of Industrial Relations has ascertained the generally prevailing rate of wages applicable to the County in which the work is to be done on this contract. Included therein are employer payments for health and welfare, vacation, pension, apprenticeship or other authorized training programs, and similar purposes. Holidays shall be as defined in the collective bargaining agreement applicable to the classification(s)

employed on the project.

h. Copies of the General Prevailing Wage rate for the applicable labor classification(s) are available at the web site for the State of California, Department of Industrial Relations-Division of Labor Statistics and Research at www.dir.ca.gov/DLSR.

i. **By signing the contract, the contractor swears 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 with 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 Nation Labor Relations Board.**

3. **Apprentices: Properly registered apprentices may be employed in the prosecution of the work. Every such apprentice shall be paid the standard wage paid to apprentices under the regulations of the craft or trade at which he or she is employed, and shall be employed only at the work of the craft or trade to which he or she is registered. The contractor and each subcontractor must comply with the requirements of Labor Code Section 1777.5 and any related regulations regarding the employment of registered apprentices.**

4. Registration of Contractors: All businesses or individuals, who construct, offer to construct, or alter any building, highway, road, parking facility, railroad, excavation, or other structure in California must be licensed by the California Contractors State License Board (CSLB) if the total cost (labor and materials) of one or more contracts on the project is $300 or more. Contractors, including subcontractors, specialty contractors, and persons engaged in the business of home improvement must be licensed before submitting bids. Licenses may be issued to individuals, partnerships, corporations or joint ventures.

C. Responsibility for Damage: Neither the State of California, The Adjutant General, nor any officer or employee of the Military Department shall be accountable in any manner, for any loss or damage that may happen to the work or any part thereof, or for any of the materials or other things used or employed in performing the work, or for injury to any person or persons, either worker or the public, for damage to property from any cause which might have been prevented by the contractor, or any contractor's employee against all of which injuries or damages to persons and property the contractor having control over such work must properly guard. The contractor shall be responsible for any liability imposed by law for any damage to any person or property resulting from defects or obstructions or from any cause whatsoever during the progress of the work or at any time before the completion and final acceptance. The contractor shall indemnity and save harmless the State of California, the Adjutant General, and all officers and employees of the Military Department from all units or actions of every name, kind and description, brought for, or on account of any injuries or damages received or sustained by any person or persons, by or from the contractor, or any contractor's employee or agents, in the construction of the work or by or in consequence of any negligence in guarding the same, in improper materials used in its construction, or by or on account of any act or omission of the contractor or contractor's agents.

D. Occupancy by the State Prior to Acceptance:

1. The State reserves the right to occupy all or any part of the project prior to completion of the entire contract, upon written order notice. In such event, the contractor will be relieved of responsibility for any injury or damage to such part as may result from such occupancy and use by the State.

2. Such occupancy does not constitute waiver of any rights or acceptance by the State either of the complete work or of any portion thereof, nor will it relieve the contractor of full responsibility for correcting defective work or materials found at any time before the formal written acceptance of the entire contract or during the full guaranty period after such acceptance, as specified in Article 2-07C.

E. Contractor's Responsibility for Work:

1. Until the formal acceptance of the work, the contractor shall have the charge and care thereof and shall bear the risk of injury or damage to any part of the work by the action of the elements or from any other cause whether arising from execution or from the non-execution of the work.

2. The contractor shall rebuild, repair, restore, and make good all injuries or damages to any portion of the work occasioned by any of the above causes before its completion and acceptance, and shall bear the expense thereof, except for such injuries or damages as are directly and proximately occasioned by acts of the Federal Government and the public enemy. In case of suspension of work from any cause whatever, the contractor shall be responsible for the work as above specified and shall also be responsible for all materials, and shall properly store them if necessary, and shall provide suitable drainage and erect temporary structures when necessary.

F. No Personal Liability: Neither the Adjutant General, nor any other officer or authorized employees of the Military Department shall be personally responsible as an individual for any liability arising under the contract.

G. Fair Employment Practices:

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

2. The contractor will send to each labor union or representative of workers with which there is an existing collective bargaining agreement or other contract. A Notice to Labor Unions, to be provided by the awarding authority, advising the said labor union or worker's representative of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

3. The contractor will permit access to its record of employment, employment advertisements, application forms, and other pertinent data and records by the Fair Employment Practices Commission, the awarding authority or any other appropriate agency of the State of California designated by the awarding authority, for the purposes of investigation to ascertain compliance with the Fair Employment Practices section of this contract.

4. A finding of willful violation of the Fair Employment Practices section of this contract or of the Fair Employment Practices Act shall be regarded by the awarding authority as a basis for determining that the contractor is not a "responsible bidder" as to any future contracts for which such contractor may submit bids for revoking the contractor's pre-qualification rating, if any, and for refusing to establish, re-establish or renew a pre-qualification rating for the contractor.

5. The awarding authority shall deem a finding of willful violation of the Fair Employment Practices Act to have occurred upon receipt of written notice from the Fair Employment Practice Commission that it has investigated and determined that the contractor has violated the Fair Employment Practices Act and has issued an order under Labor Code Section 1426 or obtained an injunction under Labor Code Section 1429.

6. Upon receipt of such written notice from the Fair Employment Practices Commission, the awarding authority shall notify the contractor that unless they demonstrate to the satisfaction of the awarding

authority within a stated period of time that the violation has been corrected, the contractor's pre-qualification rating will be revoked at the expiration of such period.

7. The contractor agrees, that should the awarding authority determine that the contractor has not complied with the Fair Employment Practices section of this contract, then pursuant to Labor Code Section 1735 and 1775, the contractor shall, as a penalty to the awarding authority, forfeit, for each calendar day or portion thereof, for each person who was denied employment as a result of such noncompliance, the penalties provided in the Labor Code for violation of prevailing wage rates. Such monies may be recovered from the contractor. The awarding authority may deduct any such damages from any monies due the contractor from the State of California.

8. Nothing contained in this Fair Employment Practices Section shall be construed in any manner or fashion so as to prevent the awarding authority of the State of California from pursuing any other remedies that may be available at law.

9. Nothing contained in this Fair Employment Practices Section shall be construed in any manner or fashion so as to require or permit the hiring of an employee not permitted by the National Labor Relations Act.

10. Standards for Affirmative Compliance:

    a. Prior to award of the contract, the contractor shall certify to the awarding authority that the contractor has or will meet the following standards for affirmative compliance, which shall be evaluated in each case by the-awarding authority.

    b. The contractor shall provide evidence, as required by the awarding authority, that the contractor has notified all supervisors, foremen and other personnel officers in writing of the content of the anti-discrimination clause and their responsibilities under it.

    c. The contractor shall provide evidence, as required by the awarding authority, that he has notified all sources of employee referrals (including unions, employment agencies, advertisements, Department of Employment) of content of the anti-discrimination clause.

    d. Personally, or through an authorized representative(s), the contractor shall, through negotiations with the unions with whom he has agreements, attempt to develop an agreement, which will:

        (1) Spell out responsibilities for non-discrimination in hiring, referral, upgrading and training.

        (2) Otherwise implement an affirmative anti-discrimination program in terms of the union's specific areas of skill and geography, to the end that qualified minority workers will be available and given an equal opportunity for employment.

    e. The contractor shall notify the contracting agency of opposition to the anti-discrimination clause by individuals, firms or organizations during the period of its pre-qualification.

11. **Employment of undocumented aliens: No state agency or department, as defined in Public Contract Code § 10357, that is subject to this code, shall award a public works contract to a bidder or contractor, nor shall a bidder or contractor be eligible to bid for or receive a public works contract, who has, in the preceding five years, been convicted of violating a state or federal law regarding the employment of undocumented aliens. See Public Contract Code § 6101.**

12. **Antitrust Claims: The contractor offers and agrees and will of his other subcontractors and suppliers to agree to assign to the awarding body all rights, title, and interest in and to all causes of action they may have under Section 4 of the Clayton Act (15 USC § 15) or under the**

Cartwright Act (Chapter 2 [commencing with § 16700] of Part 2 of Division 7 of the Business and Professions Code) arising from purchases of goods, services, or materials pursuant to the public works contract or subcontract. The assignment made by the contractor and all additional assignments made by the subcontractors or suppliers shall be deemed to have been made and will become effective at the time the awarding body tenders final payment to the contractor without further acknowledgment or the necessity of tendering to the awarding body any written assignments.

13. **If an awarding body receives, either through judgment or settlement, a monetary recovery for a cause of action assigned under Government Code sections 4550-4554, the assignor shall be entitled to receive reimbursement for actual legal costs incurred and may, on demand, recover from the public body any portion of the recovery, including treble damages and attributable overcharges that were paid by the assignor but were not paid by the public body as a part of the bid price, less the expenses incurred on obtaining that portion of the recovery. On demand in writing by the assignor, the assignee shall, within one year from such demand, reassign the cause of action assigned under Government sections 4550-4554 if the assignor has been or may have been injured by the violation of law for which the cause of action arose and (a) the assignee has not been injured thereby, or (b) the assignee declines to file a court action for the cause of action**

14. The contractor will include the provisions of the foregoing paragraphs 1 through 13 in every subcontract, so that such provisions will be binding upon each subcontractor.

H. Workers Compensation

1. The contractor will be required to secure the payment of compensation to his employees in accordance with provisions of Labor Code Section 3700.

2. Travel and subsistence payments shall be paid to each worker needed to execute the work, as such travel and subsistence payments as defined in the applicable collective bargaining agreements tiled in accordance with Labor Code Section 1773.8.

3. Patents: The contractor shall assume all costs arising from the use of patented materials, equipment, devices, or processes used on or incorporated in the work, and agrees to indemnity and save harmless the State of California, The Adjutant General, and all duly authorized representatives, from all suits at law, or actions of every nature for, or on account of the use of any patented materials, equipment, devices, or processes.

2-05. PERFORMANCE, PROSECUTION AND PROGRESS OF WORK

A. Progress of Work: The Contractor shall provide at all times sufficient competent labor, materials, and equipment to properly carry on the work and to insure completion within the time agreed.

B. Limitation on Work Site and Premises:

1. The "work site" or "job site" is defined as the area of actual construction and the areas immediately adjacent thereto, as shown on the plans or as specified. The "Premises" is defined as the area of State-owned property which surrounds the job site, limited by the property lines thereat. In some cases the premises may coincide with the job site.

2. The contractor shall limit construction operations to the work site unless otherwise shown on the plans or specifications. The contractor shall perform no operations of any nature over or on the premises except such operations as are specifically authorized in the plans or specifications, or as otherwise authorized in writing by the Military Department.

C. Accident Prevention: Precautions shall be exercised at all times for the protection of persons (including

employees) and property. The contractor shall install adequate safety guards and protective devices for any and all equipment and machinery, whether used in the work or permanently installed as part of the work. The contractor shall comply with all applicable laws relating to safety precautions, including the safety regulations of the Division of Industrial Safety, Department of Industrial Relations, of the State of California.

D. Interpretation of Contract Requirements: The contract documents are intended to be consistent, and to describe and to provide for a complete scope of work. Any requirement occurring in one document is binding as though occurring in all the contract documents. However, in the event of conflict or discrepancies therein, then the priorities stated below shall govern:

1. Addendum: An Addendum shall govern over all other contract documents. Subsequent addendum's issued shall govern over prior addendum's only to the extent specified.

E. Specifications and Drawings

The contractor shall keep on the work site a copy of the drawings and specifications and shall at all times give the contracting officer access thereto. Anything mentioned in the specifications and not shown on the drawings, or shown on the drawings and not mentioned in the specifications, shall be of like effect as if shown or mentioned in both. In case of differences between drawings and specifications, the specifications shall govern. In any case of difference in the figures, in the drawings, or in specifications, the matter shall be promptly submitted to the contracting officer who shall promptly make a determination in writing. Any adjustment by the contractor without this determination shall be at its own risk and expense. The contracting officer shall furnish from time to time such detail drawing and other information, as he may consider necessary, unless otherwise provided.

F. Clarification and Additional Instructions: Should any discrepancies, omission or apparent errors, be found in the contract documents, or should any question arise concerning interpretation or clarification of the contract documents, or if it appears that the work to be done or any matters relative thereto are not sufficiently detailed or explained in the contract documents, then, before proceeding with the work affected, the contractor shall immediately notify the Military Department in writing through the Contracting Officers Representative and request interpretation, clarification or furnishing of additional detailed instructions concerning the work. All such questions shall be resolved within a reasonable time by the Military Department, whose decision thereon shall become final. Should the contractor proceed with the work affected without giving such notice or should be given such notice and then proceed with the work affected before receipt of instructions from the Military Department, the contractor shall then remove and replace or adjust at the contractor's own expense, any work which is not in accordance with the instructions furnished by the Military Department and the contractor shall be responsible for any damage, defect or added cost resulting from this action.

G. Product and Standards:

1. Product Designation: When descriptive catalogue designations, including product brand name, or model number are referred to in the contract documents, such designations shall be considered as being those found in industry publications of current issue at date of first IFB.

2. Standards Incorporated by Reference: When standards of the State or Federal Government, trade societies, or trade associations are referred to in the contract documents by specific date of issue, these shall be considered a part of this contract. When such references do not bear a date of issue, the current published edition at date of first invitation to bid shall be considered as part of this contract.

H. Materials, Articles, and Equipment: Materials, articles and equipment furnished shall be new. When the contract documents indicate or require that materials, articles, or equipment are to be furnished but the quality or kind thereof is not specified, shown or indicated, the contractor shall furnish materials, article, or equipment at least equal to the class or quality of similar materials, articles, and equipment which are specified, shown or otherwise indicated. No-claim for additional compensation based on the State's failure

to specify or indicate the class, type or quality of materials, articles or equipment will be recognized in any event, unless the contractor makes a clear showing that the contractor could not determine the class, type or quality of materials, articles, and/or equipment.

I. Submittal of Shop Drawings and Product Data: The contractor shall submit to the State five (5) sets of shop drawings and product data for all work for which submittals are specifically required, three sets of which will be returned to the contractor. All submittals shall be fully identified as to project, agency, locations, work order, contract numbers, and the contractor's firm name. Shop drawings for construction means drawings, submitted to the State by the construction contractor, subcontractor or any lower tier subcontractor pursuant to a construct, showing in detail (i) the proposed fabrication and assembly of structural elements and (ii) the installation (i.e., form, fit, and attachment details) of materials or equipment. The State may duplicate, use, and disclose in any manner and for any purpose shop drawings delivered under this contract.

J. Brand or Trade Names and Alternatives: For convenience in designation on the plans or in the specifications, certain materials, articles, or equipment may be designated by a brand or a trade name of the manufacturer together with catalogue designation or other identifying information. Such designation is for descriptive purposes only, and does not mean that a particular product has any preference, or that an approved alternative product may not be used. The use of an alternative material, article, or equipment, which is of equal quality and of the required characteristics for the purpose intended, will be permitted if approved by the State in writing. Contractor shall be allowed a period of 35 days after award of the contract in which to submit data substantiating a request for substitution of an equal item.

K. Conduct of Work:

1. The State reserves the right to do other work in connection with the project or adjacent thereto by contract or otherwise, and the contractor shall at all times conduct its work so as to impose no hardship on the State or others engaged in the work, nor to cause any unreasonable delay or hindrance thereto.

2. The contractor shall indemnify and hold the State harmless for any claims against the State arising from the Contractor's failure to conduct adjust, correct, and coordinate its work with the work of others engaged in the work.

3. All construction equipment, including tools, plant, temporary construction elevators, hoist, scaffolding, false work, forms and centering required for prosecution of the work of this contract, and all labor, power, and signals required for the installation, operation, and maintenance of such equipment shall be provided by the contractor. The contractor shall obtain all necessary measurements for the work and shall check dimensions, levels, and construction lay out and supervise the construction, for correctness of all of which he shall be responsible. Where work of one trade joins or is on other work, there shall be no discrepancy when same is completed. In engaging work with other materials, marring or damaging some will not be permitted. Should improper work of any trade be covered by another and such improper work results in damage or defects, the whole work affected shall be made good without additional cost to the State. The contractor must anticipate relation of all parts of the work and at the proper time furnish and set anchorage, blocking, or bedding as required.

4. Materials, articles, and equipment shall be furnished in ample quantities and at such times as to insure uninterrupted progress of the work. They shall be so stored and protected as to insure the preservation of their quality, appearance, and suitability for the work. When stored they shall be so located as to facilitate prompt inspection, and so as to avoid interference with the work of others.

L. **Inspection of Records: The contractor agrees that the State Military Department, or the Bureau of Audits or its designated representative, shall have an absolute right of access to all of the contractor’s records, files, documents, accounts and financial affairs as deemed necessary for the purposes of conducting an audit to determine compliance with terms and conditions of this contract. The contractor shall provide the auditor(s) with any relevant information requested without unnecessary delay and, on reasonable notice, permit access to its premises during normal**

business hours for the purpose of interviewing staff and inspecting and copying such books, records, accounts and other material as warranted to conduct the audit. The contractor further agrees to maintain such records for a period of three years after final payment is made on this contract or three years after resolution of all issues that may arise as a result of any litigation, claim, negotiation or audit related to the contract, whichever is later. The state agrees to treat as confidential any proprietary information obtained as a part of any such audit.

M. Samples and Tests:

1. Whenever the contract documents require tests of materials, articles, equipment or other work, the contractor at its expense shall perform all such tests. However, the State may test any portion of the work, at its option, any time during the progress of the work, and shall pay the cost thereof. Unless otherwise directed, all samples for testing will be taken by the Contracting Officer's Representative from the material, articles or equipment delivered, or from work performed, and test will be under the supervision of, or directed by, and at such places as may be convenient to the State.

2. Materials, articles and equipment requiring tests shall be delivered in ample time before intended use to allow for testing, and none may be used before receipt of written approval by the State. Samples that are of value after testing or review shall remain the property of the contractor.

N. Rejection:

Should any portion of the work done or any materials delivered fail to comply with requirements of the contract, such work or materials shall be rejected and shall immediately be made satisfactory to the State by the contractor, at no additional expense to the State. Any materials that are rejected shall immediately be removed from the premises at the contractor's expense.

O. Preservation and Cleaning: The contractor having control of the work site shall clean up the work as it progresses. At frequent intervals and at all times when directed, the contractor shall remove and dispose of accumulations of old forms, rubbish and debris of all kinds. At the completion of the project, the entire work site including the surrounding premises shall be cleared of tools, false work, equipment, rubbish, etc., and ready for acceptance.

P. Labor:

1. The contractor shall observe strictly that each and every kind of work shall be performed by worker, laborers or mechanics specially skilled in the class of work required and that workmanship shall be of the best, regardless of the quality of material.

2. Any agent or employee of the contractor who the State deems incompetent or disorderly shall be promptly removed from the work by the contractor upon written notice from the State, and shall not be re-employed on the contract worker premises.

Q. Subcontracting:

1. This contract is subject to the provisions of Chapter 2, Division 5, Title 1, commencing with Section 4100 of the Government Code, which prohibits the subcontracting of the whole or any part of this contract to subcontractors other than those named in the contractor's original proposal.

2. The contractor shall be responsible for all work performed under this contract, and no subcontractor will be recognized as such. All persons engaged in the work will be considered as employees of the contractor.

3. The contractor shall give personal attention to the fulfillment of this contract and shall keep the work under its control. When any subcontractor fails to prosecute a portion of the work in a manner satisfactory to the State, the contractor shall remove such subcontractor immediately upon written

request of the State and shall not thereafter be employed on the work.

4. Although the specification sections of this contract may be arranged according to various trades general grouping of work, the contractor is not obligated to sublet the work in such manner. The State will not arbitrate disputes among subcontractors or between the contractor and one or more subcontractors concerning responsibility for performing any part of the work.

R. Time of Work and Damage:

1. The State will designate the starting day of the contract on which the contractor shall immediately begin and diligently prosecute the work to completion. The Start date will be established by a Job Start Meeting in which the Contractor and the COR shall conduct within 7 days after receipt of the fully executed contract and issuance of the Notice to Proceed. The Notice to Proceed will not be issued until the Contractor has completed the submittal process. The start date of the project established by the job start meeting must be within 10 days of the job start meeting.

2. By signing the Job Start Letter, the contractor obligates himself to perform the work completely and satisfactorily on or before the expiration date to be determined from the number of working days stated in the agreement or by stipulated date of completion, plus such days as may be subsequently allowed by the State.

3. The contractor shall not be assessed with liquidated damages nor the cost of engineering the inspection during any delay in the completion of the work caused by acts of God, or of the public enemy, fire, flood, epidemics, quarantine restrictions, freight embargo. Contractor shall notify the State in writing of the causes of delay within five (5) days from the beginning of any such delay.

2-06. CHANGES IN THE WORK

A. Requests for Changes:

1. The State reserves the right to order in writing, changes, alterations, omissions, or additions in the plans and specifications, at any time prior to the formal completion and acceptance of the work without in any way voiding the contract, and the contractor shall comply with such order. The contractor may also request changes in the work.

2. Any change or deviation from the contract plans and specifications made without authority in writing from the Military Department's Contracting Officer in the form of an amendment to the original contract will be the responsibility of the contractor. Except where otherwise expressly provided in these articles, no such changes shall be made nor adjustment in compensation recognized unless the contractor receives an executed contract amendment prior to making the changes. In cases whereby State property will be damaged during the stoppage of work, the contractor may proceed on a verbal commitment by the Military Department's Contracting Officer.

3. The contractor shall be entitled to additional compensation for any change requiring labor, materials, or equipment over and above that originally required for the contract work, while any such change resulting in lesser quantities thereof shall entitle the State to a reduction in the contract price.

4. Changed work shall be performed completely and in accordance with the original contract drawings and specifications except for the deviations specifically called for by the change order. Materials used on changed work shall be as specified in the original contract documents insofar as they do not conflict with the conditions set forth in the change order. All changed work will be prosecuted by the contractor with due diligence, and with an efficiency of labor and equipment at least equal to that exercised as to the rest of the work of the contract.

B. Changed Work, Time Adjustments:

1. For any change in the work, the contractor shall be entitled only to such adjustment in time for which completion of the entire work is delayed due to performance of the changed work. Each estimate for a change in the work submitted by the contractor shall state the amount of extra time that he considers should be allowed for making the requested change. Failure to request extra time when submitting such estimates shall constitute a waiver of the right to subsequently claim any adjustment in the time for final completion based upon such changed work.

2. If agreement is reached as to the adjustment in compensation for the performance of changed work, but agreement is not reached as to the time adjustment for such work, then the contractor shall proceed with the work at the agreed price, reserving to the contractor the right to further pursue his claim for the time adjustment.

C. Supplementary Agreements: As to certain changes in the basic scope of the work, a supplementary agreement shall be executed at the option of the State, such agreement to be executed in the manner of the original agreement, to which the change shall be attached and become a part. The bonds required by Article 2-03B shall be furnished with such supplementary agreement, covering any increased amount of the contract due to the change.

2-07. ACCEPTANCE AND PAYMENTS

A. Acceptance: The contracted work shall be accepted by the Military Department when the project is completed in accordance with the contract documents, to the full satisfaction of the State Military Department.

B. Progress Payments: Military Department policy provides that public works projects which allow the contractor 30 working days or more to complete and are estimated to exceed $30,000.00 in value are eligible for progress payments. The contractor may request progress payments during performance of the contracted work. If authorized by the Military Department Contracting Officer, progress payments shall not exceed 90% of the value of the completed work and of materials delivered to the work site.

C. Final Payment: Final payment will not be made to the contractor until such time as all punch list items have been completed and the Military Department is in receipt of all expressed manufacturer's warranties. Upon acceptance of the contractor's work by the Military Department, the COR shall complete a Contract/Contractor Evaluation Form (Office of Adjutant General Form 4) and forward to the Military Department Contracting Section for final review and approval. Approved Contract/Contractor Evaluation Forms shall be forwarded to the Military Department Accounts Payable Section where the Contract/Contractor Evaluation Form and the contractor's invoice shall be processed for payment.

D. Guarantee:

1. The contractor hereby unconditionally guarantees that the work will be done in accordance with the requirements of the contract, and further guarantees the work of the contract to be and remain free of defects in workmanship and materials for a period of one year from the date of acceptance of the contract, unless a longer guarantee period is specifically called for. The contractor hereby agrees to repair or replace any and all work, together with any other adjacent work which may be displaced in so doing, that may prove to be not in accordance with the requirements of the contract or that may be defective in its workmanship or material within the guarantee period specified, without any expense whatsoever to the State of California, ordinary wear and tear and unusual abuse or neglect excepted.

2. Contract bonds will remain in full force and effect during the guarantee period.

2-08. LIQUIDATED DAMAGES

A. The Military Department will designate the starting date of the contract on which the contractor shall

immediately begin and thereafter diligently prosecute the work to completion. The Contractor obligates himself to complete the work within the number of working days or on the fixed date established by the Military Department.

B. If the work is not completed within the time established by the contract document and mutually agreed to by the contractor and the Contracting Officer's Representative prior to the start of work, to include any time extension agreed to in writing by the Military Department, additional costs will be incurred by the Military Department. These costs incurred by the Military Department are as follows:

Category	Hourly Charge	Hours Per Day	Total
Contracting Officer's Representative time	$25.00	8	$200.00
Project Engineer's time	$40.00	2	$80.00
Contracting Officer's time	$50.00	1	$50.00
Judge Advocate General's time	$70.00	1	$70.00
Total Cost Incurred by Military Department			**$400.00**

C. The contractor shall therefore, reimburse the State the sum of $400.00 per day for each and every day's delay in finishing the work beyond the time prescribed. If the contractor fails to pay such liquidated damage the Military Department may deduct the amount thereof from any money due or that may become due the contractor under the contract.

2-09. WORKING HOURS

The work site will not be available for contractor's activities before 8:00 a.m. or after 4:30 p.m. Monday through Friday. The site will not be available for contractor's activities on weekends, or on State or Federal holidays.

2-10. CONTRACTS FUNDED IN WHOLE/IN PART BY FEDERAL GOVERNMENT

A. It is mutually understood between the parties that this contract may have been written before ascertaining the availability of congressional appropriation of funds, for the mutual benefit of both parties, in order to avoid program and fiscal delays which would occur if the contract were executed after that determination was made.

B. This contract is valid and enforceable only if the United Stated Government makes sufficient funds available to the State for each fiscal year of the contract. In addition, this contract is subject to any additional restrictions, limitations, or conditions enacted by the Congress or any statute enacted by the Congress, which may affect the provisions, terms or funding of this contract in any manner.

C. It is mutually agreed that if the Congress does not appropriate sufficient funds for the program, this contract shall be amended to reflect any reduction in funds.

D. The department has the option to void the contract under the 30-day cancellation clause or to amend the contract to reflect any reduction of funds.

2-11. Standard California Non-Discrimination Clause - Construction Contract Specifications (Government Code, Section 12990): See the last two pages of this Section.

2-12. Forced, Convict, and Indentured Labor

Contractor certifies, by submitting a bid, that no foreign-made equipment, materials, or supplies furnished to the State pursuant to the contract/agreement will be produced in whole or in part by forced labor, convict labor, or indentured labor. The contractor agrees to comply with the requirements of Public Contract Code, Section 6108.

PART 11 FEDERAL STATUTES, RULES AND REGULATIONS

2-13. Relationship of the Federal Government

This contract is funded in part by the Federal Government. The Federal Government is not a party to this contract, as a condition to receiving and expending Federal funds, there are certain rights of Federal inspection, Federal approval of contract changes and modifications, and Federal approval of settlements or dispute actions that the Federal Government will exercise prior to authorization of Federal funds. Therefore, no inspection or acceptance, change, modification, settlement, dispute claim payment, or dispute action will be considered binding until the required Federal approval is obtained. The chief, National Guard Bureau, or its designated representative, is the approval authority. This paragraph does not abrogate any rights conferred on the Federal Government by law or other clause required due to the use of Federal funding.

2-14. Changes and Extras

The contracting officer may at any time, in writing and without notice to the sureties; order extras or make changes in the drawings and/or specifications of this contract, providing such extras or changes are within the general scope thereof. If any such extra or change causes an increase or decrease in the amount due under this contract, or in the time required for its performance, an equitable adjustment shall be made, and the contract shall be modified in writing. Federal Funding support for any change or extra is subject to prior approval by the Chief, National Guard Bureau, or his duly authorized representative. Any claim of the contractor for adjustment under this clause must be asserted in writing within 30 days after the date of receipt by the contractor of the notification extra or change Provided, however, that the contracting officer, decides that the facts justify such action, may received and act upon any such claim asserted at any time prior to the date of final settlement oft the contract. If the parties fail to agree upon the adjustment to be made, the dispute shall be determined as provided in the clause 2-17 hereof entitled DISPUTES. Nothing provided in this clause, however, shall excuse the contractor from proceeding with the prosecution of the work as changed. Except as otherwise herein provided, no charge for any extra work or material will be allowed.

2-15. Changed Conditions

The Contractor shall promptly, and before such conditions are disturbed, notify the contracting officer in writing of (1) subsurface or latent physical conditions at the site differing materially from those indicated in this contract, or (2) unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inhering in work of the character provided for in this contract. The contracting officer shall promptly investigate the conditions, and if he finds that such conditions do so materially differ and cause an increase or decrease in the cost of (or the time required for), performance of this contract, an equitable adjustment shall be made, and the contract modified in writing. Federal funding support to any change or extra is subject prior approval by the chief, National Guard Bureau, or his duly authorized representative. Any claim of the contractor for adjustment hereunder shall not be allowed unless he has given notice as required above. The contracting officer, however, may if he determines the facts so justify, consider and adjust any such claim asserted before the date of final settlement of the contract. If the parties fail to agree upon the adjustment to be made, the dispute shall be determined as provided in clause 2-18 hereof entitled DISPUTES.

2-16. Termination for Default-Damages or Delay-Time Extensions

A. If the contractor refuses or fails to prosecute the work, or any separable part thereof, with such diligence as will insure its completion within the time specified in this contract, or any extension thereof, or fails to complete said work within such time, the State may, by written notice to the contractor, terminate his right to proceed with the work or such part of the work as to which there has been delay. In such event the State may take over the work and prosecute the same to completion, by contract or otherwise, and the contractor and his sureties shall be liable to the State for any excess cost occasioned the State thereby, and for liquidated damages for delay, as fixed in the specifications or accompanying papers, until such reasonable time as may be required for final completion of the work; or if liquidated damages are not so fixed, any

actual damages occasioned by such delay. If the contractor's right to proceed is so terminated, the State may take possession of and utilize in completing the work such materials, appliances, and plant as may be on the site of the work and therefore necessary.

B. If the State does not terminate the right of the contractor to proceed, as provided in subparagraph (A) hereof, the contractor shall continue the work, in which event he and his sureties shall be liable to the State, in the amount set forth in the specifications or accompanying papers, for the fixed, agreed, liquidated damages for each calendar day of delay until the work is completed or accepted: or if liquidated damages are not so fixed, any actual damages occasioned by such delay.

C. The right of the contractor to proceed shall not be terminated, as provided in subparagraph (A) hereof, not the contractor charged with liquidated or actual damages, as provided in subparagraph (B), because of any delays in the completion of the work due to causes beyond his control which could not reasonably have been anticipated and were without his fault or negligence, including, but not restricted to, acts of God, acts of the public enemy, acts of the Government or the State (either in its sovereign or contractual capacity), acts of another contractor in the performance of a contract with the State quarantine restrictions, strikes, freight embargoes, or unusually severe weather; or, delays of subcontractors or suppliers due to such unforeseeable causes beyond the control and without the fault or negligence of both the contractor and such subcontractors or suppliers at any tier; provided, that the contractor shall, within 10 days after the beginning of any such delay, unless the contracting officer shall grant a further period of time prior to the date of final settlement of the contract, notify the contracting officer in writing of the causes of delay. The contracting officer shall ascertain the facts as to the extent of the delay and make a decision whether or not to extend the time for completing the work. When in the Contracting Officer's judgment the findings of fact justify such an extension, and Contracting Officer's findings of fact thereon shall be final and conclusive on the parties hereto, subject only to appeal as provided in the DISPUTES clause hereof.

2-17. Disputes

Except as otherwise specifically provided in this contract, and except as otherwise specifically provided by the State procedure for arbitration or other State procedure established by the State law, any dispute concerning a question of fact arising under this contract which is not disposed of by mutual agreement shall be decided by the contracting officer, who shall reduce any decision to writing and send a copy to the contractor by certified mail-return receipt requested, to the address shown herein. Within thirty (30) days after the date of receipt of such copy, the contractor may appeal in writing to the Governor of this State, whose written decision thereon, or that of his designated representative or representatives, shall, unless determined by a court of competent jurisdiction to have been fraudulent or capricious or arbitrary or so grossly erroneous as necessarily to imply bad faith, or not supported by substantial evidence, be final and conclusive: provided, that if no such appeal is taken the decision of the contracting officer shall be final and conclusive. The Governor of this State may designate an individual or individuals other than the contracting officer, or a board, as the authorized representative to determine appeals under this Article. In connection with any appeal proceeding under this clause, the contractor shall be afforded an opportunity to be heard and to offer evidence in Support of his appeal. Pending final decision of a dispute hereunder, the contractor shall proceed diligently with the performance of the contract and in accordance with the contracting officer's decision. Any sum or sums allowed to the contractor under the provisions of this Article or under the State Arbitration proceedings or under other State procedure shall be paid subject to approval by the chief, National Guard Bureau, for the Government's share of the cost of the Articles or work herein disputed as deemed to be within the contemplation of this contract.

2-18. Payments to contractors

A. Unless otherwise provided in the specifications, partial payments will be made as the work progresses at the end of each calendar month, or as soon thereafter as practicable, or at more frequent intervals as determined by the contracting officer, on estimates made and approved by the contracting officer. In preparing estimates the material delivered on the site and preparatory work done may be taken into consideration.

B. In making such partial payments there shall be retained 10 percent on the estimated amount until final

completion and acceptance of all work covered by the contract: Provided, however, that the contracting officer, at any time after 50 percent of the work has been completed, upon a finding that satisfactory progress is being made, may make any of the remaining partial payments in full: and provided further, that on completion and acceptance of each separated building, public work, or other division of the contract, on which the price is stated separately in the contract, payment may be made in full, including the retained percentage thereon, less authorized deductions. The retainment on partial payments of Federal funds shall be determined by the United States Property and Fiscal Officer (USPFO) of the State in conformance with the Defense Acquisition Regulations (DAR).

C. All material and work covered by partial payments made shall thereupon become the sole property of the State, but this provision shall not be construed as relieving the contractor from the sole responsibility for all materials and work upon which payments have been made or the restoration of any damaged work, nor as a waiver of the right of the State to require the fulfillment of all of the terms or the contract.

D. Upon completion and acceptance of all work required hereunder, and after the contractor shall have furnished the State with a release of all claims against the State arising under and by virtue of this contract, other than such claims, if any, as may be specifically excepted by the contractor from the operation of the release, in stated amount to be set forth therein, the amount due the contractor under this contract will be paid upon the presentation of a properly executed and duly certified voucher. If the contractor's claim to amounts payable under the contract has been assigned under the Assignment of Claims Act of 1940, as amended (41 U.S.C, 15), a release may also be required oft the assignee at the option oft the contracting officer or USPFO of the State.

2-19. Material and Workmanship

Unless otherwise specifically provided for in the specification, all equipment, materials, and articles incorporated in the work covered by this contract are to be new and of the most suitable grade of their respective kinds for the purpose intended and all workmanship shall be first class. Where equipment, materials, or articles are referred to in the specifications as "equal to" any particular standard, the contracting officer shall decide the question of equality. The contractor shall furnish to the contracting officer for approval the name of the manufacturer of machinery, mechanical and other equipment, which is contemplated to be incorporated in the work, together with the performance capacities and other pertinent information. When required by the specifications, or when called for by the contracting officer, the contractor shall furnish to the contracting officer for approval full information concerning the materials or articles, which is contemplated for incorporation in the work. Samples of materials shall be submitted for approval when so directed. Machinery, equipment, materials, and articles installed or used without such approval shall be at the risk of subsequent rejection. The contracting officer may in writing require the contractor to remove from the work site such employee as the contracting officer deems incompetent, careless, insubordinate, or otherwise objectionable, or whose continued employment on the work site is deemed by the contracting officer to be contrary to the public interest.

2-20. Inspection

A. Except as otherwise provided in subparagraph (D) hereof, all material and workmanship (if not otherwise designated by the specifications) shall be subject to inspection, examination, and testing by representatives of the contracting officer at any and all times during manufacture and/or construction (and at any and all places where such manufacture and/or construction are carried on). The State shall have the right to reject defective material and workmanship or require its correction. Rejected workmanship shall be satisfactorily corrected and rejected material shall be replaced with proper material without charge and the contractor shall promptly segregate and remove rejected material from the premises. If the contractor fails to proceed at once with the replacement of rejected material and/or the correction of defective workmanship, the State may, by contract or otherwise, replace such material and/or correct such workmanship and charge the cost thereof to the contractor, or the State may terminate the right of the contractor to proceed as provided in Clause 2-17 of this contract, the contractor and surety being liable for any damage to the same extent as provided in said Clause 2-17 for termination.

B. The contractor shall furnish promptly, without additional charge, all reasonable facilities, labor and materials necessary for the safe and convenient inspections and tests that may be required by the contracting officer or by the USPFO of the State. All inspections and tests by the State shall be performed in such manner as not unnecessarily to delay the work. Special, full size, and performance tests shall be as described in the specifications. The contractor shall be charged with any additional cost of the inspection when material and workmanship is not ready at the time inspection is requested by the contractor.

C. Should it be considered necessary or advisable by the State, or by the representatives of the Chief, National Guard Bureau, at any time before final acceptance of the entire work to make an examination of the work already completed, by removing or tearing out same, the contractor shall on request promptly furnish all necessary facilities, labor, and material to accomplish such inspection. If such work is found to be defective or non-conforming in any material respect due to the fault of the contractor or a subcontractor, the contractor shall bear all the expenses of such examination and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the contract, an equitable adjustment shall be made in the contract price to compensate the contractor for the additional services involved in such examination and reconstruction: and, if completion of the work has been delayed thereby, the contractor shall, in addition, be granted a suitable extension of time. Federal funding support of the cost for examination and replacement of satisfactorily completed work that requires removal or that is damaged due to inspection requirements is subject to prior approval by the Chief, National Guard Bureau, or a duly authorized representative.

D. Inspection of material and finished articles to be incorporated in the work at the site shall be made at the place of production, manufacture, or shipment, whenever the quantity justifies it, unless otherwise stated in the specifications; and such inspection and acceptance shall be in writing, and unless otherwise stated in the specifications, shall be final, except as regards latent defects, departures from specific requirements of the contract and the specifications and drawings made a part thereof, damage or loss in transit, fraud, or such gross mistakes as amount to fraud. Subject to the requirement contained in the preceding sentence, the inspection of material and workmanship for final acceptance as a whole or in part, shall be made at the site. Nothing contained in this paragraph (D) shall in any way restrict the State's rights under any warranty or guarantee.

2-21. Superintendent by Contractor

The contractor shall give personal superintendent over the work or employ a competent foreman or superintendent, satisfactory to the contracting officer, on the work site at all times during progress, with full authority to act on the contractor behalf.

2-22. Permits and responsibility for Work

The contractor shall, without additional expense to the State, obtain all licenses and permits required for the prosecution of the work and pay all charges related to the connection of utility services to existing systems. The contractor shall be responsible for all damages to persons or property that occurs as a result of his fault or negligence in connection with the prosecution of the work. The contractor shall take proper safety and health precautions to protect the work, the workers, the public, and the property of others. The contractor shall also be responsible for all materials delivered and work performed until completion and final acceptance, except for any completed unit thereof which therefore may have been finally accepted.

2-23. Other Contracts

The State may undertake or award other contracts for additional work, and the contractor shall fully cooperate with such other contractors and State employees and carefully fit its own work to such additional work as may be directed by the contracting officer. The contractor shall not commit or permit any act that will interfere with the performance of work by any other contractor or by State employees.

2-24. Additional Bond Security

If any surety upon any bond furnished in connection with this contract becomes unacceptable to the State,

or if any such surety shall fail to furnish reports as to the contractor's financial condition from time to time as requested by the State, the contractor shall promptly furnish such additional security as may be required from time to time to protect the interests of the State or of persons supplying labor or materials in the prosecution of the work contemplated by the contract.

2-25. Covenant Against Contingent Fees

The contractor warrants that no person or selling agency has been employed or retained to solicit or secure this contract upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee, excepting bona fide employees or bona fide established commercial or selling agencies maintained by the contractor for the purpose of securing business. For breach or violation of this warranty the State shall have the right to annul this contract without liability or in its discretion to deduct from the contract price or consideration the full amount of such commission, percentage, brokerage, or contingent fee.

2-26. Officials to Benefit

No member of or delegate to Congress, State Legislation or resident commissioner or State official or employee shall be admitted to any share or part of this contract, or to any benefit that may arise from it; but this provision shall not be construed to extend to this contract if made with a corporation for its general benefit.

2-27. Convict Labor

In connection with the performance of work under this contract, the contractor agrees not to employ any person undergoing sentence of imprisonment, as provided by Public Law 89-176, September 10, 1965 (18 USC 4082 (c) (2)) and executive order 11755, December 29, 1973.

2-28. Gratuities

A. The State may, by written notice to the contractor, terminate the right of the contractor to proceed under this contract if it is found, after notice and hearing, by the Secretary or Governor or the duly authorized representative of either, that gratuities (in the form of entertainment, gifts, or otherwise) were offered or given by the contractor, or any agent or representative of the contractor, to any officer or employee of the State with a view toward securing a contract or securing favorable treatment with respect to the awarding or amending, or the making of any determinations with respect to the performance, of such contract: Provided, that the existence of the facts upon which the Secretary or Governor or the duly authorized representative of either makes such findings shall be in issue and may be reviewed in any competent court.

B. In the event this contract is terminated as provided in paragraph (A) hereof, the State shall be entitled (1) to pursue the same remedies against the contractor as it could pursue in the event of breach of the contract by the contractor, and (2) as a penalty in addition to any other damages to which it may be entitled by law, to exemplary damages in an amount (as determined by the Secretary or Governor or the duly authorized representative of either) which shall be not less than 3 nor more than 10 times the costs incurred by the contractor in providing any such gratuities to any such officer or employee.

C. The rights and remedies of the State provided in this Clause shall not be exclusive and are in addition to any other rights and remedies provided by law or under this contract.

2-29. Copeland ("Anti-Kickback") Act-Non Rebate of Wages

The regulations of the Secretary of Labor applicable to contractors and subcontractors (29 CFR, Part 3), made pursuant to the Copeland Act, as amended (40 U.S.C. 276c) and to aide in the enforcement of the Anti-Kickback Act (18 U.S.C. 874) are made a part of this contract by reference. The contractor will comply with these regulations and any amendments or modifications thereof and the prime contractor will be responsible for the submission of affidavits required of subcontractors. The foregoing shall apply except as the Secretary of Labor may specifically provide for reasonable limitations, variations, tolerances and

exemptions.

2-30. Withholding of Funds

A. The contracting officer may withhold or cause to be withheld from the State prime contractor so much of the accrued payment or advances as may be considered necessary (i) to pay laborers and mechanics, including apprentices, trainees, watchmen, and guards, employed by the contractor or any subcontractor on the work the full amount of wages required by the contract, and (ii) to satisfy any liability of the contractor and any subcontractor for liquidated damages under paragraph (B) of the Clause entitled Contract Work Hours and Safety Standards Act - Overtime Compensation.

B. If the contractor or any subcontractor fails to pay any laborer, mechanic, apprentice, trainee, watchman, or guard employed or working on the site of the work, all or part of the wages required by the contract, the contracting officer may, after written notice the State prime contractor, take such action as may be necessary to cause suspension of any further payments or advances until such violations have ceased.

2-31. Disputes Concerning Labor Standards

Disputes arising out of the labor standards provisions of this contract shall be subject to the Disputes Clause except to the extent such disputes involve the meaning of classification or wage rates contained in the wage determination decision of the Secretary of Labor or the applicability of the labor provisions of this contract which questions shall be referred to the Secretary of Labor in accordance with the procedures of the Department of Labor.

2-32. Subcontracts-Termination

The contractor agrees to insert the clauses hereof entitled Prevailing Wage - Labor Code Sections 1775 to 1780 inclusive, provide access to the Payrolls and Basic Records by the Fair Employment Practice Commission, Copeland ("Anti-Kickback") Act-Non Rebate of Wages, Withholding of Funds and Subcontracts-Termination physically in all subcontracts and the contractor further agrees that a breach of any of the requirements of these Clauses may be grounds for termination of this contract. The term "contractor" as used in such clauses in any subcontract shall be deemed to refer to the subcontractor except in the phrase "prime contractor."

2-33. Equal opportunity (See paragraphs 2-04,B 2 and G 1 through 13; Standard California Nondiscrimination Construction Contract Specifications (GOV. Code Section 12990).

2-34. Certification of Non-segregated Facilities

(Applicable to contracts, subcontracts, and to agreements with applicants who are themselves performing Federally assisted construction contracts, exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity Clause). By the submission of this bid, the bidder, offeror, applicant or subcontractor certifies that he does not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. He certifies further that he will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he will not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The bidder, offeror, applicant, or subcontractor agrees that a breach of this certification is a violation of the Equal Opportunity Clause in the Contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion or national origin, because of habit, local custom or otherwise. He further agrees that (except where he has obtained identical certifications from proposed subcontractors for specific time periods) he will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding $10,000 which are

not exempt from the provisions of the Equal Opportunity Clause: that he will retain such certifications in his files" and that he will forward the following notice to such proposed subcontractors (except where the proposed subcontractors have submitted identical certifications for specific time periods):

NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENT FOR CERTIFICATIONS OF NONSE-GREGATED FACILITIES: A certification of Non-segregated Facilities must be submitted prior to award of a subcontract exceeding $10,000 which is not exempt from the provisions of the Equal opportunity clause. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semiannually, or annually).

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

2-35. Clean Air and Water

(Applicable only it the contract exceeds $100,000, or the contracting officer has determined that orders under an indefinite quantity contract in any one year will exceed $100,000, or a facility to be used has been the subject of a conviction under the Clean Air Act (42 U.S.C. 1 857c-8(c)(1)) or the Federal Water Pollution Control Act (33 U.S.C 1 31 9(c)) and is listed by EPA, or the contract is not otherwise exempt.)

A. The bidder or offeror certifies as follows:

(i) Any facility to be utilized in the performance of this proposed contract is ( ), is not ( ), listed on the Environmental Protection Agency List of Violating Facilities:

(ii) The bidder/offeror will promptly notify the contracting officer, prior to award, or the receipt of any communication from the Director, Office of Federal Activities, U.S. Environment Protection Agency, indicating that any facility which is proposes for use for during the performance of the contract is under consideration to be listed on the EPA List Violating Facilities: and

(iii) The bidder/offeror will include substantially this solicitation certification, including this paragraph (iii), in every nonexempt subcontract.

B. The terms used in this clause have the following meanings:

(i) The term "Air Act" means the Clean Air Act, as amended (42 U.S.C. 1857 et seq., as amended by Public Law 91-604).

(ii) The Term "Water Act" means the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et seq., as amended by Public Law 92-500).

(iii) The term "clean air standards" means any enforceable rules, regulations, guidelines, standards, limitations, orders, controls, prohibitions, or other requirements which are contained in, issued under, or otherwise adopted pursuant to the Air Act or Executive order 11738, an applicable implementation plan as described in section 110(d) of the Clean Air Act (42 U.S.C. 1875c-5(d)), an approved implementation procedure or plan under section 111(c) or section 111(d), respectively, of the Air Act 942 U.S.C. 1 875c-6(c) or (d)), or an approved implementation procedure under section 112(d) of the Air Act (42 U.S.C. 1875c-7(d)).

(iv) The term "clean water standards" means any enforceable limitation, control, condition, prohibition, standard or other requirement which is promulgated pursuant to the Water Act or contained in a permit issued to a discharge by the Environmental Protection Agency or by a State under an approved program, as authorized by section 402 of the Water Act (33 U.S.C. 1342), or by a local government to ensure compliance with pretreatment regulations as required by section 307 of the Water Act (33 U.S.C. 1317).

(v) The term "compliance" means compliance with clean air or water standards. Compliance shall also

mean compliance with a schedule or plan ordered or approved by a court of competent jurisdiction, the Environmental Protection Agency or an air or water pollution control agency in accordance with the requirement of the Air Act or Water Act and regulations issued pursuant thereto.

(vi) The term "facility" means any building, plant, installation, structure, mine, vessel or other floating craft location, or site of operations, owned, leased, or supervised by a contractor, subcontractor, to be utilized in the performance of a contract or subcontract. Where a location or site of operations contains or includes more than one building, plant, installation, or structure, the entire location or site shall be deemed to be facility except where the Director, Office of Federal Activities, environmental Protection Agency, determines that independent facilities are co-located in one geographical area.

(vii) The term "nonexempt contract or subcontract" means a contract or subcontract of more than $100,000 which is not otherwise exempted pursuant to the EPA regulations implementing the Air Act and Water Act (40 CFR 15.5), as further implemented in ASP R 1 -2302.4 or in FPR 1-1.230204 (whichever is applicable) and the procedures of the Department awarding the contract.

2-36. Audit by Department of Defense

The contractor will permit access to the contractor's records of employment, employment advertisements, application forms, and other pertinent data and records by the National Guard Bureau Representative, the awarding authority or any other appropriate agency of the State of California designated by the awarding authority, for the purposes of investigation to ascertain compliance with the Fair Employment Practices section of this contract. In additional to employment records, the Contractor will permit access to the following documentation:

A. Examination of Cost: If this is a cost reimbursement type, incentive, time and materials, labor hour, or price re-determinable contract, or any combination thereof, the contractor shall maintain, and the contracting officer or his representatives shall have the right to examine books, records, documents, and other evidence and accounting procedures and practices, sufficient to reflect properly all direct and indirect costs of whatever nature claimed to have been incurred and anticipated to be incurred for the performance of this contract. Such right of examination shall include inspection at all reasonable times of the contractor's plants, or such parts thereof, as may be engaged in the performance of this contract.

B. Cost of Pricing Data

If the contractor submitted cost or pricing data in connection with the pricing of this contract or any change or modification thereto, unless such pricing was based on adequate price competition, established catalog of market prices of commercial items sold in substantial quantities to the general public, or prices set by law or regulation, the contracting officer or his representatives who are employees of the State of California (or representatives listed above) shall have the right to examine all books, records, documents and other data of the contractor related to the negotiation, pricing or performance of such contract, change or modification, for the purpose of evaluating the accuracy, completeness and currency of the cost or pricing data submitted.

C. Reports

If the contractor is required to furnish Contractor Cost Data Reports (CCDR) Contract Fund Status Reports (CFSR), or Cost Performance Reports (CPR) the contracting officer or his representatives shall have the right to examine books, records, other documents, and supporting materials, for the purpose of evaluating (i) the effectiveness of the contractor's policies and procedures to produce data compatible with the objectives of these reports, and (ii) the data reported.

D. Availability

The materials described in (B), and (C) above shall be made available at the office of the contractor, at all reasonable times, for inspection, audit, or reproduction, until the expiration of three (3) years from the date

of final payment under this contract.

E. The contractor shall insert a clause containing all the provisions of this Clause, including this paragraph (D), in all subcontracts hereunder, except altered as necessary for proper identification of the contracting parties and the contracting officer under the State prime contract.

2-37. Subcontractor Cost or Pricing Data-Price Adjustment

The contractor shall require subcontractors to certify that to the best of their knowledge and belief the cost and pricing data submitted is accurate, complete, and current as of the date of agreement on the negotiated price of the subcontract or subcontract change of modification.

2-38. Buy American Act

A. Agreement: In accordance with the Buy American Act (41 U.S.C. 1Oa-10d) the contractor agrees that only domestic construction material will be used (by the contractor, subcontractor, and suppliers) in the performance of this contract, except for non-domestic construction material listed in the "Non-domestic Construction Materials" clause, if any, of this contract.

B. Domestic Construction Material: "Construction material" means any article, material, or supply brought to the construction site for incorporation in the building or work. A non-manufactured construction material is a "domestic construction material" if it has been mined or produced in the United States. A manufactured construction material is a "domestic construction material" if it has been manufactured in the United States and if the cost of its components which have been mined, produced, or manufactured in the United States exceeds 50 percent of the cost of all its components. "Component" means any article, material, or supply directly incorporated in a construction material.

C. Domestic Component: A component shall be considered to have been "mined, produced, or manufactured in the United States" (regardless of its source in fact) if the article, material, or supply in which it is incorporated was manufactured in the United States and the component is of a class or kind determined by the government to be not mined, produced, or manufactured in the United States in sufficient and reasonable available commercial quantities and of satisfactory quality.

2-39. Definitions
As used throughout this contract, the following terms shall have the meaning set forth below:

A. The term "Contracting Officer" means the person executing this contract on behalf of the State and any other officer or civilian employee who is properly designated contracting officer and the term includes, except as otherwise provided in this contract, the authorized representative of a contracting officer acting within the limits of his authority.

B. The term "Government" means the United States and any Department head thereof,

C. The term "State" means the State, Commonwealth, or Territory, which is the party to this contract.

D. The term "Governor" means the Governor of the State or a duly appointed representative (other than the contracting officer).

E. The term "USPFO" means the United States Property and Fiscal Officer assigned to the State.

2-40. Approval

This contract and any subsequent termination, modifications, or change orders (including those resulting from disputes and settlements of disputes) shall be subject to the written approval of the Chief, National Guard Bureau, or his duly authorized representative, and shall not be binding until so approved.

2-41. Site Investigation

The contractor acknowledges that the contractor has investigated and is satisfied as to the conditions affecting the work, including but not restricted to not restricted to those bearing upon transportation, disposal, handling and storage of materials, availability of labor, water, electric power, roads, and uncertainties of weather, river stages, tides, or similar physical conditions at the site, the conformation and conditions of the ground, the character of equipment and facilities needed preliminary to and during prosecution of the work. The contractor further acknowledges that it is satisfied as to the character, quality and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from an inspection of the site, including all exploratory work done by the State, as well as from information presented by the drawings and specifications made a part of this contract. Any failure by the contractor be acquainted with the available information will not relieve the contractor from responsibility for estimating properly the difficulty of cost of successfully performing the work. The State assumes no responsibility for any conclusions or interpretations made by the contractor on the basis of the information made available by the State.

2-42. Protection of Existing Vegetation, Structures, Utilities, and Improvements

A. The contractor will preserve and protect all existing vegetation such as trees, shrubs, and grass on or adjacent to the site of work which is not be removed and which does not unreasonably interfere with the construction work. Care will be taken in removing trees authorized for removal to avoid damage to vegetation to remain in place. Any limbs or branches of trees broken during such operations or by the careless operation of equipment, or by workmen, shall be trimmed with a clean cut and painted with an approved tree pruning compound as directed by the contracting officer.

B. The contractor will protect from damage all existing improvements or utilities at or near the site of the work, the location of which to be made known to him, and will repair or restore any damage to such facilities resulting from failure to comply with the requirements of this contract or the failure to exercise reasonable care in the performance of the work. If the contractor fails or refuses to repair any such damage promptly, the contracting officer may have the necessary work performed and charge the cost thereof to the contractor.

2-43. Operations and Storage Areas

A. All operations of the contractor (including storage of materials) upon State premises shall be confined to areas authorized or approved by the contracting officer. The contractor shall hold and save the State, its officers and agents free and harmless from liability of any nature occasioned by his operations.

B. Temporary building (storage sheds, shops, offices, etc.) may be erected by the contractor only with the approval of the contracting officer, and shall be bunt with labor and materials furnished by the contractor without expense to the State. Such temporary buildings and utilities shall remain the property of the contractor and shall be removed by the contractor at the contractor's expense upon the completion of work. With the written consent of the contracting officer, such buildings and utilities may be abandoned and need not be removed.

C. The contractor shall, under regulations prescribed by the contracting officer, use only established roadways or construct and use such temporary roadways as may be authorized by the contracting officer. Where materials are transported in the prosecution of the work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any Federal, State or local law or regulation. When it is necessary to cross curbing or sidewalks, the contractor shall provide protection against damage and any damaged roads, curbing, or sidewalks shall be repaired by or at the expense of the contractor.

2-44. Modification Proposals-Price Breakdown

The contractor, in connection with any proposal he makes for a contract modification, shall furnish a price

breakdown, itemized as required by the contracting officer. Unless otherwise directed, the breakdown shall be in sufficient detail to permit an analysis of all material, labor equipment, subcontract, and overhead cost, as well as profit, and shall cover all work involved in the modification, whether such work was deleted, added or changed. Any amount claimed for subcontracts shall be supported by a similar price breakdown. In addition, if the proposal includes a time extension, a justification shall also be furnished. The proposal, together with the price breakdown and time extension Justification, shall be furnished by the date specified by the contracting officer.

2-45. Cleaning Up

The contractor shall at all times keep the construction area, including storage areas used by him, free from accumulations of waste material or rubbish and prior to completion of the work remove any rubbish from the premises and all tools, scaffolding, equipment and materials not the property of the State. Upon completion of the construction the contractor shall leave the work and premises in a clean, neat, and workmanlike condition satisfactory to the contracting officer.

2-46. Inspections

The work will be conducted under the general direction of the contracting officer and is subject to inspection by his appointed inspectors to insure strict compliance with the terms of the contract. No inspector is authorized to change any provision of the specifications without written authorization of the contracting officer, nor shall the presence or absence of an inspector relieve the contractor from any requirement of the contract.

2-47. Recycling Certification

The Contractor shall certify in writing under penalty of perjury, the minimum, if not exact, percentage of recycled content, both post consumer waste and secondary waste as defined in the Public Contract Code, Sections 12161 and 12200, in materials, goods, or supplies offered or products used in the performance of this Agreement, regardless of whether the product meets the required recycled product percentage as defined in the Public Contract Code, Sections 12161 and 12200. Contractor may certify that the product contains zero recycled content (PCC 10233, 10308.5, 10354).

2-48. Child Support Compliance Act

For any contract in excess of $100,000.00, the contractor acknowledges in accordance with, that:

a.) The contractor recognizes the importance of child and family support obligations and shall fully comply with all applicable state and federal laws relating to child and family support enforcement, including, but not limited to, disclosure of information and compliance with earnings assignment orders, as provided in Chapter 8 (commencing with Section 5200) of Part 5 of Division 9 of the Family Code; and

b.) The contractor, to the best of its knowledge is fully complying with the earnings assignment orders of all employees and is providing the names of all new employees to the New Hire Registry maintained by the California Employment Development Department.

2-49. SUSPENSION AND DISBARMENT

By entering in this contract your firm and its principals certifies that it has not been suspended or disbarred from any Federal contracts and does not appear on the Excluded Parties List System (EPLS). In addition, your company certifies that all your organization’s subcontractors and its principals have not been susepended or disbarred from any Federal contracts and does not appear on the Excluded Parties List System (EPLS).

2-50. **EXPATRIATE CORPORATIONS:** Contractor hereby declares that it is not an expatriate corporation or subsidiary of an expatriate corporation within the meaning of PCC Section 10286 and 10286.1, and is eligible to contract with the State.

END OF SECTION 2

SECTION 3
BID SUBMISSION, CONTRACT AWARD, AND INSURANCE LIABILITY

3-01. Bid Description: The State is seeking bids based on a single lump sum quotation inclusive of all Contractors' costs involved in performing the full scope of this service.

a. Bids will be submitted for the entire scope of work as described in Section 4 of this IFB. Any deviation from the specification (including qualified bids) will not be considered a valid proposal and will be cause for rejection.

b. Proposals must be signed by the bidder or by an officer of the bidder who has authority to sign contracts binding upon the bidder. Unsigned proposals will be rejected. **Bidders are required to submit one (1) signed original Proposal.**

3-02. Bid Opening: At time and date as stated in Section 1, paragraph 1-01, all bids received will be publicly opened and read at the Office of the Adjutant General, 9800 Goethe Road, Sacramento, CA 95827.

a. All bids must have reached the Purchasing and Contracting Branch prior to bid opening time.

b. PROOF OF RECEIPT PRIOR TO DEADLINE IS A MILITARY DEPARTMENT PURCHASING AND CONTRACTING BRANCH DATE STAMP. BIDDERS ARE CAUTIONED THAT INTERNAL STATE HANDLING OF MAIL CAN ADD UP TO 24 HOURS TO DELIVERY TIME WITHIN THE DEPARTMENT PRIOR TO DATE STAMPING.

3-03. Bid Forms: Proposals must be submitted on official Military Department forms (or copied reproduction thereof) or bid will be rejected.

3-04. Bid Withdrawal: Prior to the published time and date, a proposal may be withdrawn by submitting a written request signed by the bidder or a duly authorized officer of the bidder. The Military Department will not accept telephonic nor telegraphic bids, or telephonic/telegraphic requests to modify or withdraw bids. Bids may not be withdrawn after published bid opening time on the proposal due date. All bids offers will remain in effect until the contract is awarded by the State.

3-05. Rejection and Waiver: The State may reject any or all bids and may waive any immaterial deviation. The State's waiver of an immaterial deviation shall in no way modify the Invitation for Bids (IFB) or excuse the bidder from full compliance with the objectives if the bidder is awarded the contract.

3-06. Basis of Award of Contract: The basis of award of this contract will be the lowest responsive bid from a qualified, responsible bidder; then taking into account Small Business and DVBE Preference.

3-07. Protest Exclusions:

In accordance with the State Contracting Manual Section 6.03 F. Protest Exclusions: "The contract award is for a type of contract not subject to the protest procedures. This category includes contracts for the construction, alteration, improvement, repair or maintenance of real or personal property; goods or commodities and contracts for professional architecture or engineering services under GC 4525." **This contract therefore, is excluded from any form of protest.**

3-08 General Provisions Applying to All Insurance Policies

a. Coverage Term – Coverage needs to be in force for the complete term of the contract. If insurance expires during the term of the contract, a new certificate must be received by the State at least ten (10) days prior to the expiration of this insurance. Any new insurance must still comply to the original terms of the contract.

b. Policy Cancellation or Termination & Notice of Non-Renewal – Insurance policies shall contain a provision stating coverage will not be cancelled without 30 days prior written notice to the State. In the event Contractor fails to keep in effect at all times the specified insurance coverage, the State may, in addition to any other remedies it may have, terminate this Contract upon the occurrence of such event, subject to the provisions of this Contract.

c. Deductible – Contractor is responsible for any deductible or self-insured retention contained within their insurance program.

d. Primary Clause – Any required insurance contained in this contract shall be primary, and not excess or contributory, to any other insurance carried by the State.

e. Insurance Carrier Required Rating – All insurance companies must carry a rating acceptable to the Office of Risk and Insurance Management. If the Contractor is self insured for a portion or all of its insurance, review of financial information including a letter of credit may be required.

f. Endorsements – Any required endorsements requested by the State must be physically attached to all requested certificates of insurance and not substituted by referring to such coverage on the certificate of insurance.

g. Inadequate Insurance – Inadequate or lack of insurance does not negate the contractor's obligations under the contract.

3.09 Insurance Requirements

a. Commercial General Liability – Contractor shall maintain general liability on an occurrence form with limits not less than $1,000,000 per occurrence for bodily injury and property damage liability combined with a $2,000,000 annual policy aggregate. The policy shall include coverage for liabilities arising out of premises, operations, independent contractors, products, completed operations, personal & advertising injury, and liability assumed under an insured contract. This insurance shall apply separately to each insured against whom claim is made or suit is brought subject to the Contractor's limit of liability. The policy must include The State of California, its officers, agents, employees and servants as additional insureds, but only with respect to work performed under the contract.
This endorsement must be supplied under form acceptable to the Office of Risk and Insurance Management. In the case of Contractor's utilization of subcontractors to complete the contracted scope of work, contractor shall include all subcontractors as insured's under Contractor's insurance or supply evidence of insurance to The State equal to policies, coverages and limits required of Contractor.

b. Automobile Liability – Contractor shall maintain motor vehicle liability with limits not less than $1,000,000 combined single limit per accident. Such insurance shall cover liability arising out of a motor vehicle including owned, hired and non-owned motor vehicles.

c. Workers Compensation and Employers Liability – Contractor shall maintain statutory worker's compensation and employer's liability coverage for all its employees who will be engaged in the performance of the Contract. Employer's liability limits of $1,000,000 are required.

3-10. Contractor's Liability Insurance: Contractor shall obtain a policy of comprehensive bodily injury and property damage liability insurance whose provisions conform to this article and which is issued by an insurance company acceptable to the Department of General Services, Office of Insurance and Risk Management. **Contractor shall maintain such policy in full force and effect at all times.**

3-11. Terms of Policy (breakdown in accordance with the above requirements):

a. Minimum limit of coverage of the policy shall be:

(1) Vehicle Liability (BI & PD):	$1,000,000 per occurrence
(2) Public Liability:	$1,000,000 per occurrence
(3) Workers Compensation:	Statutory

b. Insurer shall not cancel or modify policy without 30 days prior written notice to

the Military Department.

c. State shall not be responsible for premiums or assessments on the policy.

d. The State of California, its officers, agents, employees, and servants are included as additional insured, but only insofar as the operations under this contract are concerned.

NOTE: THE ABOVE FOUR (4) TERMS MUST BE ON THE INSURANCE CERTIFICATE

Certificate of Insurance is to be mailed to the following address:

Military Department
CAST-PC-SC (A0545)
P. O. BOX 269101
SACRAMENTO, CA 95826-9101

The above certifications must be provided to the Military Department upon request of the Military Department's Contracting Officer and mailed to the address above.

SPECIFICATIONS

BURBANK ARMORY KITCHEN & LATRINE MODERNIZATION

Bid Set Submittal

Burbank National Guard
3800 W. Valhalla Dr.
Burbank, CA 91505-1119

Prepared for:

California Military Department
Procurement Branch
Attn: Captain Garth Page
9800 Goethe Road
Sacramento, CA 95827

January 20, 2012

Prepared by:

WINZLER & KELLY
2235 Mercury Way, Suite 150
Santa Rosa, CA 95407-5472
(707) 523-1010

DOCUMENT 00010
TABLE OF CONTENTS

DIVISION 09 - FINISHES

DIVISION 10 - SPECIALTIES
NOT USED

DIVISIONS 11 - EQUIPMENT
NOT USED

DIVISIONS 12 - FURNISHINGS

DIVISIONS 13 – SPECIAL CONSTRUCTION
NOT USED

DIVISION 14 – CONVEYING SYSTEMS
NOT USED

DIVISION 21 – FIRE SUPPRESSION
NOT USED

DIVISION 22 – PLUMBING

DIVISION 23 – HEATING VENTILATING AND AIR CONDITIONING

DIVISION 26 – ELECTRICAL

DIVISION 27 – COMMUNICATIONS
NOT USED

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY
NOT USED

END OF DOCUMENT

SECTION 00700 – SEALS PAGE

PROJECT

Name: Burbank Armory Kitchen and Latrine Modernization
Location: Burbank National Guard
3800 W. Valhalla Drive
Burbank, CA 91505-1119

ARCHITECT OF RECORD

RIM Architects
1000 Sansome Street
San Francisco, CA 94111

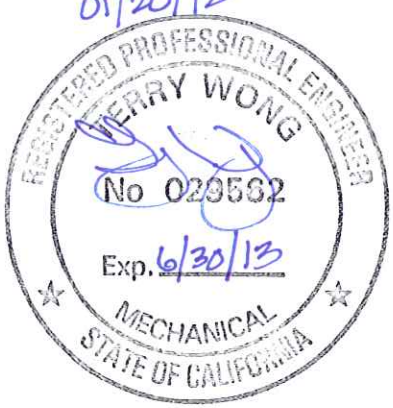
Michelle Jones

Architect of Record

MECHANICAL ENGINEER OF RECORD

Winzler & Kelly
2235 Mercury Way, Suite 150
Santa Rosa, CA 95407

01/20/12

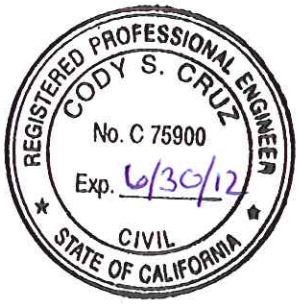


Mechanical Engineer of Record

Winzler & Kelly
2235 Mercury Way, Suite 150
Santa Rosa, CA 95407

Electrical Engineer of Record

Winzler & Kelly
2235 Mercury Way, Suite 150
Santa Rosa, CA 95407



Civil Engineer of Record

END OF SECTION 00700

SECTION 01015 - GENERAL REQUIREMENTS

PART 1 GENERAL

1.1 SCOPE

A. The work consists of furnishing equipment, materials, and labor necessary to modernize the Burbank Armory building. Work will include the placement of some government furnished equipment. Modernization work will include the conversion the existing kitchen area into a shower room, conversion of existing classroom areas into a full size kitchen, and upgrade to existing restrooms.

B. Accomplish all work in accordance with the drawings and specifications contained herein.

C. Accomplish all work in accordance with California Building Codes (2010 Edition), California Mechanical Code (2010 Edition) and California Electrical Code (2010 Edition).

D. Perform all work at the California National Guard Armory located at 3800 W. Valhalla Drive, Burbank, California, 91505-1119.

1.2 CONTRACTING OFFICER'S REPRESENTATIVE

A. Wherever in these specifications the abbreviation COR is referenced, it shall be the same as if the term Contracting Officer's Representative is referenced.

1.3 ENGINEER/CONSTRUCTION INSPECTOR

A. Wherever the specifications direct the Contractor to the ENGINEER/CONSTRUCTION INSPECTOR (ECI) for appropriate determination, the Contractor will direct his inquiries to the State Military Department, 9800 Goethe Road, P.O. Box 269101, Sacramento, California 95826, ATTN: CAFE-EN Quality Control. Phone: (916)826-8415.

1.4 CONTRACTOR'S RESPONSIBILITY

A. Nothing contained in these specifications shall relieve the contractor from the responsibility of visiting the site, accurately measuring the work or otherwise insuring that the quantities used in preparing his bid are the actual quantities of the work to be accomplished under the contract. By submitting a bid the contractor confirms that he has visited the aforementioned site and verifies that the quantities used in preparing his bid are the actual quantities of the work to be accomplished under the contract.

B. The Contractor shall maintain a competent foreman, English speaking, to continuously supervise the work, with authority to discard unsuitable materials and remove unsatisfactory workmen from the project.

1.5 VEHICLE MOVEMENT

The following applies to all vehicles, except emergency vehicles responding to an emergency:

A. Any vehicles on the Armory compound will operate at 10 MPH maximum. Vehicles when in close proximity to military vehicles or buildings will operate at 5 MPH maximum.

B. Vehicles will not be backed without a ground guide.

C. All vehicles which do not require the engine to be running for contract purposes will have the ignition turned off and the parking brake set and the vehicle's transmission placed in park.

1.6 CONTRACTOR STORAGE AREA AND PERSONNEL

A. The COR will designate an area that the contractor may use as a storage area. The contractor shall contact the COR for information regarding parking areas to be used for contractors equipment and by contractor personnel and any restrictions that will be placed on contractor personnel while on the job site.

1.7 TEMPORARY FACILITIES

A. Water, electric power, and toilet facilities are available free of charge at the site. Contractor shall make arrangements with the COR for use of such facilities, and shall comply with such requirements and restrictions for their use as may be prescribed.

1.8 MATERIAL SUBMITTALS

A. Contractor shall submit to the Project Manager for approval, one (1) copy in writing, of a complete list of material submittals and equipment to accomplish the work specified.

B. Submittals shall comply with Section 01300 of these specifications. Transmit submittals (from Submittal List) on Submittal Log (the list and a blank log is provided after Section 01300).

C. PROJECT MANAGER must receive submittals for Specification identified materials (no substitutions permitted) within ten (10) working days after receiving the "Proposed Contract" for signature.

D. Receipt of Submittals that substitute an "or equal" are required within fifteen (15) days after date of Contract Agreement.

E. Do not start work until Project Manager approves all project submittals, issues special instructions, and a "Notice to Proceed" is received from the Contracting Officer.

1.9 APPROVAL OF PROCEDURES

A. The manufacturer's written recommended installation procedures, these specifications and drawings will serve as a basis for inspection and acceptance or rejection of actual installation

procedures used on the work.

1.10 ORDINANCES AND REGULATIONS

A. All work shall be accomplished in accordance with all local, State and Federal regulations. Permits and fees shall be the responsibility of the contractor at no additional cost to the Government.

1.11 WORKING DAYS

A. Contractor shall complete the work within sixty (60) working days from starting date, as notified by the contracting office.

1.12 WORKING HOURS

A. The work site will be available for contractor's activities from 8:00 a.m. until 4:30 p.m. Monday through Friday. The site will not be available for contractor's activities on weekends and State or Federal holidays.

1.13 SCHEDULING AND INSPECTION

A. Within ten (10) calendar days after receipt of Notice to Proceed, and before commencing work, the contractor shall submit in writing to the ECI for approval, the complete scope of work and the procedures and sequence required to complete the work.

B. The contractor shall work directly with the COR and ECI on work scheduling and inspection procedures prior to starting any work.

1.14 AS BUILT DRAWINGS

A. The contractor shall provide two (2) full and accurate sets of as-built drawings showing the work accomplished by all trades for this contract marked up in a neat and understandable manner, submitted to the COR upon completion of the work and prior to issuance of a Certificate of Completion.

PART 2 PRODUCTS

2.1 MATERIALS

A. All materials for use under this project shall meet or exceed the standards of quality hereinafter set forth.

PART 3 EXECUTION

3.1 QUALITY CONTROL

A. To insure proper project quality control and required record keeping, contractor shall comply

with Section 01400.

3.2 CONTRACT CLOSEOUT

A. Contract closeout requires contractor compliance with Section 01700.

END OF SECTION 01015

SECTION 01300 - SUBMITTALS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Submittal procedures.

B. Construction progress schedules.

C. Product data.

D. Manufacturer's instructions.

E. Manufacturer's warranty certificates.

G. Shop drawings.

1.2 RELATED SECTIONS

A. See other specification sections, for materials, equipment, assemblies and other items that require a submittal.

1.3 SUBMITTAL PROCEDURES

A. Transmitted submittals will be tracked using a submittal log provided with this Section. The items described on attached submittal list are presented to the contractor only as a guideline for required submittals. More may be required by the COR.

B. Submittals shall be transmitted via Email in form of Adobe .pdf files. The .pdf file shall include all items described in 1.3.C, D, F and H below.

C. All submittals including all data sheets, shop drawings and samples shall be signed by the contractor with either his/her signature, stamp or initials verifying review of project and that items submitted are accordance with the requirements of the Work and Contract Documents. Each submittal shall be positively identified with project location, contract number and contractor's name.

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

E. Submittals consisting of physical items & electronic data shall not be considered complete until all elements of the submittal have been reviewed.

F. Apply Contractor's stamp, signed or initialed 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.

G. Schedule submittals to expedite the Project, and deliver required copies to Project Manager for review and approval.

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

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

1.4 CONSTRUCTION PROGRESS SCHEDULES

A. Submit one (1) electronic copy (see paragraph 1.3.B above) of initial progress schedule within ten (10) days after date of established notice to proceed for review and approval.

B. Revise and resubmit as required.

1.5 PRODUCT DATA

A. Submit (1) one electronic copy (see paragraph 1.3.B above) to the Project Manager.

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

C. Include manufacturer's style, specification or catalog cuts, and color chips for each material proposed for use. Approval of proposed materials will be based on manufacturer's data and compliance with contract documents. Each item of material submitted shall be initialed by the contractor as verification that the submittal has been reviewed in detail and is, in fact, the contractor's choice of materials.

1.6 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual specification Sections, submit manufacturer's printed instructions for installation, start-up, adjusting, finishing, and maintenance, in quantities specified for Product Data.

B. Identify conflicts between manufacturer's instructions and Contract Documents.

1.7 MANUFACTURER'S WARRANTY CERTIFICATES

A. When specified in individual specification Sections, submit manufacturer's certificate to Project Manager for review, in quantities specified in PRODUCT DATA paragraph of this section.

B. Specify material or product data that conforms to or exceeds the requirements of the contract. Submit supporting reference data, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or Product, but must be acceptable to the Engineer.

1.8 CONTRACTOR'S WARRANTY

A. Provide roofing contractor's 3 year workmanship warranty on all roofing and associated flashing. Warranty shall cover blistering, wrinkling and all other conditions related to waterproofing.

B. Provide painting contractor's 3 year workmanship warranty on all painting. Warranty shall cover blistering, flaking, peeling and chalking.

1.9 SHOP DRAWINGS

A. Submit in PDF format and hardcopy one reproducible transparency and three opaque reproductions, two copies of which will be retained by Engineer/Construction Inspector.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION 01300

SECTION 01400 - QUALITY CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Quality assurance and control of installation.

B. Inspection and testing.

1.2 RELATED SECTIONS

A. Section 01300 - Submittals: Submission of Manufacturer's Instructions and Warranty Certificates.

1.3 QUALITY ASSURANCE/CONTROL OF INSTALLATION

A. Contractor must insure quality control over products received from suppliers, manufacturers, services, site conditions, and workmanship to produce work of specified quality.

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

C. Should manufacturer's instructions conflict with Contract Documents, request clarification from Contracting Officer’s Representative before proceeding.

D. Perform work by persons qualified to produce workmanship of specified quality.

E. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, and physical distortion.

1.4 INSPECTION AND TESTING

A. Contractor is responsible for inspection and testing of all work on the job. The State Military Department reserves the right to have its employees independently inspect and test any work on the job and to review the contractor's quality of work. The State Military Department may designate an employee to be its Inspector.

B. Where plans or specifications call for a testing or inspection agency or company to perform tests or inspections, Contractor shall first obtain Owner’s approval for use of that testing or inspection agency.

C. All testing/sampling, and inspections shall be made at the job site in connection

with the actual installation.

D. Test Locations. Where plans or specifications call for testing or taking of a sample from the new work, Contractor shall provide opportunity for Owner's Inspector, or Engineer, or Contracting Officer's Representative to designate the locations of the test or sample taking.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION 01400

SECTION 01700 - CONTRACT CLOSEOUT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Closeout procedures.

B. Final cleaning.

C. Adjusting.

D. Project record documents.

1.2 CLOSEOUT PROCEDURES

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected and accepted, and that Work is complete in accordance with Contract Documents and ready for inspection.

B. Comply with requirements of specification sections 01015 and 01300.

C. Provide warranty certificates to COR.

D. Submit final Application for Payment to Contracting Officer identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.3 FINAL CLEANING

A. Execute final cleaning prior to final inspection.

B. Clean site; sweep paved areas.

C. Remove waste and surplus materials, rubbish, and construction facilities from the site.

D. Repair and repaint any items or surfaces damaged by work of this contract in accordance with, paint, and other manufacturer's requirements and Section 099123.

1.4 ADJUSTING

A. Adjust operating Products and equipment to ensure smooth, proper operation.

1.5 PROJECT RECORD DOCUMENTS

A. Maintain on site, one set of the following record documents; record actual revisions to the Work:

1. Project Drawings.

2. Specifications.

3. Change Orders and other Modifications to the Contract.

4. Reviewed product data, and samples.

5. Manufacturer’s Warranty Certificate(s).

B. Store Record Documents separate from documents used for construction.

C. Record information concurrent with construction progress.

D. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:

1. Manufacturer's name and product model number.

2. Product substitutions or alternates utilized.

3. Changes made by Addenda and Modifications.

E. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:

1. Field changes of dimension and detail.

2. Details not on original Contract Drawings.

3. Submit one (1) electronic set and one (1) hardcopy set prior to final inspection, bound in 8-1/2 x 11 inch text pages, 3-D side ring binder.

4. Internally subdivide the binder contents with page dividers, logically organized, and tabbed to identify contents of binder.

5. Part 1: Directory, listing names, addresses, and telephone numbers of Contractor, and all Subcontractors.

6. As Built Drawings: Provide As-Built drawings in AutoCad 2007 Version on CD.

7. Part 2: Project documents and certificates, including the following:

   a. Shop drawings and product data.

   b. Warranty certificates.

F. Submit one (1) revised electronic and one (1) hard copy of completed volume in final form seven (7) days prior to final inspection. Revise content of documents as required prior to final contract close out per COR directions.

G. Submit final revised documents within ten (10) days after final inspection.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION 01700

SECTION 02082 - ASBESTOS ABATEMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Removal of asbestos-containing materials and paint preparation work.

1.2 RELATED DOCUMENTS AND SECTIONS

A. Section 01015: Summary of Work.

B. Section 01300: Submittals.

C. Section 099123: Interior Painting.

1.3 REFERENCES

A. General - Codes, regulations and references applicable to asbestos abatement work include but are not limited to the following:

1. American National Standards Institute (ANSI) publications:

Z87.1-79 Occupational and Educational Eye and Face Protection.

Z88.2-80 Practices for Respiratory Protection.

Z89.1-81 Requirements for Protective Headgear for Industrial workers.

Z41-83 Personal Protection - Protective Footwear.

Z88.6-84 Respiratory Protection - Respiratory Use Physical Qualifications for Personnel.

2. American Society for Testing and Materials (ASTM) publications:

D1331-56 Surface and Interfacial Tensions of Solutions of Surface Active Agents.

B. Code of Federal Regulations (CFR):

29 CFR 1910.12 Construction Work.

29 CFR 1910.20 General Safety and Health Provisions Access to Employee Exposure and Medical Records.

29 CFR 1910	Subpart I, Personal Protective Equipment.
29 CFR 1910.145	Specifications for Accident Prevention Signs and tags.
29 CFR 1910.1101	Asbestos.
34 CFR 231	Appendix C, Procedures for Containing and Removing Building Materials Containing Asbestos.

B. Compressed Gas Association, Inc.:

G-7.1 Commodity Specification for Air (1973).

C. CEC - California Electrical Code 2010 Edition.

D. UL 586-77 (R1982) Test Performance of High Efficiency Particulate Air Filter Units (June 10, 1977, 5th Ed.; Rev. March 12, 1982).

E. National Institute for Occupation Safety and Health (NIOSH):

N31, 3rd. Ed., Vol. 1, Manual of Analytical Methods, Method 7400 Fibers.

F. Environmental Protection Agency Documents:

EPA 530-SW-85-007	Asbestos Waste Management Guidance, May 1985.
EPA 560/5-85-024	Guidance for Controlling Asbestos-Containing Material in Buildings, June 1985.
EPA 600/4-85-049	Measuring Airborne Asbestos Following an Abatement Action, November 1985.
EPA 560 OPTS-86.001	A Guide to Respiratory Protection for the Asbestos Abatement Industry, April 1986.

G. California Code of Regulations (CCR):

Title 8, Article 2.5 Registration Asbestos-Related Work, Section 341.6 through 341.14.

Title 8, Section 5208	General Industry Safety Orders, Asbestos Regulations.
Title 22, Division 4, Chapter 30	Minimum Standards for Management of Hazardous and Extremely Hazardous Waste.

H. Local Air Pollution Control District Regulations.

1.4 DEFINITIONS

A. Abatement: Procedures to control fiber release from asbestos-containing building materials. Includes removal, repair, encapsulation, and enclosure.

B. Action Level: An exposure of airborne concentrations of asbestos fibers in excess of 0.10 fiber per cubic centimeter of air.

C. Air Monitoring: The process of measuring the fiber content of a specific volume of air in a stated period of time.

D. Air Sampling Professional: The professional contracted or employed to supervise air monitoring and analysis schemes. This individual is also responsible for recognition of technical deficiencies in Worker protection equipment and procedures during both planning and on-site phases of an abatement project. This individual shall be certified in the comprehensive practice of (industrial hygiene) or (air sampling of hazardous materials) by The Comprehensive Practice of Industrial Hygiene (C.I.H.) and have specialized experience in air sampling for asbestos and be approved by the State. Other acceptable air sampling professionals include environmental engineer, architects, chemists, and environmental scientists with equivalent experience in asbestos/air monitoring and worker protection.

E. Amended Water: Water to which a surfactant has been added.

F. Area Monitoring: Sampling of asbestos fiber concentrations within the asbestos Work Area and outside the asbestos Work Area which is representative of the airborne concentrations of asbestos fibers which may reach the breathing zone.

F. Asbestos: The term asbestos includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite.

G. Asbestos-Containing Material (ACM) - Material composed of asbestos of any type and in any amount greater than one-tenth of one percent by weight, either alone or mixed with other fibrous or non-fibrous materials.

H. Asbestos Fibers: This expression refers to asbestos fibers having an aspect ratio of 3:1 and longer than 5 micrometers.

I. Authorized Visitor: The State's Project team member, the State's Representative, and any Representative of a regulatory or other agency having jurisdiction over the project.

J. Encapsulant (sealant): A liquid material which can be applied to asbestos containing material and which controls the possible release of asbestos fiber from the material either by creating a membrane over the surface (bridging encapsulant) or by penetrating into the material and binding its components together (penetrating encapsulant).

K. Encapsulation: Procedures necessary to apply an encapsulant to asbestos-containing building materials to control the possible release of asbestos fibers into the ambient air.

L. Excursion Limit: A limit of 1.0 f/cc over a 30-minute sampling period to which employees may not be exposed without appropriate respiratory protection.

M. Friable Asbestos Material: Material that contains more than one tenth percent asbestos by weight and that can be crumbled, pulverized, or reduced to powder by hand pressure when dry.

N. HEPA Vacuum Equipment: Vacuuming equipment with a HEPA filter system.

P. Non-Friable Asbestos Material: Material that contains asbestos in which the fibers have been locked in by a bonding agent, coating, binder, or other material so that the asbestos is well bound and will not release fibers in excess of the asbestos control limit during any appropriate use, handling, demolition, storage, transportation, processing or disposal.

O. Personnel Monitoring: Sampling of asbestos fiber concentrations within the breathing zone of an asbestos Worker.

R. Removal: Procedures necessary to remove asbestos-containing materials from designated areas and to dispose of these materials at an acceptable site.

1.5 SUBMITTALS

A. Requirements are as set forth in the General Conditions, Supplementary Conditions, Sections 01015 and 01300 for items required to be submitted under this section.

B. Product data shall include manufacturer's product data, specifications, samples and application instructions and other pertinent information as necessary.

C. Alternatives: Product substitution submittal shall be in accordance with the General Conditions and Supplementary Conditions of the contract, and Section 01300.

D. Disposal Certifications: Submit proof satisfactory to the State that required permits, site location and arrangements for transport and disposal of asbestos-containing waste materials have been made.

1.6 QUALITY ASSURANCE

A. Qualification: Within ten (10) days from Notice to Proceed, submit the following documents.

B. Registration: Submit copy of the registration for Asbestos-Related Work from the Division of Occupational Safety and Health in accordance with Title 8, Article 2.5 of the California Code of Regulations.

C. Personnel Training-Superintendent and Foreman: Submit copy of signed certificates that the superintendent and foreman has successfully completed a training course in asbestos abatement project supervision offered by an EPA endorsed educational institution.

D. Personnel Training-Workers: Submit copy of the asbestos abatement employee training program, and certificates signed by each employee that he or she has had instructions on the hazards of asbestos exposure, has had training in asbestos removal, and understands this instruction.

E. Respirators: Submit a written standard operating procedure governing selection, fit-testing, and use of respirators in accordance with 29 CFR 1910, Subpart I, 29 CFR 1926.58, CGAI Standard G7.1, ANSI Z88.2, and Z88.6. Also submit manufacturer's certification that the respirators to be used in this project comply with these regulatory requirements.

F. Medical Examination: Submit proof that personnel who will be entering contaminated areas have had medical examinations, and furnish the results of said exam to the State. Comply with 29 CFR 1910.20 for access to employee exposure and medical records.

3. Before exposure to airborne asbestos, provide each employee with a comprehensive medical exam meeting the general definition outlined in California Administration Code Title 8, CCR Section 5208 (j). No employee shall be allowed to enter the Work Area without having first provided a copy of his Medical History to the State.

4. Submit an employee roster to the State for each Work shift and confirm in writing within 24 hours of commencement of shift.

G. Notifications, Communications and Postings:

1. Submit copies of notifications to all appropriate Government agencies, including the following:

a. Division of Occupational Safety and Health
Occupational Carcinogen Control Unit
525 Golden Gate Avenue
San Francisco, CA 94602

(415) 557-2037

b. Notification shall be in accordance with the Section 341.9 of Title 8 of California Code of Regulations.

2. Copies of Government agency correspondence shall be included in the submittals.

H. Safety Compliance: In addition to detailed requirements of this Specification, comply with laws, ordinances, rules, and regulations of federal, state, regional, and local authorities regarding handling, storing, transporting, and disposing of asbestos waste materials. Comply with applicable requirements of the current issue of 29 CFR 1910.1101, 29 CFR 1926.58, and 40 CFR 61, Subparts A, & M, 40 CFR 61.152, and CCR Section 5208. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting Work. Where requirements of this Specification and reference documents vary, the most stringent requirement shall apply.

I. Contractor shall have at least one copy each of 29 CFR 1910, Subpart I, 29.CFR.1910.1101; 29 CFR 1926.58; 40 CFR Part 61, Subparts A & M; and CCR, Title 8, Section 5208, at his office and also at the job site.

J. Before the commencement of any Work at the site, post bilingual EPA and CAL/OSHA caution signs in and around the Work Area to comply with EPA and OSHA regulations.

1.7 FIELD AIR SAMPLING:

Personnel monitoring and other monitoring which is required by law or considered necessary by the Contractor for Worker protection shall be the responsibility of the Contractor and performed by Contractor's Air Sampling Professional.

1.8 CERTIFICATIONS:

Rental Equipment: When rental equipment is to be used in removal areas or to transport waste materials, a copy of the written notification provided to the rental company informing them of the nature of use of the rented equipment shall be submitted to the Contracting Officer's Representative, and signed by the rental company.

PART 2 PRODUCTS

2.1 GENERAL

A. Submit manufacturer's product data for all the items listed under this part.

2.2 PROTECTIVE PACKAGING

A. All asbestos containing material shall be disposed of at a Class III disposal facility that

will accept asbestos containing materials.

B. The abatement Contractor shall comply with all Federal, State, Local and OSHA requirements for the disposal of asbestos containing roofing materials.

2.3 WARNING LABELS AND SIGNS

A. As required by 29 CFR 1926.58 and 29 CFR 1910.145.

2 .4 PERSONAL PROTECTIVE EQUIPMENT

A. Personal Protective Equipment shall comply with the requirements of 29 CFR 1910, Subpart I.

B. Work clothes shall consist of disposable, full-body coveralls, head covers, boots, rubber gloves, and sneakers or equivalent in accordance with 29 CFA 1926.58, and ANSI Z41. Sleeves at wrists and cuffs at ankles shall be taped secure.

C. Eye protection and hard hats shall be available as required by applicable safety regulations and shall conform to ANSI 87.1 and 89.1.

D. Provide authorized visitors with suitable protective clothing, headgear, eye protection, and footwear whenever they are required to enter Work area.

2.5 RESPIRATORS

A. Provide all workers, foremen, superintendents, authorized visitors, and inspectors personally issued and marked respiratory equipment jointly approved by NIOSH/MSHA. When respirators with disposable filters are employed, provide sufficient filters for replacement as recommended by manufacturers or this specification. Selection of respirators shall be made according to the guidance of 29 CFR 1910 Subpart I; ANSI Z88.2; CGAI G7.1; EPA 560 OPTS-86.001.

B. When positive pressure supplied air Type "C" equipped with full face piece respirators are employed, the Air Supply System shall provide Grade "D" breathing air in accordance with OSHA 29 CFR 1910 Subpart I and ANSI Z88.2 and CGAI G7.1.

C. The Compressed Air system for Type "C" Respirators shall be high pressure (nominal 100 psi), with a compressor capacity to satisfy the respirator manufacturer's recommendations. The receiver shall have sufficient capacity to allow a 15 minute escape time for the respirator wearers in the event of compressor failure or malfunction. Type C supplied air respirators with HEPA filter disconnect may be used as an alternate to the 15 minute escape time required with event of compressor failure for Type C respirators. The Compressed Air System shall have compressor failure alarm, high

temperature alarm, carbon monoxide alarm, and suitable in-line air purifying sorbent beds and filters to assure Grade "D" breathing air.

B. The minimum respiratory protection required for this project is as follows:

1. Use half face mask air purifying respirators approved for asbestos in case the removal activity generates fibers.

2. If the fiber level at the work area exceeds 0.1 fiber/cc the respirator shall be upgraded to "powered air purifying respirator" full face piece with high efficiency filters.

PART 3 EXECUTION

3.1 PROJECT PROCEDURES

Initial Testing Procedures:

1. Furnish a minimum of two workers to manually remove existing roofing for a period of four hours. Workers and area of work will be monitored by an Air Sampling Professional, certified by the American Board of Industrial Hygiene and approved by the State. Use work practices to minimize fragmentation and tearing of material that contribute to increased dust generation, such as wetting roof, cutting roofing felts by hand and removing with spud bars.

2. Testing shall determine worker exposure level on an 8-hour time weighted average. If testing demonstrates that worker exposure is below action level of 0.1 fiber/cc of air calculated as an 8-hour time weighted average, the following shall not be required: Worker's using Personal Protective Equipment, Respirators, Decontamination Enclosure System (General), Worker Decontamination Enclosure System and Equipment Decontamination Enclosure System.

3. Dispose of removed material as specified in Paragraph III.5.

3.2 ABATEMENT PROCEDURE PLANS

A. Submit a detailed plan of the work procedures for abatement of asbestos-containing roofing materials to COR. Include the following:

B. Initial Testing Procedures. If initial testing procedure results in fiber level below action level, follow the same manual removal procedure for remainder of roofing removal as outlined in the Paragraph III.1.A. above.

C. Personnel monitoring procedures in accordance with 29 CFR 1926.58.

D. Phasing of abatement work indicating daily roster of workers for each phase.

E. Security system warning signs locations in accordance with 29 CFR 1926.58.

F. Detailed plans for worker decontamination facility and equipment decontamination facility, and toilets showing connections to the work area.

G. Standard procedures for protecting workers, visitors, and employees and protection of spaces outside work area from contamination.

3.3 EMERGENCY PRECAUTIONS AND PROCEDURES

A. Establish emergency and fire exits from the Work Area.
B. Local medical emergency personnel, both ambulance crews and hospital emergency room staff, shall be notified prior to commencement of abatement operations as to the possibility of having to handle contaminated or injured Workers, and shall be advised on safe decontamination.

C. Contractor shall be prepared to administer first aid to injured personnel after decontamination. Seriously injured personnel shall be treated immediately or evacuated without delay for decontamination. When an injury occurs, the Contractor shall stop Work and implement fiber reduction techniques (e.g., water spraying) until the injured person has been removed from the Work Area.

3.4 PREPARATION

A. Work Areas:

1. Do not begin Work until area is free of loose equipment.

2. Clean the proposed work areas using HEPA filtered vacuum equipment or wet cleaning methods as necessary to maintain fiber levels at or below O.1 f/cc. Methods that raise dust, such as dry sweeping or vacuuming with equipment not equipped with HEPA filters shall not be used.

3. Seal off openings, including but not limited to corridors, doorways, ducts, grills, diffusers, and any other penetrations into building interior, with plastic sheeting sealed with tape. Doorways and corridors which will not be used for passage during Work must be sealed with barriers.

4. Maintain emergency and fire exits from Work Areas.

B. Equipment Decontamination Enclosure System:

1. Provide an equipment decontamination enclosure system consisting of areas as follows:

    a. A wet sponge area to clean the outside of bagged waste.

    b. A holding area for the bagged asbestos roofing waste.

C. Asbestos abatement work shall not commence until:

1. Arrangements have been made for disposal of waste at an acceptable site and submitted to the Engineer for approval.

2. Tools, equipment and material waste receptors are on hand.

3. Preparatory steps have been taken and applicable notices posted and permits obtained.

4. Contractor’s submittals for isolating non-asbestos work areas have been reviewed and approved by the Government.

5. Timing of removal work has been coordinated with reroofing work, through the Construction Inspector and COR. Removal shall not be commenced until it is determined that removal can be accomplished and reroofing or temporary protective roofing can be completed without danger of damage by inclement weather.

3.5 DISPOSAL

A. Waste Transportation: Submit to ECI the method of transport of Asbestos containing material waste including name, address, EPA I.D. number and telephone number of transporter.

B. Asbestos Containing Material Waste Site: Submit to ECI for approval, the name, address, EPA I.D. number and telephone number of the Class III (3) waste site(s) to be utilized for disposal.

C. The sealed asbestos containers shall be delivered to Contractor's pre-designated approved Class III Waste Site, in accordance with Title 22, CCR, EPA guidelines and 40 CFR 61.156 and local Air Pollution Control District Regulations.

D. Notify the State 48 hours in advance of the time when contaminated materials are to be removed from the site.

E. Contractor shall be responsible for safe handling and transportation of asbestos-containing waste generated by this Contract to the designated Class III Waste Site.

F. Contractor shall hold the State of California Military Department harmless for claims, damages, losses, and expenses against the Government, including attorney's fees arising out of or resulting from asbestos spills on the site or spills enroute to the disposal site.

3.6 AIR MONITORING

A. Area Air Monitoring:

1. Throughout the abatement process area air monitoring shall be conducted by an approved Observation Service to ensure Work is done in conformance with fiber concentration limits in accordance with 29 CFR 1926.58.

2. If area air monitoring outside the Work Area or personnel air monitoring results are in excess of 0.05 f/cc Contractor shall make changes in work procedures to assure compliance with minimum standards. Unsatisfactory results are fiber counts in excess of 0.05 fibers/cc by PCM or 0.01 asbestos fibers/cc by TEM, determined as a TWA outside the work area for Area Air Monitoring.

3.7 CLEAN UP

A. Maintain a clean project site during and upon completion of Work of this Section. Cleaning shall be in accordance with Section 01700.

END OF SECTION 02082

LA Testing
159 Pasadena Avenue, South Pasadena, CA 91030
Phone: (323) 254-9960 Fax: (323) 254-9982 Email: pasadenalab@latesting.com

LA TESTING

Attn: Glenn Plaskett
Dresser Services
P. O. Box 378
Bakersfield, CA 93302-0376
Fax: (661) 589-8658 Phone: (661) 589-8655
Project: CNG/3800 W. Valhalla Dr. [redacted]

Customer ID: 32DRES55
Customer PO: 402
Received: 05/12/04 9:00 AM
LA Testing Order 320404832
LA Testing Proj:
Analysis Date: 5/12/2004

Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

				Non-Asbestos			Asbestos
Sample	Location	Appearance	Treatment	% Fibrous		% Non-Fibrous	% Type
402239 *320404832-0001*		Brown Non-Fibrous Homogeneous	Ashed	<1%	Cellulose	98% Matrix	2% Chrysotile
402239 M *320404832-0011*		Black Non-Fibrous Homogeneous	Heated	2%	Cellulose	98% Matrix	None Detected
402240 *320404832-0002*		Black Non-Fibrous Homogeneous	Ashed			100% Matrix	None Detected
0 M *4832-0012*		Yellow Non-Fibrous Homogeneous	Heated	<1%	Cellulose	100% Matrix	None Detected
402241 *320404832-0003*		Gray Non-Fibrous Heterogeneous	Teased	30%	Cellulose	70% Matrix	None Detected
402241 M *320404832-0013*		Black/Yellow Non-Fibrous Homogeneous	Teased	5%	Cellulose	95% Matrix	<1% Chrysotile
402242 *320404832-0004*		Gray Non-Fibrous Homogeneous	Ashed			100% Matrix	None Detected
402242 M *320404832-0014*		Yellow Non-Fibrous Homogeneous	Heated	3%	Cellulose	97% Matrix	None Detected
402243 *320404832-0005*		Tan Non-Fibrous Homogeneous	Ashed			100% Matrix	None Detected

Analyst(s)

Rafik Vartanian, Ph.D (17)

or other approved signatory

Due to magnification limitations inherent in PLM, asbestos fibers in dimensions below the resolution capability of PLM may not be detected. Samples reported as <1% or none detected may require additional testing by TEM to confirm asbestos quantities. The above test report relates only to the items tested and may not be reproduced in any form without the express written approval of EMSL Analytical, Inc. EMSL's liability is limited to the cost of analysis. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client.

Analysis performed by LA Testing (NVLAP #200232-0)

LA Testing
159 Pasadena Avenue, South Pasadena, CA 91030
Phone: (323) 254-9960 Fax: (323) 254-9982 Email: pasadenalab@latesting.com

LA TESTING

Attn: Glenn Plaskett
Dresser Services
P. O. Box 378
Bakersfield, CA 93302-0376
Fax: (661) 589-8658 Phone: (661) 589-8655
Project: **CNG/3800 W. Valhalla Dr.**

Customer ID: 32DRES55
Customer PO: 402
Received: 05/12/04 9:00 AM
LA Testing Order 320404832
LA Testing Proj:
Analysis Date: 5/12/2004

Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

				Non-Asbestos		Asbestos
Sample	Location	Appearance	Treatment	% Fibrous	% Non-Fibrous	% Type
402244 *320404832-0006*		Tan Non-Fibrous Homogeneous	Ashed		100% Matrix	None Detected
402244 M *320404832-0015*		Black Non-Fibrous Homogeneous	Heated	2% Cellulose	98% Matrix	None Detected
402245 *320404832-0007*		Tan Non-Fibrous Homogeneous	Ashed	<1% Cellulose	100% Matrix	None Detected
6 *4832-0008*		Brown Non-Fibrous Homogeneous	Crushed		98% Matrix	2% Chrysotile
402246 M *320404832-0016*		Black Non-Fibrous Homogeneous	Heated	2% Cellulose	98% Matrix	None Detected
402247 *320404832-0009*		Tan Non-Fibrous Homogeneous	Ashed		100% Matrix	None Detected
402247 M *320404832-0017*		Tan Non-Fibrous Homogeneous	Heated		100% Matrix	None Detected
402248 *320404832-0010*		Brown Non-Fibrous Homogeneous	Ashed	2% Cellulose	98% Matrix	None Detected

Analyst(s)

Rafik Vartanian, Ph.D (17)

or other approved signatory

Due to magnification limitations inherent in PLM, asbestos fibers in dimensions below the resolution capability of PLM may not be detected. Samples reported as <1% or none detected may require additional testing by TEM to confirm asbestos quantities. The above test report relates only to the items tested and may not be reproduced in any form without the express written approval of EMSL Analytical, Inc. EMSL's liability is limited to the cost of analysis. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client.

Analysis performed by LA Testing (NVLAP #200232-0)

THIS IS THE LAST PAGE OF THE REPORT.

LA Testing
159 Pasadena Avenue, South Pasadena, CA 91030
Phone: (323) 254-9960 Fax: (323) 254-9982 Email: pasadenalab@latesting.com

Attn: Glenn Plaskett
Dresser Services
P. O. Box 378
Bakersfield, CA 93302-0376
Fax: (661) 589-8658 Phone: (661) 589-8655
Project: **CNG/3800 W. Valhalla Dr.**

Customer ID: 32DRES55
Customer PO: 402
Received: 05/12/04 9:00 AM

LA Testing Order 320404835
LA Testing Proj:

Lead in Paint Chips by Flame AAS (SW 846, 7420)

Client Sample Description	*Lab ID*	*Analyzed*	*Lead Concentration*
402249	*0001*		2200.00 ppm
402250	*0002*		45000.00 ppm
402251	*0003*		53000.00 ppm
402252	*0004*		1100.00 ppm

or other approved signatory

Reporting limit is 0.01 % wt. This report relates only to those items tested.
ACCREDITATIONS: California State DHS #2283,AIHA #102814 and Cal ELap #2283

Date Printed: 5/12/2004 1:31:32 PM

PB w/o QC-1

LEAD-BASED PAINT SAMPLING RECORD

Dresser Services, Inc. Po Box 378 Bakersfield, Ca. 93302

Off. (661) 589-8655 Fax (661) 589-8658

Job #: 402 Job name: California National Guard Owner representative: Carl Williams

Date: 5/12/04

The samples itemized below were taken from the following location: 3800 W. Valhall Dr.

[redacted] CA

THE FOLLOWING SAMPLES WERE TAKEN TO DETERMINE LEAD CONTENT

Sample Number	Date Collected	Location of Sample	Description of Sample	Condition	Percentage by weight of lead	Parts per million
402249	5/11/04	UPSTAIRS RAIL TOP LAYER	BROWN PAINT	GOOD	0.220	2200.00
402250	5/11/04	UPSTAIRS RAIL 2ND LAYER	GREEN PAINT	GOOD	4.500	45000.00
402251	5/11/04	EAST STAIR POST	BROWN / GREEN PAINT	GOOD	5.300	53000.00
402252	5/11/04	WEST STAIR POST	BROWN / GREEN PAINT	GOOD	0.110	1100.00

Note: EPA and DHS: paint is considered to be "Lead-based Paint" at or above 5000 PPM or 0.5%.

CalOSHA: 600 PPM or 0.06% is considered to be lead-containing paint.

Samples analyzed by: LA Testing 159 Pasadena Ave. South Pasadena, Ca. 91030

Thank you for the opportunity to be of service,

Glenn Plaskett

President

DHS ID # 3614

File: 402burbank2lead

LA Testing
159 Pasadena Avenue, South Pasadena, CA 91030
Phone: (323) 254-9980 Fax: (323) 254-9982 Email: pasadenalab@latesting.com

Attn:	Glenn Plaskett Dresser Services P. O. Box 378 Bakersfield, CA 93302-0376	Customer ID:	32DRES55
		Customer PO:	402
		Received:	05/12/04 9:00 AM
Fax:	(661) 589-8658 Phone: (661) 589-8655	LA Testing Order	320404835
Project:	CNG/3800 W. Valhalla Dr.	LA Testing Proj:	

Lead in Paint Chips by Flame AAS (SW 846, 7420)

Client Sample Description	*Lab ID*	*Analyzed*	*Lead Concentration*
402249	0001		2200.00 ppm
402250	0002		45000.00 ppm
402251	0003		53000.00 ppm
402252	0004		1100.00 ppm

or other approved signatory

Reporting limit is 0.01 % wt. This report relates only to those items tested.
ACCREDITATIONS: California State DHS #2283,AIHA #102814 and Cal ELap #2283

Date Printed: 5/12/2004 1:31:32 PM

PB w/o QC-1

ASBESTOS BULK S...MPLING RECORD

Dresser Services, Inc. Po Box 378 Bakersfield, Ca. 93302

Off. (661) 589-8655 Fax (661) 589-8658

Job #: 402 Job name: California National Guard Owner representative: Carl Williams

File: 402burburbank2 Date: 5/12/04

The samples itemized below were collected from the following location: 3800 W. Valhalla Dr.

[redacted]A

Sample Number	Date Collected	Location of Sample	Description of Sample	Friable (FR) . Nonfriable(NF)	Percentage of asbestos	Estimated Quantity
402239	5/11/04	ROOM 112 FLOOR	BROWN 9" TILE / BROWN MASTIC	NF	2/ND	400 SQ FT
402240	5/11/04	ROOM 113 FLOOR (KITCHEN)	BLACK 12" TILE/MASTIC	NF	ND/ND	
402241	5/11/04	ROOM 113 FLOOR	WHITE GLUE	NF	ND/<1	200 SQ FT
402242	5/11/04	ROOM 113 FLOOR	GRAY 12" TILE / YELLOW GLUE	NF	ND/ND	
402243	5/11/04	ROOM 113 FLOOR BOTTOM LAYER	GOLD LINOLEUM / YELLOW GLUE	FR	ND	
402244	5/11/04	ROOM 201 (UPSTAIRS TRAINING ROOM) FLOOR UNDER CARPET	TAN 12" TILE / YELLOW GLUE / BLACK ADHESIVE	NF	ND/ND	
402245	5/11/04	ROOM 201 BASEBOARD	WHITE GLUE	NF	ND	
402246	5/11/04	UPSTAIRS MENS RESTROOM HALL	BROWN 9" TILE / BLACK MASTIC*	NF	2/ND	2225 SQ FT
402247	5/11/04	ROOM 210 FLOOR	TAN 12" TILE / GLUE	NF	ND/ND	
402248	5/11/04	ROOM 215 FLOOR	CARPET GLUE OVER 9" BROWN TILE	NF	ND	

* ALSO IN ROOMS 204, 205, 206, 207, 208, 209, 212, 213, 214, 215.

CEMENT FLOORS IN ROOMS 101, 102, 103, 104, 105, 106, 107, 108.

N = NORTH S = SOUTH E = EAST W = WEST EXT = EXTERIOR INT = INTERIOR FR = FRIABLE NF = NON-FRIABLE ND = NONE DETECTED

ASBESTOS BULK S..IPLING RECORD

Dresser Services, Inc. Po Box 378 Bakersfield, Ca. 93302

Off. (661) 589-8655 **Fax (661) 589-8658**

Job #: 402 Job name: California National Guard Owner representative: Carl Williams

File: 402burbank2 Date: 5/12/04

Samples analyzed by: LA Testing
159 Pasadena Ave.
South Pasadena, Ca. 91030

Dresser Services, Inc.

Glenn Plaskett
President
CAC# 92-0669

N = NORTH S = SOUTH E = EAST W = WEST EXT = EXTERIOR INT = INTERIOR FR = FRIABLE NF = NON-FRIABLE ND = NONE DETECTED

LA Testing
159 Pasadena Avenue, South Pasadena, CA 91030
Phone: (323) 254-9960 Fax: (323) 254-9982 Email: pasadenalab@latesting.com

Attn: Glenn Plaskett
Dresser Services
P. O. Box 376
Bakersfield, CA 93302-0376
Fax: (661) 589-8658 Phone: (661) 589-8655
Project: CNG/3800 W. Valhalla Dr.

Customer ID: 32DRES55
Customer PO: 402
Received: 05/12/04 9:00 AM
LA Testing Order 320404832
LA Testing Proj:
Analysis Date: 5/12/2004

Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Location	Appearance	Treatment	Non-Asbestos % Fibrous	Non-Asbestos % Non-Fibrous	Asbestos % Type
402239 *320404832-0001*		Brown Non-Fibrous Homogeneous	Ashed	<1% Cellulose	98% Matrix	2% Chrysotile
402239 M *320404832-0011*		Black Non-Fibrous Homogeneous	Heated	2% Cellulose	98% Matrix	None Detected
402240 *320404832-0002*		Black Non-Fibrous Homogeneous	Ashed		100% Matrix	None Detected
402240 M *320404832-0012*		Yellow Non-Fibrous Homogeneous	Heated	<1% Cellulose	100% Matrix	None Detected
402241 *320404832-0003*		Gray Non-Fibrous Heterogeneous	Teased	30% Cellulose	70% Matrix	None Detected
402241 M *320404832-0013*		Black/Yellow Non-Fibrous Homogeneous	Teased	5% Cellulose	95% Matrix	<1% Chrysotile
402242 *320404832-0004*		Gray Non-Fibrous Homogeneous	Ashed		100% Matrix	None Detected
402242 M *320404832-0014*		Yellow Non-Fibrous Homogeneous	Heated	3% Cellulose	97% Matrix	None Detected
402243 *320404832-0005*		Tan Non-Fibrous Homogeneous	Ashed		100% Matrix	None Detected

Analyst(s)
Rafik Vartanian, Ph.D (17)

or other approved signatory

Due to magnification limitations inherent in PLM, asbestos fibers in dimensions below the resolution capability of PLM may not be detected. Samples reported as <1% or none detected may require additional testing by TEM to confirm asbestos quantities. The above test report relates only to the items tested and may not be reproduced in any form without the express written approval of EMSL Analytical, Inc. EMSL's liability is limited to the cost of analysis. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client.
Analysis performed by LA Testing (NVLAP #200232-0)

PLM-1

LA Testing
159 Pasadena Avenue, South Pasadena, CA 91030
Phone: (323) 254-9960 Fax: (323) 254-9962 Email: pasadenalab@latesting.com

Attn: Glenn Plaskett
Dresser Services
P. O. Box 378
Bakersfield, CA 93302-0376
Fax: (661) 589-8658 Phone: (661) 589-8655
Project: CNG/3800 W. Valhalla Dr.

Customer ID: 32DRES55
Customer PO: 402
Received: 05/12/04 9:00 AM
LA Testing Order 320404832
LA Testing Proj:
Analysis Date: 5/12/2004

Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Location	Appearance	Treatment	Non-Asbestos % Fibrous	Non-Asbestos % Non-Fibrous	Asbestos % Type
402244 320404832-0008		Tan Non-Fibrous Homogeneous	Ashed		100% Matrix	None Detected
402244 M 320404832-0015		Black Non-Fibrous Homogeneous	Heated	2% Cellulose	98% Matrix	None Detected
402245 320404832-0007		Tan Non-Fibrous Homogeneous	Ashed	<1% Cellulose	100% Matrix	None Detected
402246 320404832-0008		Brown Non-Fibrous Homogeneous	Crushed		98% Matrix	2% Chrysotile
402246 M 320404832-0016		Black Non-Fibrous Homogeneous	Heated	2% Cellulose	98% Matrix	None Detected
402247 320404832-0009		Tan Non-Fibrous Homogeneous	Ashed		100% Matrix	None Detected
402247 M 320404832-0017		Tan Non-Fibrous Homogeneous	Heated		100% Matrix	None Detected
402248 320404832-0010		Brown Non-Fibrous Homogeneous	Ashed	2% Cellulose	98% Matrix	None Detected

Analyst(s)
Rafik Vartanian, Ph.D (17)

or other approved signatory

Due to magnification limitations inherent in PLM, asbestos fibers in dimensions below the resolution capability of PLM may not be detected. Samples reported as <1% or none detected may require additional testing by TEM to confirm asbestos quantities. The above test report relates only to the items tested and may not be reproduced in any form without the express written approval of EMSL Analytical, Inc. EMSL's liability is limited to the cost of analysis. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client.
Analysis performed by LA Testing (NVLAP #200232-0)

PLM-1

THIS IS THE LAST PAGE OF THE REPORT.

DRESSER SERVICES, INC.

P.O. Box 378, Bakersfield, CA 93302-0378
7827 Mosasco Street, Bakersfield, CA 93312

(661) 589-8655
Fax (661) 589-8658

February 12, 2004

State of California
Military Department
9800 Goethe Road
P O Box 269101
Sacramento, Ca. 95826-9101

Attn: Geoff Nickless
Subject: Armory located at 3800 W Valhalla Dr, Burbank
Asbestos inspection

Attached is the final report of our asbestos inspections on January 20th and 24th, 2004. The report was delayed due to additional testing required on samples of exterior paint surfaces of the armory building.

Results of this inspection are inconclusive, but my professional opinion is that the original tan paint on the exterior walls contains asbestos. However, the asbestos content is below the California regulated quantity of >0.1%. Additional sampling and a more exact lab analysis method which is required for low levels of asbestos gave results of either none detected or <0.1%. However, the caulking placed on cracks on the walls contains asbestos below the federal level >1.0%, but above the California level of >0.1%. There are at least 25 locations with about 10 square feet average per location where this material has been applied. Caution must be used in preparing the walls for new paint in these areas. If the material is to be removed in preparation for painting, you should use a registered asbestos contractor if 100 square feet or more will be disturbed.

The original of this report will hard mailed to you when original laboratory reports are received.

Dresser Services, Inc.

Glenn Plaskett, president
CAC 92-0669

RECEIVED
04 APR -5 AM 9:34

ASBESTOS BULK S...MPLING RECORD

Dresser Services, Inc. Po Box 378 Bakersfield, Ca. 93302
Off. (661) 589-8655 **Fax (661) 589-8658**

Job #: 402 Job name: California National Guard Owner representative: Geoff Nickless

File: 402burbank Date: 2/12/04

The samples itemized below were collected from the following location: 3800 West Valhalla Drive
Burbank, CA 91505

ARMORY

Sample Number	Date Collected	Location of Sample	Description of Sample	Friable (FR) Nonfriable(NF)	Percentage of asbestos	Estimated Quantity
40231	1/20/04	UPPER WINDOWS	GRAY PUTTY	NF	ND	
40232 POINT CT	1/20/04	SOUTH UPPER WALL, CENTER ON CRACK	TAN PAINT / TAPE	FR	<1 ND	
40233 POINT CT	1/20/04	SOUTH UPPER WALL, CENTER ON CRACK	TAN PAINT/CAULK	NF	<1 <0.1	250 SQ.FT*
40234	1/20/04	LOWER ROOF CURB TOP SEAL	WHITE CAULK	NF	ND	
40235	1/20/04	SW CORNER SOUTH UPPER WALL ON JOINT	WHITE CAULK	NF	ND	
40236	1/20/04	LOWER WINDOWS	WHITE PUTTY	NF	ND	
40237	1/20/04	LOWER WINDOWS	REPLACEMENT PUTTY	NF	ND	
402115 POINT CT	1/24/04	W EXTERIOR WALL @ CORNER ON CRACK	WHITE CAULK	NF	<1 <0.1	SEE 40233
402116 POINT CT	1/24/04	SOUTH EXTERIOR WALL EAST END ON CRACK	WHITE CAULK	NF	<1 0.3	SEE 40233
402117 POINT CT	1/24/04	NORTH EXTERIOR WALL ON CRACK	WHITE CAULK / TAPE	NF	<1 <0.1	SEE 40233

* APPROXIMATELY 25 LOCATION

N = NORTH S = SOUTH E = EAST W = WEST EXT = EXTERIOR INT = INTERIOR FR = FRIABLE NF = NON-FRIABLE ND = NONE DETECTED

ASBESTOS BULK S..MPLING RECORD

Dresser Services, Inc. Po Box 378 Bakersfield, Ca. 93302

Off. (661) 589-8655 Fax (661) 589-8658

Job #: 402 Job name: California National Guard Owner representative: Geoff Nickless

File: 402burbank Date: 2/12/04

Sample Number	Date Collected	Location of Sample	Description of Sample	Friable (FR) Nonfriable(NF)	Percentage of asbestos	Estimated Quantity
402118 POINT CT	1/24/04	UPPER EXTERIOR WALL NW CORNER AT NEW ROOF FLASHING	OLDER TAN PAINT	NF	<1 <0.1	ENTIRE EXTERIOR
402119	1/24/04	UPPER GUTTERS	TAN PAINT	NF	ND	

NOTE: NO EXPANSION JOINT MATERIAL OBSERVED.

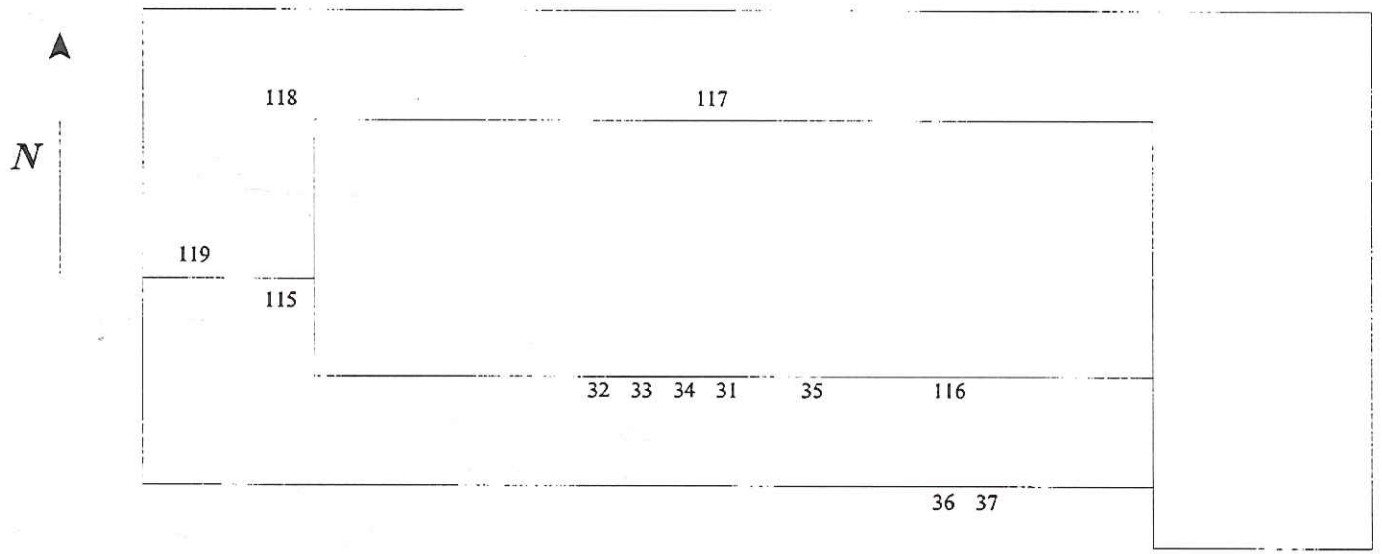
N = NORTH S = SOUTH E = EAST W = WEST EXT = EXTERIOR INT = INTERIOR FR = FRIABLE NF = NON-FRIABLE ND = NONE DETECTED

ASBESTOS BULK S..MPLING RECORD

Dresser Services, Inc. Po Box 378 Bakersfield, Ca. 93302
Off. (661) 589-8655 Fax (661) 589-8658

Job #: 402 Job name: California National Guard Owner representative: Geoff Nickless
File: 402burbank Date: 2/12/04

FLOOR PLAN & SAMPLE LOCATION MAP



N = NORTH S = SOUTH E = EAST W = WEST EXT = EXTERIOR INT = INTERIOR FR = FRIABLE NF = NON-FRIABLE ND = NONE DETECTED

ASBESTOS BULK S..MPLING RECORD

Dresser Services, Inc. Po Box 378 Bakersfield, Ca. 93302
Off. (661) 589-8655 Fax (661) 589-8658

Job #: 402 Job name: California National Guard Owner representative: Geoff Nickless
File: 402burbank Date: 2/12/04

Samples analyzed by: LA Testing
159 Pasadena Ave.
South Pasadena, Ca. 91030

Dresser Services, Inc.

Glenn Plaskett
President
CAC# 92-0669

N = NORTH S = SOUTH E = EAST W = WEST EXT = EXTERIOR INT = INTERIOR FR = FRIABLE NF = NON-FRIABLE ND = NONE DETECTED

LA Testing
159 Pasadena Avenue, South Pasadena, CA 91030
ne: (323) 254-9960 Fax: (323) 254-9982 Email: pasadenalab@latesting.com

LA TESTING

Attn: Glenn Plaskett
Dresser Services
P. O. Box 378
Bakersfield, CA 93302-0376
Fax: (661) 589-8658 Phone: (805) 589-8655
Project: **CNG Project E335/3800 W. Valhall Dr.**

Customer ID: 32DRES55
Customer PO:
Received: 01/21/04 9:00 AM
LA Testing Order 320400443
LA Testing Proj:
Analysis Date: 1/22/2004

Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Location	Appearance	Treatment	Non-Asbestos % Fibrous	Non-Asbestos % Non-Fibrous	Asbestos % Type
40231 *320400443-0001*		Gray Non-Fibrous Homogeneous	Teased Dissolved		100% Non-fibrous (other)	**None Detected**
40232 *320400443-0002*		Beige Fibrous Heterogeneous	Teased	20% Glass	80% Non-fibrous (other)	**<1% Chrysotile**
40233 *320400443-0003*		Beige Non-Fibrous Heterogeneous	Crushed Dissolved		100% Non-fibrous (other)	**<1% Chrysotile**
.J443-0004		White/Black Non-Fibrous Heterogeneous	Teased	10% Cellulose	90% Non-fibrous (other)	**None Detected**
40235 *320400443-0005*		Beige Non-Fibrous Heterogeneous	Teased		100% Non-fibrous (other)	**None Detected**
40236 *320400443-0006*		Beige Non-Fibrous Heterogeneous	Teased		100% Non-fibrous (other)	**None Detected**
40237 *320400443-0007*		White Non-Fibrous Homogeneous	Teased		100% Non-fibrous (other)	**None Detected**

Analyst(s)

Duong Kieu-anh (7)

or other approved signatory

Due to magnification limitations inherent in PLM, asbestos fibers in dimensions below the resolution capability of PLM may not be detected. Samples reported as <1% or none detected may require additional testing by TEM to confirm asbestos quantities. The above test report relates only to the items tested and may not be reproduced in any form without the express written approval of EMSL Analytical, Inc. EMSL's liability is limited to the cost of analysis. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client.
Analysis performed by LA Testing (NVLAP #200232-0)

THIS IS THE LAST PAGE OF THE REPORT.

LA Testing
159 Pasadena Avenue, South Pasadena, CA 91030
Phone: (323) 254-9960 Fax: (323) 254-9982 Email: pasadenalab@latesting.com

LA TESTING

Attn: Glenn Plaskett
Dresser Services
P. O. Box 378
Bakersfield, CA 93302-0376
Fax: (661) 589-8658 Phone: (805) 589-8655
Project: **CNG/Valhalla, Burbank**

Customer ID: 32DRES55
Customer PO: 402
Received: 01/26/04 9:00 AM
LA Testing Order 320400559
LA Testing Proj:
Analysis Date: 1/26/2004

Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

				Non-Asbestos			Asbestos
Sample	Location	Appearance	Treatment	% Fibrous		% Non-Fibrous	% Type
402115 *320400559-0001*		Tan Non-Fibrous Heterogeneous	Crushed Dissolved			100% Non-fibrous (other)	<1% Chrysotile
402116 *320400559-0002*		Tan Non-Fibrous Heterogeneous	Crushed Dissolved			100% Non-fibrous (other)	<1% Chrysotile
402117 *320400559-0003*		Tan Non-Fibrous Heterogeneous	Crushed Dissolved			100% Non-fibrous (other)	<1% Chrysotile
8 *J559-0004*		Tan Non-Fibrous Heterogeneous	Crushed Dissolved			100% Non-fibrous (other)	<1% Chrysotile
402119 *320400559-0005*		Tan Non-Fibrous Homogeneous	Crushed Dissolved	<1%	Cellulose	100% Non-fibrous (other)	None Detected

Analyst(s)

Duong Kieu-anh (5)

or other approved signatory

Due to magnification limitations inherent in PLM, asbestos fibers in dimensions below the resolution capability of PLM may not be detected. Samples reported as <1% or none detected may require additional testing by TEM to confirm asbestos quantities. The above test report relates only to the items tested and may not be reproduced in any form without the express written approval of EMSL Analytical, Inc. EMSL's liability is limited to the cost of analysis. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client.

Analysis performed by LA Testing (NVLAP #200232-0)

THIS IS THE LAST PAGE OF THE REPORT.

LA Testing
159 Pasadena Avenue, South Pasadena, CA 91030
Phone: (323) 254-9960 Fax: (323) 254-9982 Email: pasadenalab@latesting.com

Attn: Glenn Plaskett
Dresser Services
P. O. Box 378
Bakersfield, CA 93302-0376
Fax: (661) 589-8658 Phone: (805) 589-8655
Project: **CNG Project E335/3800 W. Valhall Dr., Burbank**

Customer ID: 32DRES55
Customer PO:
Received: 02/06/04 5:00 PM
LA Testing Order 320401098
LA Testing Proj:
Analysis Date: 2/9/2004

Asbestos Analysis of Bulk Material via EPA 600/R-93/116. Quantitation using the 1,000 Point Count Procedure

				Non-Asbestos		Asbestos
Sample	Location	Appearance	Treatment	% Fibrous	% Non-Fibrous	% Type
40232 *320401098-0001*		Beige Fibrous Heterogeneous	Teased		100.00% Matrix	None Detected
40233 *320401098-0002*		Beige Non-Fibrous Heterogeneous	Crushed Dissolved		100.00% Matrix	<0.1% Chrysotile

Analyst(s)
Angelique Petrosyan (2)

or other approved signatory

Comment:Some samples may contain asbestos fibers present in dimensions below PLM resolution limits. LA Testing suggests that samples reported as <0.1% or none detected undergo additional analysis via TEM. The above test report relates only to the items tested. This report may not be reproduced, except in full, without written approval LA Testing. This test report must not be used by the client to claim product endorsement by NVLAP or any agency of the United States Government. LA Testing. bears no esponsibility for sample collection activities, analytical method limitations, or the accuracy of results when requested to separate layered samples. LA Testing liability is limited to the cost of sample analysis.
Analysis performed by LA Testing (NVLAP #200232-0)

THIS IS THE LAST PAGE OF THE REPORT.

LA Testing
159 Pasadena Avenue, South Pasadena, CA 91030
Phone: (323) 254-9960 Fax: (323) 254-9982 Email: pasadenalab@latesting.com

Attn: Glenn Plaskett
Dresser Services
P. O. Box 378
Bakersfield, CA 93302-0376
Fax: (661) 589-8658 Phone: (805) 589-8655
Project: **CNG/ Valhalla, Burbank**

Customer ID: 32DRES55
Customer PO:
Received: 02/06/04 4:00 PM
LA Testing Order 320401099
LA Testing Proj:
Analysis Date: 2/9/2004

Asbestos Analysis of Bulk Material via EPA 600/R-93/116. Quantitation using the 1,000 Point Count Procedure

				Non-Asbestos		Asbestos
Sample	Location	Appearance	Treatment	% Fibrous	% Non-Fibrous	% Type
402115 *320401099-0001*		Tan Non-Fibrous Heterogeneous	Crushed Dissolved		100.00% Matrix	<0.1% Chrysotile
402116 *320401099-0002*		Tan Non-Fibrous Heterogeneous	Crushed Dissolved		99.70% Matrix	0.30% Chrysotile
402117 *320401099-0003*		Tan Non-Fibrous Heterogeneous	Crushed Dissolved		100.00% Matrix	<0.1% Chrysotile
[illegible] *3-0004*		Tan Non-Fibrous Heterogeneous	Crushed Dissolved		100.00% Matrix	<0.1% Chrysotile

Analyst(s)
Angelique Petrosyan (4)

or other approved signatory

...ner.Some samples may contain asbestos fibers present in dimensions below PLM resolution limits. LA Testing suggests that samples reported as <0.1% or none detected undergo additional analysis via TEM. The above test report relates only to the items tested. This report may not be reproduced, except in full, without written approval LA Testing. This test report must not be used by the client to claim product endorsement by NVLAP or any agency of the United States Government. LA Testing bears no esponsibility for sample collection activities, analytical method limitations, or the accuracy of results when requested to separate layered samples. LA Testing liability is limited to the cost of sample analysis.
Analysis performed by LA Testing (NVLAP #200232-0)

THIS IS THE LAST PAGE OF THE REPORT.

STATE OF CALIFORNIA — Arnold Schwarzenegger, *Governor*

DEPARTMENT OF INDUSTRIAL RELATIONS
DIVISION OF OCCUPATIONAL SAFETY AND HEALTH
ASBESTOS CONSULTANT and TRAINER APPROVAL UNIT
[illegible] Park Towne Circle, Suite 1
Sacramento CA 95825
Tel: (916) 574-2993 Fax: (916) 483-0574

Dresser Services, Inc.
Glenn R Plaskett
P. O. Box 378
Bakersfield, CA 93302-0378

12/23/2003

Dear Certified Asbestos Consultant or Technician:

Enclosed is your certification card. **To maintain your certification, please abide by the rules printed on the back of the certification card.**

Your certification is valid for a period of one year. If you wish to renew your certification, you must apply for renewal at least 60 days before the expiration date shown on your card. [8 CCR 341.15(h)(1)].

Please hold and do not send copies of your required AHERA refresher renewal certificates to the Division until you apply for renewal of your certification.

Please inform the Division of any changes in your mailing address or work address within 15 days.

Sincerely,

Rick Axe

Rick Axe
Senior Industrial Hygienist

RA/ms

Attachment: Certification Card

cc: File

State of California
Division of Occupational Safety and Health
Certified Asbestos Consultant
Glenn R Plaskett

Certification No. 92-0669
Expires on 1/28/2005

This certificate was issued by the Division of Occupational Safety and Health as authorized by Sections 7180 et seq. of the Business and Professions Code

LEAD-BASED PAINT SAMPLING RECORD

Dresser Services, Inc. Po Box 378 Bakersfield, Ca. 93302

Off. (661) 589-8655 **Fax (661) 589-8658**

Job #: 402 Job name: California National Guard Owner representative: Geoff Nickless

Date: 1/26/04 BURBANK

The samples itemized below were taken from the following location: 3800 West Valhalla Drive
Burbank CA 91505

THE FOLLOWING SAMPLES WERE TAKEN TO DETERMINE LEAD CONTENT

INTERIOR PAINT SAMPLES

Sample Number	Date Collected	Location of Sample	Description of Sample	Condition	Percentage by weight of lead	Parts per million
40238	1/20/04	ASSEMBLY HALL @ WEST ROLL-UP DOOR	TAN PAINT	GOOD	1.500	15000.00
40239	1/20/04	ASSEMBLY HALL WALLS @ FLOOR	BROWN / BLACK / GREEN PAINT	GOOD	0.770	7700.00
40240	1/20/04	NORTH WALL MAIN DOORS	BROWN PAINT	GOOD	2.900	29000.00
40241	1/20/04	ENTRY CEILING	TAN PAINT	GOOD	0.110	1100.00
40242	1/20/04	EAST WALL N SINGLE DOOR	BROWN / GREEN PAINT	GOOD	1.200	12000.00
40243	1/20/04	SOUTH WALL EAST DOUBLE DOOR	BROWN / GREEN PAINT	GOOD	0.260	2600.00
40244	1/20/04	SOUTH WALL WEST DOOR	BROWN / GREEN PAINT	GOOD	5.200	52000.00
40245	1/20/04	MEZZANINE RAILING	BROWN / GREEN PAINT	GOOD	0.880	8800.00
40246	1/20/04	LOWER WINDOW FRAMES	TAN / BROWN PAINT	GOOD	1.500	15000.00
40247	1/20/04	UPPER WINDOW FRAMES	TAN / BROWN PAINT	GOOD	0.170	1700.00

LEAD-BASED PAINT SAMPLING RECORD

Dresser Services, Inc. Po Box 378 Bakersfield, Ca. 93302

Off. (661) 589-8655 **Fax (661) 589-8658**

Job #: 402 Job name: California National Guard Owner representative: Geoff Nickless

Date: 1/26/04

EXTERIOR PAINT SAMPLES

Sample Number	Date Collected	Location of Sample	Description of Sample	Condition	Percentage by weight of lead	Parts per million
40248	1/20/04	NORTH WALL MAIN DOOR	BROWN PAINT	GOOD	0.450	4500.00
40249	1/20/04	EAST WALL SINGLE DOOR	BROWN PAINT	GOOD	0.049	490.00
40250	1/20/04	SOUTH WALL EAST DOUBLE DOOR	BROWN PAINT	GOOD	0.036	3600.00
40251	1/20/04	SOUTH WALL WEST DOUBLE DOOR	BROWN / GREEN PAINT	GOOD	4.800	48000.00
40252	1/20/04	WEST WALL NORTH SINGLE DOOR	BROWN / TAN PAINT	GOOD	0.024	240.00
40253	1/20/04	UPPER GUTTER	TAN PAINT	POOR	<0.010	<100.00
40254	1/20/04	UPPER FASCIA	TAN PAINT / RED PRIMER	POOR	<0.010	<100.00
40255	1/20/04	LOWER GUTTER	TAN PAINT / RED PRIMER	POOR	<0.010	<100.00
40256	1/20/04	VENT - SOUTH WALL	TAN PAINT / ORANGE PRIMER	POOR	2.000	67000.00
40257	1/20/04	UPPER WINDOW FRAMES	BROWN PAINT	GOOD	0.450	4500.00
40258	1/20/04	LOWER WINDOW FRAMES	BROWN PAINT	GOOD	2.000	20000.00

LEAD-BASED PAINT SAMPLING RECORD

Dresser Services, Inc. Po Box 378 Bakersfield, Ca. 93302
Off. (661) 589-8655 Fax (661) 589-8658

Job #: 402 Job name: California National Guard Owner representative: Geoff Nickless
Date: 1/26/04

Note: EPA and DHS: paint is considered to be "Lead-based Paint" at or above 5000 PPM or 0.5%.
OSHA: Any detectable amount is considered to be lead-containing paint.

Samples analyzed by: LA Testing 159 Pasadena Ave. South Pasadena, Ca. 91030

Thank you for the opportunity to be of service,

Glenn Plaskett
President
File: 402burbanklead

LA Testing
159 Pasadena Avenue, South Pasadena, CA 91030
Phone: (323) 254-9960 Fax: (323) 254-9982 Email: pasadenalab@latesting.com

LA TESTING

Attn: Glenn Plaskett
Dresser Services
P. O. Box 378
Bakersfield, CA 93302-0376
Fax: (661) 589-8658 Phone: (805) 589-8655
Project: **CNG Project E335/3800 W. Valhalla Dr.**

Customer ID: 32DRES55
Customer PO: 402
Received: 01/21/04 9:00 AM

LA Testing Order 320400441
LA Testing Proj:

Lead in Paint Chips by Flame AAS (SW 846, 7420)

Client Sample Description	*Lab ID*	*Analyzed*	*Lead Concentration*
40238	*0001*		15000.00 ppm
40239	*0002*		7700.00 ppm
40240	*0003*		29000.00 ppm
40241	*0004*		1100.00 ppm
40242	*0005*		12000.00 ppm
40243	*0006*		2600.00 ppm
40244	*0007*		52000.00 ppm
40245	*0008*		8800.00 ppm
40246	*0009*		15000.00 ppm
40247	*0010*		1700.00 ppm
	0011		4500.00 ppm
[illegible]	*0012*		490.00 ppm
40250	*0013*		360.00 ppm
40251	*0014*		48000.00 ppm
40252	*0015*		240.00 ppm
40253	*0016*		<100.00 ppm
40254	*0017*		<100.00 ppm
40255	*0018*		<100.00 ppm
40256	*0019*		67000.00 ppm
40257	*0020*		4500.00 ppm
40258	*0021*		20000.00 ppm

or other approved signatory

Reporting limit is 0.01 % wt.
ACCREDITATIONS: California State DHS #2283,AIHA #102814 and Cal ELap #2283

Date Printed: 1/22/2004 2:50:48 PM

PB w/o QC-1

National Asbestos Laboratories, Inc.

CA National Guard
Watt Ave
Sacramento, CA 95821
Phone #: 916-854-3608
Fax #:
Attention: Ron Beehler

Job Site: Burbank Armory

Job #:

Date Samples Taken 6/10/92
Date Report Submitted 6/10/92
NAL ID # / Lot # 484 / 1
Total Samples 6

POLARIZED LIGHT MICROSCOPY ANALYTICAL REPORT

Sample ID #	Asbestos Fibers Percent	Asbestos Fibers Type	Non Asbestos Fibers Percent	Non Asbestos Fibers Type	Non-Fibrous Materials Percent	Non-Fibrous Materials Type
Client ID CS-1a NAL ID 484 - 1 - 01 Location / Description: High roof - (Assy Hall) - painting/top layer. (silver and black)	2 - 3	Chrysotile	20 - 30	Cellulose	67 - 78	Calcite, tar, binder, clay, opaques, and misc. particles
Client ID CS-1b NAL ID 484 - 1 - 02 Location / Description: High roof - (Assy Hall) - bottom layer. (black)	0 - 0	None Detected	20 - 30	Cellulose	70 - 80	Calcite, tar, clay, opaques, organics, and misc. particles
Client ID CS-2a NAL ID 484 - 1 - 03 Location / Description: Mid roof - (Rifle Range) - painting / top layer. (silver and black)	2 - 3	Chrysotile	10 - 20	Cellulose	77 - 88	Calcite, tar, binder, clay, opaques, and misc. particles
Client ID CS-2b NAL ID 484 - 1 - 04 Location / Description: Mid roof - (Rifle Range) - bottom layer. (black)	0 - 0	None Detected	30 - 40	Cellulose	60 - 70	Calcite, tar, clay, opaques, and misc. particles
Client ID CS-3a NAL ID 484 - 1 - 05 Location / Description: Low roof - (Rear offices) - painting / top layer. (silver and black)	1 - 2	Chrysotile	20 - 30	Cellulose	68 - 79	Calcite, tar, clay, opaques, and misc. particles

Comments:

Key: 0-1*: Trace amount, <1%.
0-0: None Detected, <1%.
Login # 12884

yst: _____ Laboratory Manager: _____

All analyses performed at NAL are analyzed utilizing the procedures for the mineralogical identification of asbestos. NAL is accredited by the National Voluntary Laboratory Accreditation Program.

Samples are retained for six months and disposed of accordingly thereafter. If sample return is desired, please give notice at time of submittal.

National Asbestos Laboratories, Inc.

CA National Guard
Watt Ave
Sacramento, CA 95821
Phone #: 916-854-3608
Fax #:
Attention: Ron Beehler

Job Site: Burbank Armory

Job #:

Date Samples Taken 6/10/92
Date Report Submitted 6/10/92
NAL ID # / Lot # 484 / 1
Total Samples 6

POLARIZED LIGHT MICROSCOPY ANALYTICAL REPORT

Sample ID #	Asbestos Fibers Percent	Asbestos Fibers Type	Non Asbestos Fibers Percent	Non Asbestos Fibers Type	Non-Fibrous Materials Percent	Non-Fibrous Materials Type
Client ID CS-3b	0 - 0	None Detected	30 - 40	Cellulose	60 - 70	Calcite, tar, clay, opaques, organics, and misc. particles
NAL ID 484 - 1 - 06	- -		- -			
Location / Description: Low roof - (Rear office) - bottom layer. (black)						

Comments:

Key: 0-1*: Trace amount, <1%.
0-0: None Detected, <1%.

Login # 12884

/st: Xiao

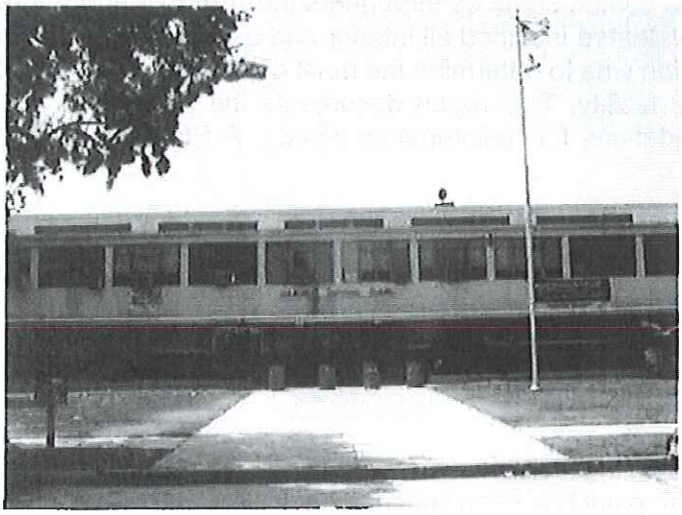
Laboratory Manager:

All analyses performed at NAL are analyzed utilizing the procedures for the mineralogical identification of asbestos. NAL is accredited by the National Voluntary Laboratory Accreditation Program.

Samples are retained for six months and disposed of accordingly thereafter. If sample return is desired, please give notice at time of submittal.

Final Report

Coating Evaluation
Armory Facility – Burbank, CA



Prepared for:

Steve Schultz
Architectural Senior Engineer
California National Guard
9800 Goethe Road
Sacramento, CA 95827

Prepared by:

Billy Campbell
Field Technician

Patrick Sweeney
Project Manager

Barry Barman
Principal Consultant

CSI Services, Inc.
P. O. Box 801357
Santa Clarita, CA 91380

June 14, 2006

P. O. Box 801357
Santa Clarita, CA 91380-2316
Toll free: 877.274.2422
Fax: 661.775.7628
www.CSIservices.biz

Providing Quality Technical Services to the Coating Industry

INTRODUCTION

Under the California National Guard's authorization, CSI Services, Inc. (CSI) completed an evaluation of various coated surfaces throughout the Armory Facility, Burbank, CA. The specific locations evaluated included all interior and exterior surfaces of the facility. The focus of the evaluation was to determine the most cost-effective approach to maintaining the coatings on the facility. This report documents the findings of the evaluation and includes recommendations for maintenance work. A Photo Summary has also been included.

Mr. Billy Campbell, NACE Certified Coating Inspector No. 8796 completed the fieldwork on Wednesday, June 7, 2006. This fieldwork involved visual observations and physical testing on various accessible surfaces. Analysis of heavy metals in the existing coatings was not a part of the scope of this assignment.

SUMMARY

Overall, the coatings on the facility are in mostly fair to good condition. The interior surfaces have areas where the paint has been spot mechanically damaged and areas with peeling, flaky, and delaminating paint. The exterior paint system is heavily chalked with spot locations of flaky and loosely adherent paint. Although the amount of cracks on the building is somewhat minimal, there are cracks in some areas that will require repair prior to coatings work. There also is evidence that unscheduled openings at windows and walls have allowed water to enter the building. The proper seal of all windows and the assurance that no unscheduled opening at construction joints or other locations should be verified. Some of these issues may be able to be corrected by replacing any poorly adhered caulking at construction joints and in and around windows, or replacing broken window glass.This should also be completed prior to any coating work.

It is recommended that all existing coated interior and exterior surfaces be water cleaned, patched, spot primed and overcoated. Any films containing heavy metals must be properly dealt with in accordance with all federal, state, and local safety and environmental regulations. It is further recommended that all poorly adhered caulking be removed and replaced prior to the start of any coating work.

FIELD EVALUATION

The focus of this fieldwork was to evaluate the current condition of the existing exterior and interior coating systems. The evaluation involved visual observations, and adhesion testing. Photographs were taken and a Photo Summary is included. The condition of the coatings were rated as poor, fair, good, or excellent. Where applicable, various tests and quantifications were completed. The degree of exterior chalking was determined in accordance with ASTM D4214 "Standard Test Method for Evaluating the Degree of Chalking of Exterior Paint Films." Any areas of thru-rusting were quantified in accordance with ASTM D610 "Standard Test Method for Evaluating the Degree of Rusting of Painted Steel Surfaces." Coating adhesion was assessed using ASTM D6677 "Standard Test Method for Evaluating Adhesion by Knife". Items of note from the field evaluation follow:

Interior Surfaces

Assembly Room – North Wall

1) The North wall is separated into seven sections by 8-inch vertical pillars and steel I-beams. The wall has two stories with a balcony and offices on the second floor. The paint on this wall is in fair condition. Each section of the wall is discussed below:

   a) **Section 1** - This section to the right has a staircase leading to the upstairs, an exit door, men's latrine door, and doors #117 & #118. The handrail for the stairs has mechanical damage on the top rail from typical long-term wear and tear. There are some moderately sized heavy paint delaminations on the lower half of the wall between the exit door and door #117. There is some minor mechanical damage on the lower part of the wall leading up the stairs and outside wall of the handrail upstairs. The areas of painted concrete in the stairwell is in good condition.

   b) **Section 2** – This section of the wall has some delaminations around the windows areas, and minor mechanical damage on the lower part of the wall and on the doors to the upstairs offices.

   c) **Section 3** – This section of the wall has some delaminations around the windows areas, and minor mechanical damage on the lower part of the wall and on the doors to the upstairs offices.

   d) **Section 4** – This section has the opening to the main entrance hall. The hall's sidewalls are comprised of red brick. The ceiling of the hall has some minor paint delaminations. The window above on the wall has paint peeling along its frame.

e) ***Section 5*** – The paint in this section has some minor mechanical damage on both the lower and upper parts of the wall. The areas around the window has peeling paint and indications of water leaks.

f) ***Section 6*** – Areas of the lower part of the wall have storage lockers against the wall that prevented a thorough inspection. The paint in this section has some minor mechanical damage on both the lower and upper parts of the wall. The areas around the window has peeling paint and indications of water leaks.

g) ***Section 7*** - The paint in this section has some minor mechanical damage on both the lower and upper parts of the wall. The areas around the window has peeling paint. The paint on the concrete stairwell is in good condition. The stair handrail has typical mechanical damage, and the window in the staircase has paint that is delaminating at its base.

2) Adhesion of the coating on the areas of the wall tested was found to be fair (ASTM D6677, 6).

Assembly Room – East Wall

1) Although there were numerous lockers on the wall that prevented a thorough evaluation, the coating on the wall in the areas inspected is in good condition with isolated areas of mechanical damage. The majority of the mechanical damage appears to be the result of activities in the area.

2) There is one window on the wall that appears to have a least one location where water has been leaking into the building. There is some peeling paint with efflorescence in the paint area damaged by water.

3) Adhesion of the coating on the lower section of the wall was found to be poor to fair (ASTM D6677, 4-6).

Assembly Room – South Wall

1) The South wall is separated into seven sections by 8-inch vertical steel I-beams and pillars.

2) The paint on the lowest 8 feet of the wall is in fair condition and mostly intact except for isolated areas with mechanical damage. Mechanical damage appears to be the result of impact activities in the area.

3) Each of the windows appears to leak during periods of rain. Evidence of water staining on top of the paint finish is present in many areas. There are also cracks that extend through the coating into the concrete in many

areas. Some of these cracks clearly have allowed water to enter behind the coating, which has resulted in peeling and delaminating in many areas.

4) There are numerous areas on this wall exhibiting moisture intrusion through cracks in the concrete substrate. Efflorescence and peeling paint is present in many areas.

5) Adhesion of the coating on the lower section of the wall was found to be fair (ASTM D6677, 6).

Assembly Room – West Wall

1) The paint on the lowest 8 feet of the wall is in fair condition and mostly intact except for isolated areas with mechanical damage. Mechanical damage appears to be the result of dings and scrapes in the area.

2) There is a roll-up door has some mechanical damage to the coating in the form of dings, scrapes, and breaks in various places across its surface. Some areas of the door have peeling paint and some of these mechanically damaged areas are showing signs of light corrosion. The coating on this wall is in fair condition with no visible peeling paint or cracking.

3) There is a minor crack that extends up from the corner area of the door entry. The paint immediately adjacent to this crack is flaky and peeling.

4) Adhesion of the coating on the lower section of the wall was found to be fair (ASTM D6677, 6).

Assembly Room – Ceiling

1) The ceiling is comprised of a steel roof support structure that is connected to each of the I-beams noted on the north and south walls. The steel structure supports an unpainted wood ceiling. The coating on the steel structure is in mostly good condition with the exception of the south and north corners. These areas primarily located specifically at the vertical supports have areas with peeling paint. There was no significant corrosion identified with this condition (ASTM D610, 9).

Assembly Room - Doors

1) The coating on all of the pedestrian doors leading out of the assembly room is in fair condition with minor areas of isolated damage. All damage is in the form of mechanical scrapes and dings.

Kitchen and Offices

1) The coating on the walls and ceiling of the kitchen is in excellent condition and the area appears to have been recently painted. The offices and latrine have various substrates in which the coating is in good condition with only minor damage. The areas around a few of the windows have indications of minor leaks.

Assembly Room - Floor

1) The floor of the assembly room appears to have a clearcoat on its surface. Although the coating has some minor cracks in areas, there are no wholesale coating concerns across its surface.

Exterior Surfaces

East Wall of Facility

1) The exterior coating on the east-facing wall is in mostly good condition. There is evidence of past climbing vegetation on a portion the wall that was not completely removed. There are also some minor cracks that are present that have some efflorescence present at the cracks.

2) The coated areas of the window frames are flaky in areas with some minor spot rust in areas.

3) The coating is relatively thick, heavily chalked (ASTM 4214, 6), and adhesion was found to be fair (ASTM D6677, 6) on areas evaluated.

4) The roof flashing has some light rust along much of its surface.

South Wall of Facility

1) The coating on the building's South wall is in good condition and the coating is heavily chalked (ASTM 4214, 6). The paint on the walls has areas with loose flaky paint and delaminations primarily at cracks in the substrate. There are also many spot locations that exhibit paint checking.

2) There are some painted steel substrate areas, notably on the pedestrian door that have some spot rusting.

3) The coating on the windows is in fair condition. The paint and sealant in many areas is loose and flaky.

4) Paint adhesion was found to be good (ASTM D6677, 6) in the areas evaluated.

West Wall of Facility

1) The coating on the west wall is in fair condition and heavily chalked (ASTM 4214, 6). The paint on the walls has areas with loose flaky paint and delaminations. There are some minor cracks present on this wall.

2) The coating on the windows is in poor condition. The paint and sealant in many areas is loose and flaky.

3) There is a galvanized rain gutter running along the upper edge of the main wall of the building. The paint on the majority of the interior of the gutter has peeled, but no significant corrosion was identified with one exception. There is one gap in the gutter that has rusted, and there is significant amount of rust staining running down along the wall.

4) Adhesion ranged from poor to fair (ASTM D6677, 4-6) in the various areas evaluated.

North Wall of Facility

1) The coating on the North wall is in good condition and heavily chalked (ASTM 4214, 6). The paint is mostly intact with no significant cracking identified. The concrete wall has many bugholes across its surface.

2) There are areas on the walls where some climbing vegetation had been removed. These areas were evident by residual vegetation still present in many areas.

3) The painted rain gutter has peeling paint along its outer edge. There are some minor areas with rust spots, but overall the paint is peeling from an intact undercoat.

4) There is a red brick wall within the lower center part of the wall that has some staining on its surface.

5) Coating adhesion ranged from fair to good (ASTM D6677, 6-8) in the areas evaluated.

DISCUSSION

Overall, the coatings on the facility are in mostly fair to good condition. The interior surfaces have areas where the paint has been spot mechanically damaged. There are also areas of peeling, flaky, and delaminating paint mostly in areas where there are walls cracks or indications of past water leaks. The exterior paint system is heavily chalked with spot locations of flaky and loosely adherent paint. Although the amount of cracks on the building is minimal, there are cracks in some areas that will require repair prior to coatings work. It

was also noted that there are some remnants of climbing vegetation that will also need to be addressed prior to any painting. There also is evidence that some of the windows have allowed water to enter the building. The proper seal of all windows and the assurance that no unscheduled construction joints or other unscheduled openings should be confirmed prior to painting work. Some of these issues may be able to be corrected by replacing any poorly adhered caulking at construction joints and in and around windows. This should also be completed prior to any coating work. Most mechanically damaged paint is typically in locations that see high traffic or have a tendency to have equipment or personnel impacting its surface.

All coated exterior surfaces should be pressure water cleaned and all spot defects should be feather-edged to sound coating/primed. All prepared surfaces should then be overcoated. Cracks in concrete walls greater than 1/32" should be v-grooved and filled with a cementicious grouting material. Water cleaning should be made using 3000 to 5000 PSI water. This process will perform two important functions. First it will test the integrity of the coating. If the existing coating can withstand the pressure, it is considered well bonded. Second, the process will clean all remaining intact coating of contaminants. The cleaning process should utilize detergents to remove all debris (i.e. chalk, dirt, etc.). Because of the difficulty in dealing with large volumes of water on the interior surfaces, water cleaning on the interior can be performed using stiff bristled brushes followed by hand or power tool cleaning to remove all loose, flaky and non-adherent coatings. Once free of dirt, oil, grease and unsound coatings, feather-edge back all spot prepared areas to sound coatings, spot repair and overcoat. Coatings are considered sound when they cannot be removed with the blade of a dull putty knife. It should also be noted that the red bricks on the exterior would benefit from power washing off all of the staining on their surface. The bricks, however, should not be coated unless special direction is given.

It is suspected that the existing systems that are experiencing heavy mechanical damage for the most part are probably acrylics. A harder, more durable coating such as an epoxy would provide a better performance against abrasion, but the marginal adhesion of the existing coatings would not adequately act as a base coat for this type of system. On this basis, an acrylic system should be reapplied once the existing poorly adhered coatings have been properly prepared for new coatings.

It is understood that the coatings will be tested for heavy metals by others as part of the evaluation and planning for this coating project. It should be clear that any films containing heavy metals must be properly dealt with in accordance with all federal, state, and local safety and environmental regulations.

RECOMMENDED WORK

In order to complete the most economical approach to maintaining the coatings on the facility, the following recommended work should be completed:

1) Remove and replace all poorly adhered expansion joint caulking.

2) Remove all substantial remnants of climbing vegetation on the exterior walls.

3) Assure that all wall penetrations are properly sealed.

4) Remove all chalking, efflorescence, contaminants, and poorly adhered coatings in accordance with SSPC: The Society of Protective Coatings' Surface Preparation Specification No .12 Low-Pressure Water Cleaning (SSPC-SP12, LPWC) using 3000 to 5000 PSI using a solution of trisodium phosphate (TSP) at 3 ounces to a gallon of clean water. All areas should then be rinsed with clean water and allowed to dry. Special care should be made to assure that all surfaces are impacted by the full water pressure. This will assure that all remaining coatings are well bonded and that all contaminants have been removed. This washing should include the use of stiff bristled brushes. Obviously, special care should be made to protect surfaces that cannot get wet. Power washing should also include the building's exterior red brick surfaces that should not be painted.

5) Spot repairs to damaged coating should be made using either hand or power tool cleaning equipment in accordance with SSPC-SP2 or 3. All spot repairs should be feathered back to sound coating a minimum of 3 inches in all directions.

6) Cracks in concrete walls greater than 1/32" should be v-grooved to a depth of ¼" and flush filled with an acrylic resin based cementicious grouting material.

7) Special care should be made to assure the proper coating of all irregular areas of the walls (i.e. bugholes)

8) Following all proper surface preparation, as noted above apply the following coating systems in accordance with the manufacturer's written recommendations:

   A) Metal substrates:
   Prime Coat:
   High-solids epoxy coating applied at 3.0 – 5.0 mils
   2nd Coat:
   Waterborne Acrylic enamel applied at 2.0 – 3.0 mils

Finish Coat:
Waterborne Acrylic enamel applied at 2.0 – 3.0 mils

B) Concrete, wood, and all other substrates:

Prime Coat:
Waterborne Acrylic enamel applied at 2.0 – 3.0 mils DFT.

Finish Coat:
Waterborne Acrylic enamel applied at 2.0 – 3.0 mils DFT.

Photo Summary

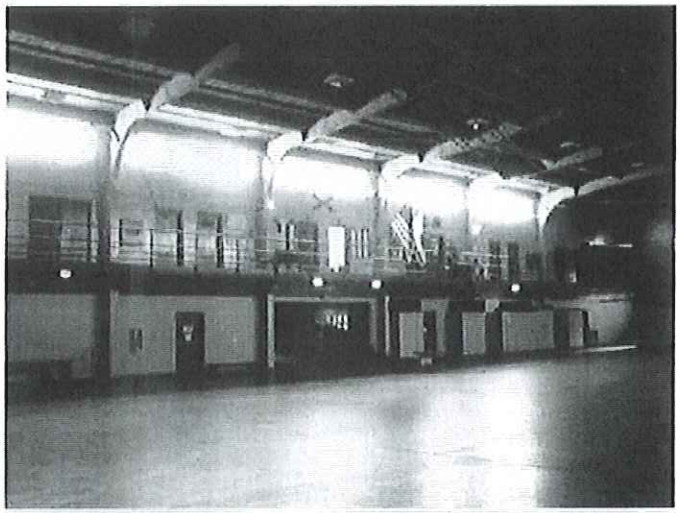


Photo 1 – Overview of interior assembly hall, North wall.

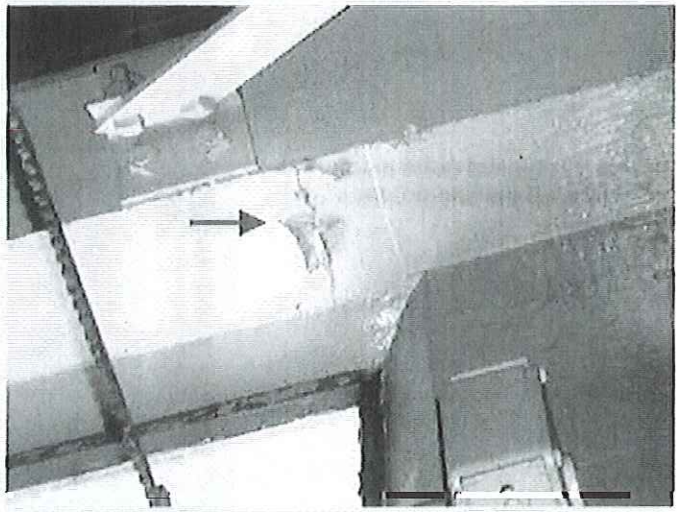


Photo 2 – Condition of the wall adjacent to a window. Note the crack and resulting peeling paint.

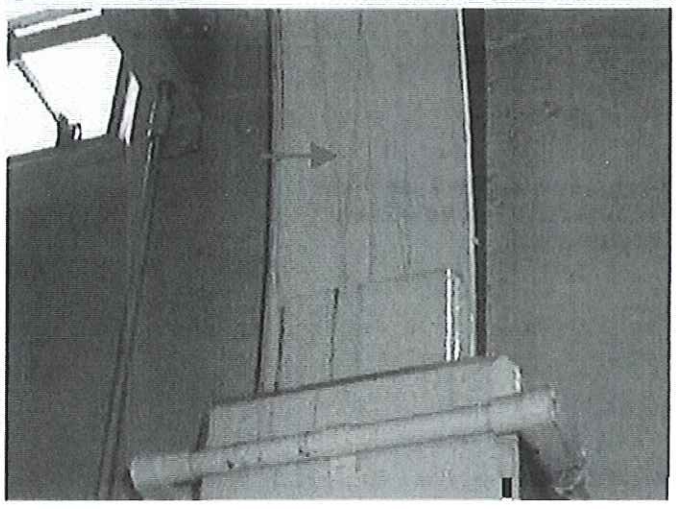


Photo 3 – Water staining on top of the paint on the vertical steel wall beams.

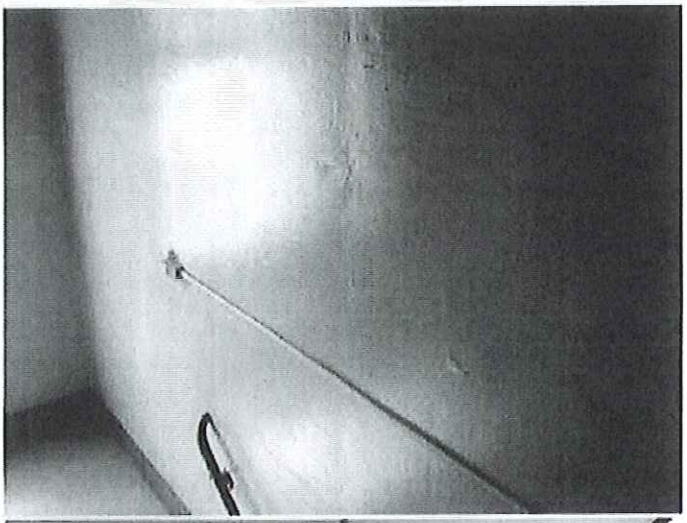


Photo 4 – Typical good condition of the concrete walls within the stairwells.

Photo 5 – Typical good condition of the walls on the second floor of the North wall.

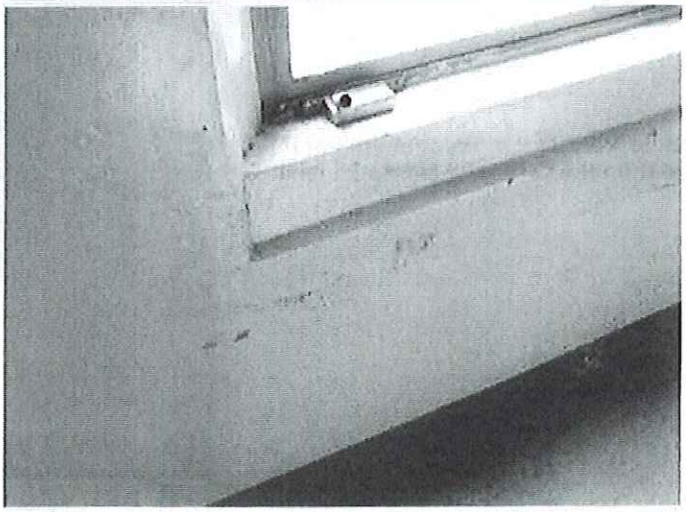


Photo 6 – Areas of mechanically damaged paint in the stairwell of the North wall.

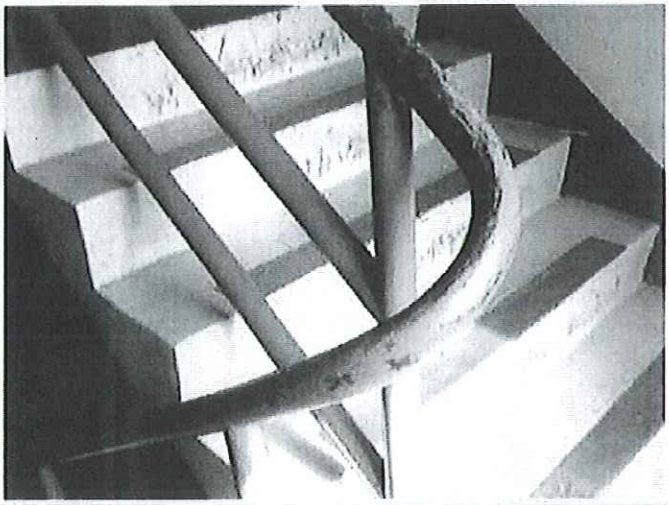


Photo 7 – Typical condition of the heavy traffic areas of the stairwell handrails with mechanically damaged paint.

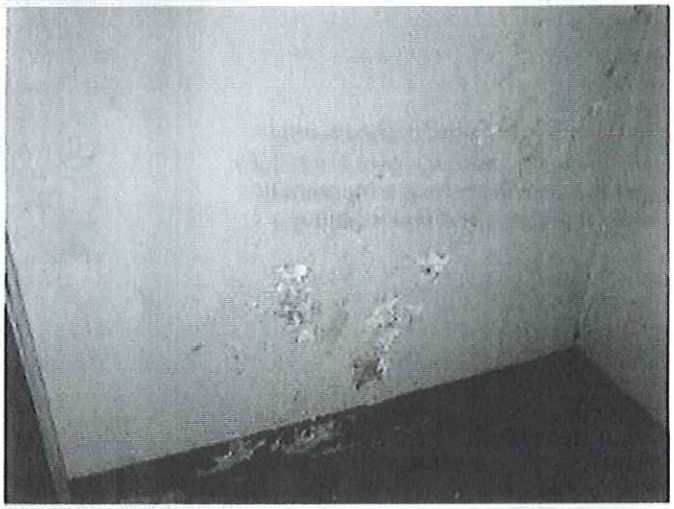


Photo 8 – Area on North wall that has flaky, peeling paint.

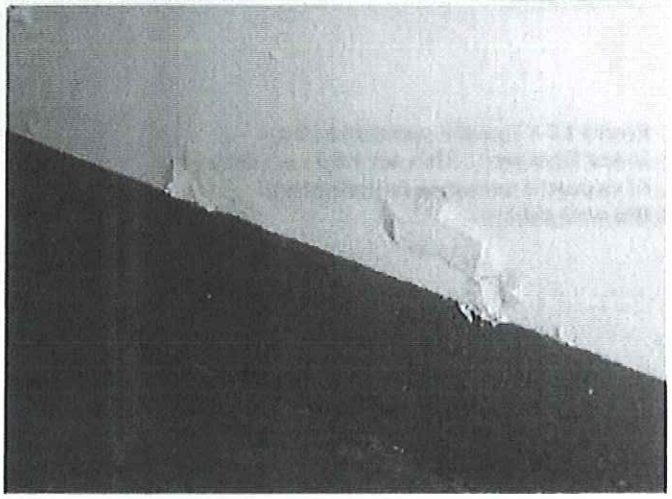


Photo 9 – View of an area within the lowest 2 feet of the on the West wall where the paint is loose and peeling.

Photo 10 – Overview of East wall.

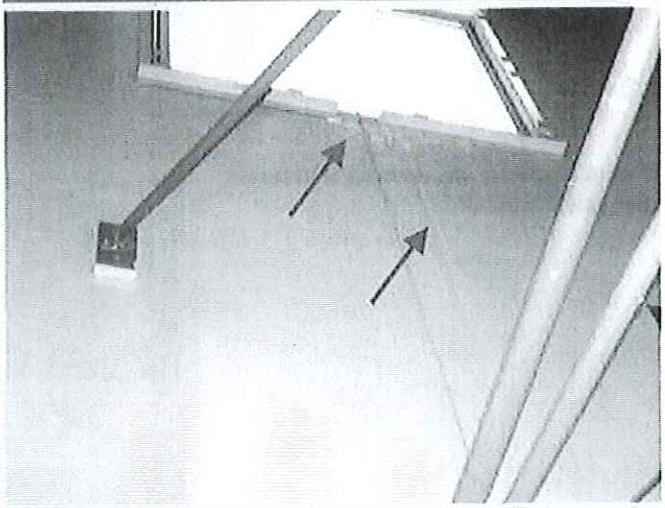


Photo 11 – Area immediately below the East wall window. Note the flaky paint and efflorescence immediately above the areas of water staining

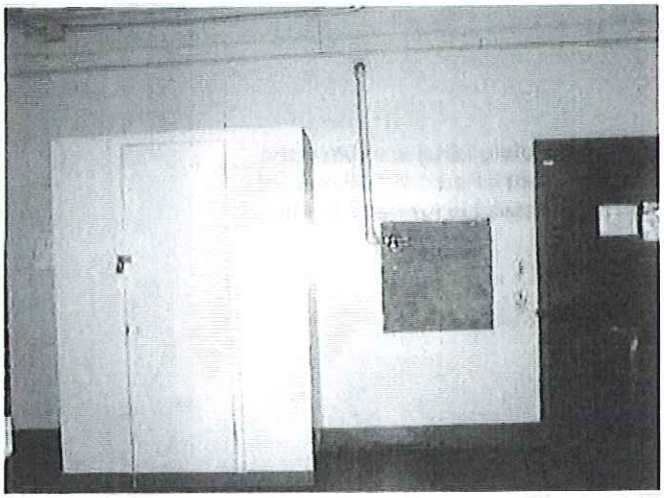


Photo 12 – Typical condition of the lower East wall. This view has an area of exposed concrete to the right of the wall cabinet.

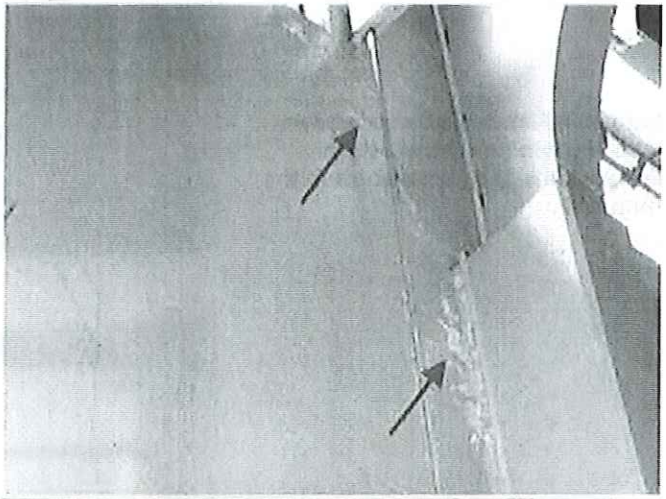


Photo 13 – Area on South wall with flaky, peeling paint at a crack extending from a window sill. This area had efflorescence associated with its condition.

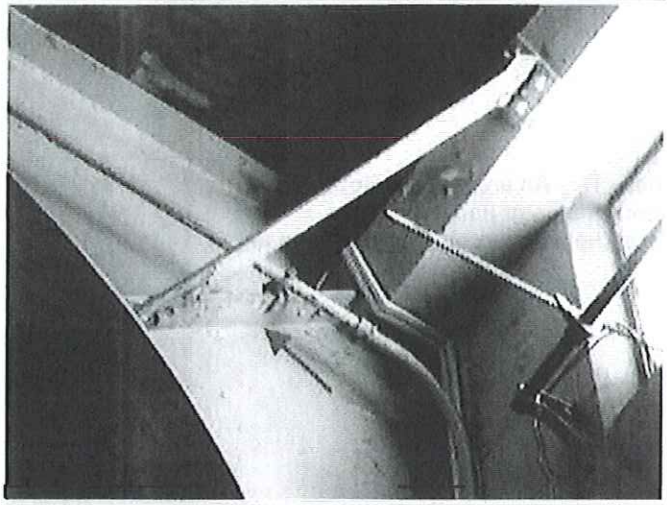


Photo 14 – View of area on South wall where a vertical roof support beam is adjacent to a window. Note the peeling and flaky paint from the primer.

Photo 15 – Flaky paint on the edges of two cracks on the South wall.

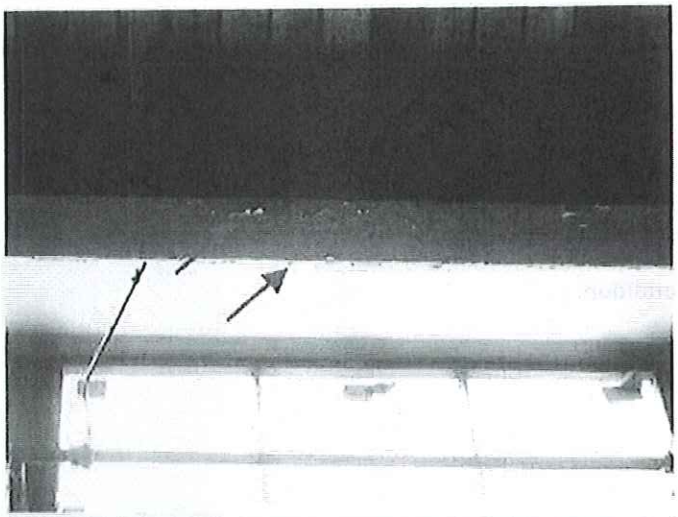


Photo 16 – Flaky paint on a beam above the window immediately beneath the ceiling adjacent to the South wall.

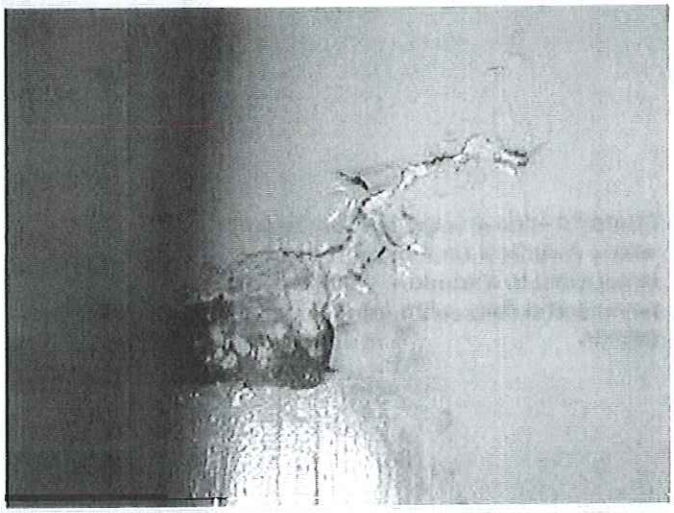


Photo 17 – An area on the South wall where the paint has disbonded. Note: the efflorescence under the paint.

Photo 18 – Typical good condition of the interior ceiling and walls of the various side office rooms of the interior.

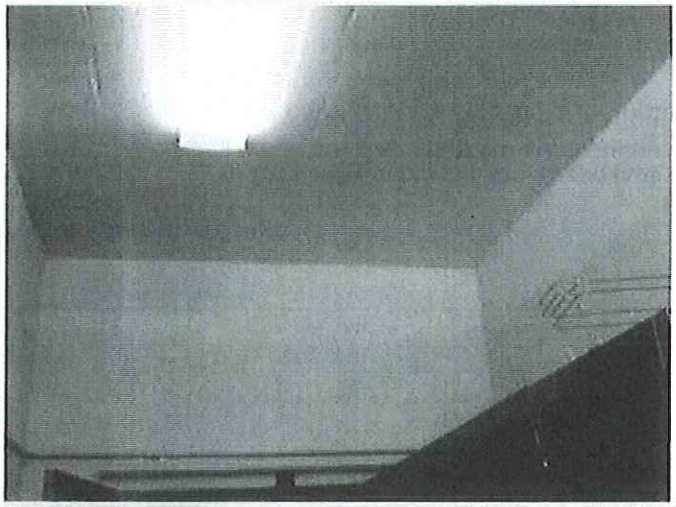


Photo 19 – Typical good condition of the interior ceiling and walls of the kitchen.

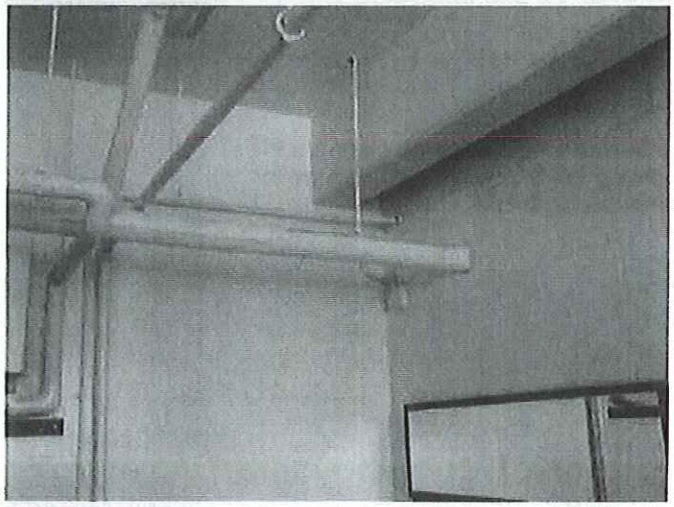


Photo 20 – Typical good condition of the interior ceiling and walls of the latrine.

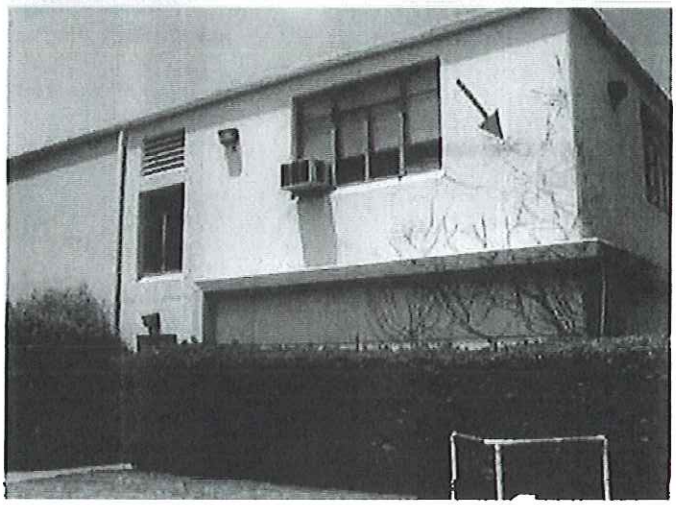


Photo 21 – Overview of the exterior East wall with paint in good condition. Note the remnants of climbing vegetation on the corner of the building.

Photo 22 – View of an area with an air-conditioning unit. Note the cracked wall below the unit with efflorescence.

Photo 23 – View of paint peeling off of the outside of the roof rain gutter on the East wall.

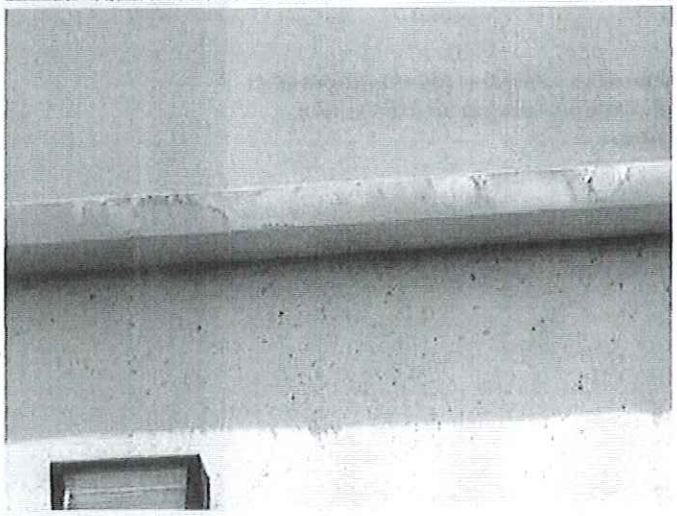
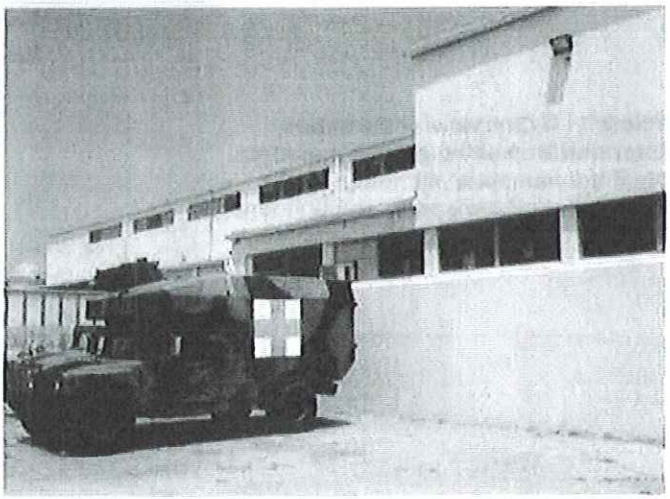


Photo 24 – Overview of exterior South wall.



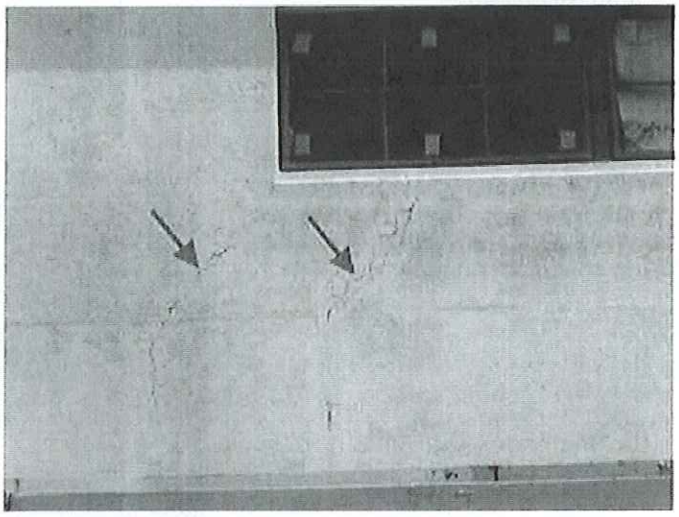


Photo 25– Close-up view of an area below the second story windows on the Exterior South wall. Note the cracking and minor checking of the paint in this area.

Photo 26 – View of some peeling, flaky paint between two windows on the exterior South wall.

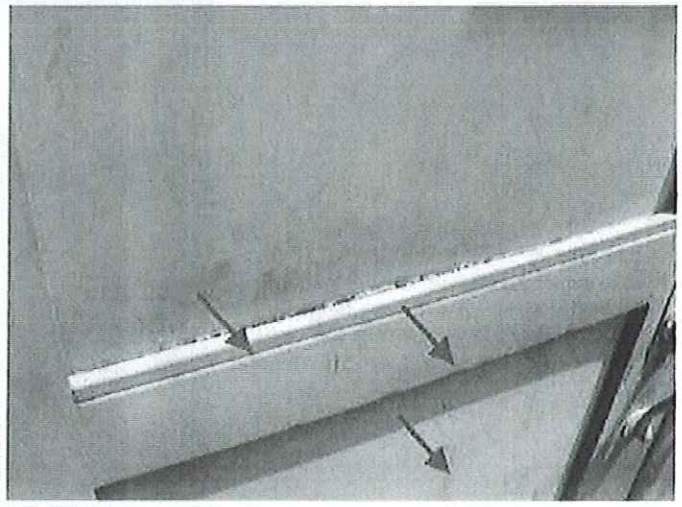


Photo 27 – Close-up view of the condition of a pedestrian door on the South wall. Note the heavy chalking and spot rust developing.

Photo 28 – Overview of the Exterior of the West wall. The arrow notes a rust area with rust staining extending from an upper rain gutter.

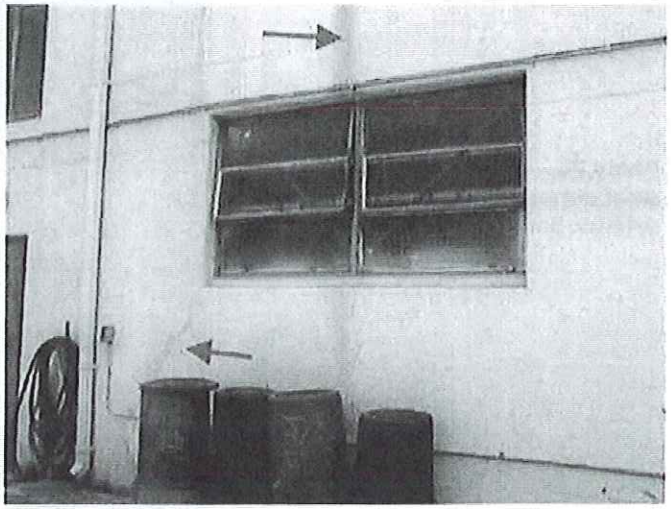


Photo 29 – View of a window on the exterior West wall. Note the cracking and efflorescence extending from the window frame. Also of note is the tail end of the rust staining noted above in Photo 28.

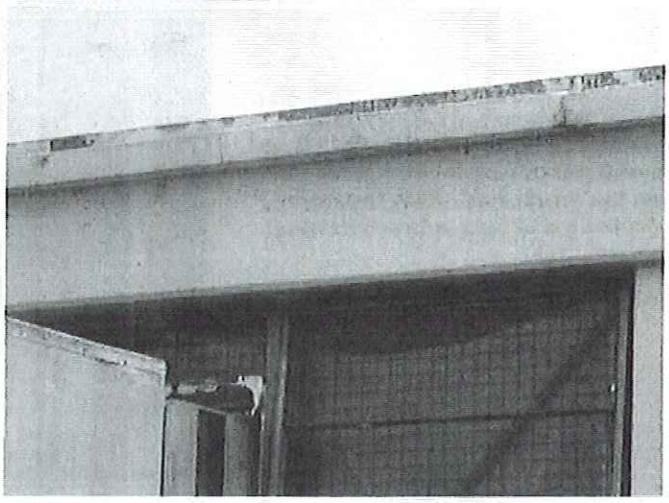


Photo 30 – View of a rain gutter with peeling paint primarily from its inside galvanized surfaces. Also of note is the flaky condition of the sealant and paint on the window frame.

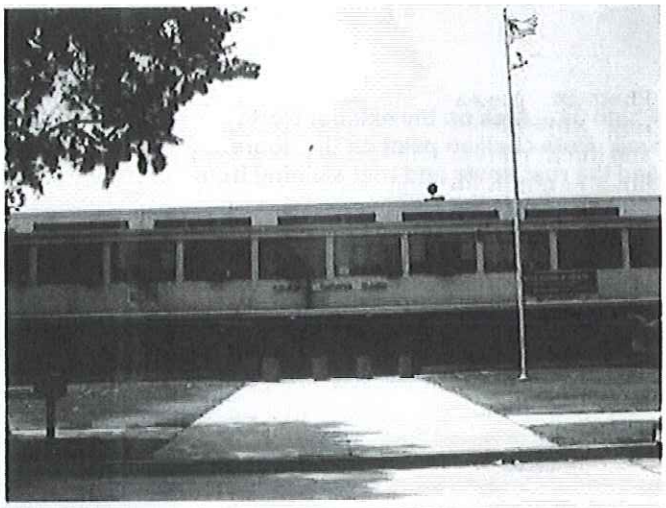


Photo 31 – Overview of the exterior North wall.

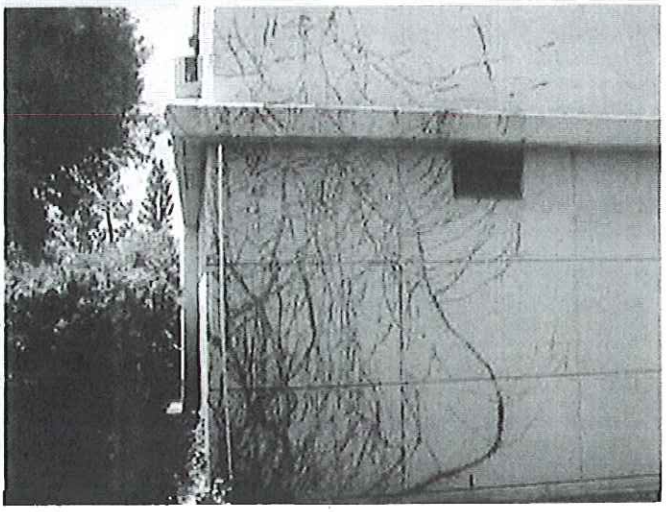


Photo 32 – View of the exterior North wall with remnants of climbing vegetation over the painted surfaces.

Photo 33 – View of the upper portion of the exterior North wall. Note the peeling paint on the rain gutter and concrete bugholes

Photo 34 – Area on the exterior North wall. Note chalked paint on the doors and the rust spots and rust staining from the area above the sign.

Photo 35 – Area of red bricks that have at least heavy staining on their surface.

Photo 36 – View of an area on the exterior North wall with peeling paint and heavily chalked window frames.

SECTION 02090 – REMOVAL AND DISPOSAL OF LEAD-CONTAINING PAINT

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. This specification section provides requirements for the removal, handling, transporting, storage and disposal of lead based coatings. The Contractor shall comply with all Federal, State and Local regulations for removal, handling, transporting, storing and disposing of lead based coatings.

1.2 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred within the text by the basic designation only.

1. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

    a. ANSI Z9.2 - 1979 Fundamentals Governing the Design and Operation of Local Exhaust Systems.

    b. ANSI Z88.2 - 1980 Respiratory Protection.

2. CALIFORNIA CODE OF REGULATIONS (CCR)

    a. TITLE 22 - California Code of Regulations.

3. CODE OF FEDERAL REGULATIONS (CFR)

    a. 29 CFR 1910. 94 - Ventilation.

    b. 29 CFR 1910.1025 - Respiratory Protection.

    c. 29 CFR 1910.1025 - Lead.

    d. 29 CFR 1910.1200 - Hazard Communication.

    e. 29 CFR 1926.55 - Gases, Vapors, Fumes, Dusts and Mists.

    f. 29 CFR 1926.57 - Ventilation

    g. 29 CFR 1926.62 - Lead

h. 40 CFR 52 - Clean Air Act

i. 40 CFR 260 - Hazardous Waste Management Systems: General.

j. 40 CFR 261 - Identification and Listing of Hazardous Waste.

k. 40 CFR 262 - Generators of Hazardous Waste.

l. 40 CFR 263 - Transporters of Hazardous Waste.

m. 40 CFR 264 - Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities.

n. 40 CFR 265 - Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities.

o. 40 CFR 172 - Hazardous Materials Tables and Hazardous Materials Communications Regulations 40 CFR 178 Shipping Container Specification.

4. UNDERWRITERS LABORATORES INC. (UL)

a. UL 586 - 1990 High-Efficiency, Particulate, Air Filter Units.

1.3 DEFINITIONS

A. Action Level for Lead Based Coatings.

1. Action Level for Airborne Lead Concentrations: Employee exposure, without regard to use of respirators, to an airborne concentration of lead of 30 micrograms per cubic meter of air averaged over an 8-hour period. As used in this section, “30 micrograms per cubic meter of air” refers to the action level.

2. Action Level for Lead Content: The level of lead concentration established for each type of analysis performed, which if the lead concentration equals or exceeds the action level specified herein, renders the material hazardous.

a. Action Level for Toxicity Characteristic Leaching Procedure (TCLP) by EPA 200.7: Action level for TCLP is 5.0 milligrams per liter.

b. Action Level for Total Threshold Limit Concentration Leak (TTLC) by EPA 6010: Action level for TTLC is 1000 milligrams per kilogram.

c. Action Level for Soluble Threshold Limit Concentration (STLC) by EPA 200.7: Action level for STLC is 5.0 milligrams per liter.

B. Area Monitoring: Sampling of lead concentrations within the lead control area and inside the physical boundaries which is representative of the airborne lead concentrations which may reach the breathing zone of personnel potentially exposed to lead.

C. Physical Boundary: Area physically roped or partitioned off around an enclosed lead control area to limit unauthorized entry of personnel. As used in this section, "inside boundary" shall mean the same as "outside lead control area."

D. Certified Industrial Hygienist (CIH): As used in this section, refers to an Industrial Hygienist employed by the Contractor and who is certified by the American Board of Industrial Hygiene in comprehensive practice.

E. Change Rooms and Shower Facilities: Rooms within the designated physical boundary around the lead control area equipped with separate storage facilities for clean protective work clothing and equipment and for street clothes which prevent cross-contamination.

F. Decontamination Room: Room for removal of contaminated personal protective equipment (PPE).

G. Eight-Hour Time Weighted Average (TWA): Airborne concentration of lead averaged over an 8-hour workday to which an employee is exposed.

H. High Efficiency Particulate Air (HEPA) Filter Equipment: HEPA filtered vacuuming equipment with a UL 586 filter system capable of collecting and retaining lead-contaminated paint dust. A high efficiency particulate filter means 99.97 percent efficient against 0.3 micron size particles.

I. Lead: Metallic lead, inorganic lead compounds, and organic lead compounds.

J. Lead Control Area: An enclosed area or structure with full containment to prevent the spread of lead dust, paint chips, or debris of lead-containing paint removal operations. The lead control area is isolated by physical boundaries to prevent unauthorized entry of personnel.

K. Lead Permissible Exposure Limit (PEL): Fifty micrograms per cubic meter of air as an 8-hour time weighted average as determined by 29 CFR 1910.1025. If an employee is exposed for more than 8 hours in a work day, the PEL shall be determined by the following formula:

PEL (micrograms/cubic meter of air)-400/# hours worked per day.

L. Personal Monitoring: Sampling of lead concentrations within the breathing zone of an employee to determine the 8-hour time weighted average concentration in accordance with 29 CFR 1910.1025. Samples shall be representative of the employee's work tasks. Breathing zone shall be considered an area within a hemisphere, forward of the shoulder, with a radius of 6 to 9 inches and the center at the nose or mouth of an employee.

1.4 GENERAL DESCRIPTION

A. The work includes removal and disposal of lead-containing paint from contaminated surfaces as indicated.

1. Removal shall be accomplished by removal of unsound lead base coatings from the contaminated surfaces within the area of work as identified on the project drawings.

2. In some instances removal may be accomplished by complete removal of contaminated surfaces such as facia boards, gutters, roof flashings, and window frames.

3. Additionally, the contractor shall dispose of all stripped lead base coatings and demolition materials which are coated with lead based paints.

1.5 QUALITY ASSURANCE

A. Medical Examinations: Before exposure to lead-contaminated dust, provide workers with a comprehensive medical examination as required by 29 CFR 1910.1025 and 29 CFR 1910.1200. The examination will not be required if adequate records show that employees have been examined as required by 29 CFR 1910.1025 within the last year.

1. Medical Records: Maintain complete and accurate medical records of employees for a period of at least 40 years or for the duration of employment plus 20 years, whichever is longer.

B. CIH Responsibilities:

1. Certify training.

2. Review and approve lead-containing paint removal plan for conformance to the applicable referenced standards.

3. Inspect lead-containing paint removal work for conformance with the approved plan.

4. Ensure work is performed in strict accordance with specifications at all times.

5. Ensure hazardous exposure to personnel and to the environment are adequately controlled at all times.

C. Training: Train each employee performing paint removal, disposal, and air sampling operations prior to the time of initial job assignment, in accordance with 29 CFR 1910.1025.

1. Training Certification: Submit certificates signed and dated by the CIH and by each employee stating that the employee has received training.

D. Respiratory Protection Program:

1. Furnish each employee required to wear a negative pressure respirator or other appropriate type with a respirator fit test at the time of initial fitting and at least every 6 months thereafter as required by 29 CFR 1910.1025. Where negative pressure respirators are worn they shall not be worn for more than 4.4 hours per day.

2. Establish and implement a respiratory protection program as required by ANSI Z88.2, 29 CFR 1910.134, 29 CFR 1910.1025 and 29 CFR 1926.55.

E. Hazard Communication Program: Establish and implement a Hazard Communication Program as required by 29 CFR 1910.12000.

F. Hazardous Waste Management: The Hazardous Waste Management plan shall comply with applicable requirements of federal, state, and local hazardous waste regulations and address:

1. Identification of hazardous wastes associated with the work.

2. Estimated quantities of wastes to be generated and disposed of.

3. Names and qualifications of each contractor or facility that will be transporting, storing, treating, and disposing of the wastes. Include the facility location and a 24-hour point of contact with name, address and telephone number. Identify what EPA, state and local hazardous waste permits are required to authorize/permit the transport, storage treatment and/or disposal of the hazardous materials and provide proof/ verification that the Contractor or facility has obtained the required permits. Include EPA identification number, with expiration date.

4. Names and qualifications (experience and training) of personnel who will be working on-site with hazardous wastes.

5. List of waste handling equipment to be used in performing the work, to include cleaning, volume reduction, and transport equipment.

6. Spill prevention, containment, and cleanup contingency measures to be implemented.

7. Work plan and schedule for waste containment, removal and disposal. Waste shall be cleaned up and containerized daily.

8. Cost for hazardous waste disposal according to this plan.

G. Additional Requirements: In addition to the detailed requirements of this specification, comply with the following:

1. Clean Air Act (CAA) 40 CFR 52.

2. The local air pollution control district (APCD) or air quality management

district (AQMD) rules and regulations.

3. Ambient Air Monitoring: Ambient air monitoring shall be conducted through the use of high-volume samplers set within and downwind of the subject abatement area. These samplers shall be preceded by a 7-day meteorological study to determine the consistent wind velocity and wind direction for the determination of the location of the sampler.

4. Samplers: Samplers shall include APCD or AQMD approved PM10 (Particulate matter 10 μm or smaller) sampler(s) and a total suspended particulate (TSP) monitor. Sampling conducted using these samplers shall conform with CAA requirements.

5. Ambient Air Monitoring shall conform with CAA requirements for 1.5. μg/ cubic meter.

6. Safety and Health Compliance: In addition to the detailed requirements of this specification, comply with laws, ordinances, rules and regulations of federal, state, and local authorities regarding removing, handling, storing, transporting, and disposing of lead waste materials. Comply with the applicable requirements of the current issue of 29 CFR 1910.1025. Submit matters regarding interpretation of standards to the State for resolution before starting work. Where specification requirements and the referenced documents vary, the most stringent requirements shall apply. The following local laws, ordinances, criteria, rules and regulations regarding removing, handling, storing, transporting, and disposing of lead-contaminated materials apply:

7. TITLE 22, California Code of Regulations.

H. Pre-Construction Conference: Along with the CIH, meet with the COR and Project Inspector to discuss in detail the lead-containing paint removal work plan, including work procedures and precautions for the work plan.

1.6 SUBMITALS

A. Submit the following in accordance with Section 01300, “Submittals.”

1. Manufacturer’s Catalog Data:

a. Vacuum filters.

b. Respirators.

2. Instructions:

a. Paint removal materials. Include applicable material safety data sheets.

3. Statements:

    a. Qualifications of CIH.

    b. Testing Laboratory qualifications.

    c. Lead-containing paint removal plan.

    d. Rental equipment notification.

    e. CIH approval of work plan (signature, date, and certification number).

    f. Respiratory protection program.

    g. Hazard communication program.

    h. EPA approved hazardous waste treatment or disposal facility for lead disposal.

    i. Hazardous waste management plan.

B. Qualifications of CIH: Submit name, address, and telephone number of the CIH selected to perform responsibilities in paragraph entitled "CIH Responsibilities." Provide previous experience of the CIH. Submit proper documentation that the Industrial Hygienist is certified by the American Board of Industrial Hygiene in comprehensive practice, including certification number and date of certification/recertification.

C. Testing Laboratory: Submit the name, address, and telephone number of the testing laboratory selected to perform the monitoring, testing, and reporting of airborne concentrations of lead. Provide proper documentation that persons performing the analysis have been judged proficient by successful participation within the last year in the National Institute for Occupational Safety and Health (NIOSH) Proficiency Analytical Testing (PAT) Program. The laboratory shall be accredited by the American Industrial Hygiene Association (AIHA). Provide AIHA documentation along with the date of accreditation/reaccreditation.

D. Lead-Containing Paint Removal Plan

1. Submit a detailed job-specific plan of the work procedures to be used in the removal of lead-containing paint. The plan shall include a sketch showing the location, size, and details of lead control areas, location and details of decontamination rooms, change rooms, shower facilities, and mechanical ventilation system.

2. Submit eating, drinking, smoking and restroom procedures, interface of trades, sequencing of lead related work, collected wastewater and paint debris disposal plan, air sampling plan, respirators, protective equipment, and a detailed description of the method of containment of the operation to ensure that airborne lead concentrations of 30 micrograms per cubic meter of air are not exceeded outside of the lead control area. Include air sampling, training and strategy, sampling methodology, frequency, duration of sampling, and qualifications of air monitoring personnel in the air sampling portion of the plan.

E. Field Test Reports

1. Monitoring Results.

F. Air Monitoring: Submit monitoring results to the State within 3 working days, signed by the testing laboratory employee performing the air monitoring, the employee that analyzed the sample, and the CIH.

G. Certificates

1. Vacuum filters.

H. Records

1. Completed and signed hazardous waste manifest from treatment, storage and disposal facility.

2. Certification of medical examinations.

3. Employee training certification.

I. Contractor to provide copies of all applicable regulation pamphlets on the job site, and provide same to inspector on request.

1.7 REMOVAL

A. Title of Materials: Materials resulting from demolition work, except as specified otherwise, shall become the property of the Contractor and shall be disposed of, "Demolition of Equipment", except as specified herein.

1.8 EQUIPMENT

A. Furnish the State with two complete sets of personal protective equipment daily, as required herein, for entry into and inspection of the paint removal work within the lead controlled area. Personal protective equipment shall include fitted respirators and disposable whole body covering, including appropriate foot, head, and hand protection. PPE shall remain the property of the Contractor.

B. Respirators: Furnish appropriate respirators approved by the NIOSH, Department of Health and Human Services, for use in atmospheres containing lead dust. Respirators shall comply with the requirements of 29 CFR 1910.1025.

C. Special Protective Clothing: Furnish personnel who will be exposed to lead-contaminated dust with appropriate disposable protective whole body clothing, head covering, gloves, and foot coverings. Furnish appropriate disposable plastic or rubber gloves to protect hands. Reduce the level of protection only after obtaining approval from the CIH.

D. Rental Equipment Notification: If rental equipment is to be used during lead-containing paint handling and disposal, notify the rental agency in writing concerning the intended use of the equipment. Furnish a copy of the written notification to the State.

E. Vacuum Filters: UL 586 labeled HEPA filters.

PART 2 PRODUCTS

2.1 PAINT REMOVAL PRODUCTS

A. Submit applicable Material Safety Data Sheets for paint removal products used in paint removal work. Use the least toxic product acceptable to the Industrial Hygienist. Conform with 29 CFR 1910.94 for ventilation.

PART 3 EXECUTION

3.1 PROTECTION

A. Notification: Notify the State in writing 14 calendar days prior to the start of any paint removal work.

B. Lead Control Area Requirements

1. Establish a lead control area by completely enclosing the area or structure where lead-containing paint removal operations will be performed.

2. Contain removal operations by the use of a negative pressure full containment system with at least one change room and with HEPA filtered exhaust.

3. Verify that personnel are not in building's affected area at time of lead-containing paint removal.

C. Protection of Existing Work to Remain: Perform paint removal work without damage or contamination of adjacent areas. Where existing work is damaged or contaminated, restore work to its original condition or better.

D. Boundary Requirements: Provide physical boundaries around the lead control area by stripping off the area designated in the Lead-Containing Paint Removal Plan, and providing curtains, portable partitions or other enclosures to ensure that airborne concentrations of lead will not reach 30 micrograms per cubic meter of air outside of the lead control area.

E. Furnishings: Remove furniture and equipment from the work area before lead-containing paint removal work begins. Coordinate with COR.

F. Heating, Ventilating and Air Conditioning (HVAC) Systems: Seal intake and exhaust vents in the lead control area with 6-mil plastic sheet and tape. Seal seams in HVAC components that pass through the lead control area.

G. Change Room and Shower Facilities: Provide clean change rooms and shower facilities within the physical boundary around the designated lead control area in accordance with requirements of 29 CFR 1910.1025.

H. Mechanical Ventilation System

1. Use adequate Ventilation to control personnel exposure to lead in accordance with 29 CFR 1926.57.

2. To the extent feasible, use fixed local exhaust ventilation connected to HEPA filters. Local exhaust ventilation systems shall be designed, constructed, installed, and maintained in accordance with ANSI Z9.2.

3. Provide specification of the mechanical ventilation system to the industrial hygienist.

I. Personnel Protection: Personnel shall wear and use protective clothing and equipment as specified herein. Eating, smoking, or drinking is not permitted in the lead control area. No one will be permitted in the lead control area unless they have appropriate training and protective equipment.

J. Warning Signs: Provide warning signs at approaches to lead control areas. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Signs shall comply with the requirements of 29 CFR 19101.1025.

3.2 WORK PROCEDURES

A. Perform removal of lead-containing paint in accordance with approved lead-containing paint removal plan. Use procedures and equipment required to limit occupational and environmental exposure to lead when lead-containing paint is removed in accordance with 29 CFR 1910.1025, except as specified herein. Dispose of removed paint chips and associated waste in compliance with Environmental Protection Agency (EPA), federal, state, and local requirements.

B. Personnel Exiting Procedures: Whenever personnel exit the lead-controlled area, they shall perform the following procedures and shall not leave the work place wearing any clothing or equipment worn during the work day.

C. Monitoring: Monitoring of airborne concentrations of lead shall be in accordance with 29 CFR 1910.1025 and as specified herein. Air monitoring, testing, and reporting shall be performed by a CIH or an Industrial Hygiene (IH) Technician who is under the direction of a CIH.

1. The CIH or the IH Technician under the direction of the CIH shall be on the job site directing the monitoring, and inspecting the lead-containing paint removal work to ensure that the requirements of the Contract have been satisfied during the entire lead-containing paint removal operation.

2. Take personal air monitoring samples on employees who are anticipated to

have the greatest risk of exposure as determined by the CIH. In addition, take air monitoring samples on at least 25 percent of the work crew or a minimum of two employees, whichever is greater, during each work shift.

3. Submit results of air monitoring samples, signed by the CIH, within 3 days after the air samples are taken. Notify the State immediately of exposure to lead at or in excess of the action level of 30 micro grams per cubic meter of air outside of the lead control area.

D. Monitoring During Paint Removal Work: Perform personal and area monitoring during the entire paint removal operation. Sufficient area monitoring shall be conducted at the physical boundary to ensure unprotected personnel are not exposed above 30 micrograms per cubic meter of air at all times. If the outside boundary lead levels are at or exceed 30 micrograms per cubic meter of air, work shall be stopped and the CIH shall immediately correct the condition(s) causing the increased levels and notify the State immediately. The CIH shall review the sampling data collected on that day to determine if condition(s) requires any further change in work methods. Removal work shall resume when approval is given by the CIH. The Contractor shall control the lead level outside of the work boundary to less than 30 micrograms per cubic meter of air at all times. As a minimum, conduct area monitoring daily on each shift in which lead paint removal operations are performed in areas immediately adjacent to the lead control taken on the downwind side of the lead control area. If adjacent areas are contaminated, clean, visually inspect and take wipe samples (if applicable) of the contaminated areas. The CIH shall certify that the area has been cleaned of lead contamination.

3.3 LEAD CONTAINING PAINT REMOVAL

A. Remove paint as necessary within the areas designated in specification Section 099123 to provide substrate required for application of new paint system. Take whatever precautions are necessary to minimize damage to the underlying substrate.

B. Indoor Lead Paint Removal

1. Selection: Select paint removal processes to minimize contamination of work areas with lead- contaminated dust or other lead-contaminated debris/waste. The following paint removal is unacceptable:

a. Gas-fired open-flame burning.

b. Uncontained water blasting.

c. Open abrasive blasting.

3.4 SURFACE PREPARATION

A. Avoid flash rusting or other deterioration of the substrate. Provide required

surface preparation for painting in accordance with specification section 099123.

3.5 CLEANUP AND DISPOSAL

A. Cleanup: Maintain surfaces of the lead control area free of accumulations of paint chips and dust. Restrict the spread of dust and debris; keep waste from being distributed over the work area. Do not dry sweep or use compressed air to clean up the area. At the end of each shift and when the paint removal operation has been completed, clean the area of visible lead paint contamination by vacuuming with a HEPA filtered vacuum cleaner.

B. Certification: The CIH shall certify in writing that the inside and outside the lead control area air monitoring samples are less than 30 micrograms per cubic meter of air, wipe sampling result show no trace of lead, the respiratory protection for the employees was adequate, the work procedures were performed in accordance with 29 CFR 1910.1025, and that there were no visible accumulations of lead-contaminated paint and dust on the work site. Do not remove the lead control area or roped-off boundary and warning signs prior to the State's receipt of the CIH's certification. Reclean areas showing dust or residual paint chips. The following documents shall be delivered to the COR for review:

1. Training certification.

2. IH certificate.

3. Lead-containing paint removal plan.

4. Final clearance certification.

C. Testing of Lead-Containing Paint Residue and Used Abrasive: Where indicated or when directed by the State, Test lead containing paint residue and used abrasive in accordance with 40 CFR 261 and TITLE 22 for hazardous waste.

D. Disposal

1. Collect lead-contaminated waste, scrap, debris, bags, containers, equipment, and lead-contaminated clothing which may produce airborne concentrations of lead particles. Label the containers in accordance with 29 CFR 1910.1025. Dispose of lead-contaminated waste material at a EPA, CCR and California Administrative Code (CAC) TITLE 22 approved hazardous waste treatment, storage, or disposal facility off State property.

2. Store waste materials in U.S. Department of Transportation (49 CFR 178) approved 55-gallon drums. Properly label each drum to identify the type of waste (49 CFR 172) and the date the drum was filled. The State or an authorized representative will assign an area for interim storage of waste-containing drums. Do not store hazardous waste drums in interim storage longer than 90 calendar days from the date affixed to each drum.

3. Handle, store, transport and dispose lead or lead-contaminated waste in accordance with 40 CFR 260, 40 CFR 261, 40 FR 262, 40 CFR 263, 40 CFR 264, and 40 CFR 265. Comply with land disposal restriction notification requirements as required by 40 CFR 268.

E. Disposal Documentation: Submit written evidence that the hazardous waste treatment, storage, or disposal facility (TSD) is approved for lead disposal by the EPA and state or local regulatory agencies. Submit one copy of the completed manifest, signed and dated by the initial transporter in accordance with 40 CFR 262.

END OF SECTION 02090

SECTION 030130 – STRENGTHENING OF CAST-IN-PLACE

PART 1 - GENERAL

1.1 Description of Work

A. This specification is intended to define the minimum requirements of structural strengthening using externally bonded fiber reinforced polymer (FRP) composite systems.

B. The work includes the furnishing of all materials, labor, equipment and services for the design, supply, installation and finish of all structural strengthening using externally bonded FRP composite system.

C. The general contractor or subcontractor shall furnish design calculation and work drawings, all materials, tools, equipment, transportation, necessary storage, access, labor and supervision required for the proper installation of the externally bonded FRP composite system.

D. The general contractor or subcontractor shall be responsible for producing material samples for testing materials' physical properties, and for recording sizes, layouts, and quantities of such materials as indicated on the drawings. Contractor shall also provide testing and testing reports of such tests. FRP Submittal(s) will not be reviewed or approved without material testing reports.

1.2 WORK INCLUDED

A. This Section of the Specification is not necessarily complete in itself. Read in conjunction with the Contract Document.

1.3 REFERENCE STANDARDS

A. General: The publications listed below form a part of this specification to the extent referenced. Where a date is given for referenced standards, the edition of that date shall be used. Where no date is given for reference standards, the latest edition available on the date of the Notice of Invitation to Bid shall be used.

B. International Code Council (ICC)
   1. ICC AC125, Acceptance Criteria for Concrete and Reinforced and Unreinforced Masonry Strengthening Using Externally Bonded Fiber Reinforced Polymer (FRP) Composite Systems.
   2. ICC AC178, Interim Criteria for Inspection and Verification of Concrete and Reinforced and Unreinforced Masonry Strengthening Using Externally Bonded Fiber Reinforced (FRP) Composite Systems.

C. American Standard for Testing and Materials (ASTM)
   1. ASTM A370, Standard Test Methods and Definitions for Mechanical Testing of Steel Products

2. ASTM C42, Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
3. ASTM D7565, Standard Test Method for Determining Tensile Properties of Fiber Reinforced Polymer Matrix Composites Used for Strengthening of Civil Structures.
4. ASTM D3039, Standard Test Method for Tensile Properties of Polymer Matrix Composite Materials.
5. ASTM D7522, Standard Test Method for Pull-Off Strength for FRP Bonded to Concrete Substrate.
6. ASTM D4541, Standard Test Method for Pull-off Strength of Coating Using Portable Adhesive-Testers.

D. American Concrete Institute (ACI)
1. ACI 440.2R-08, Guide for the Design and Construction of Externally Bonded FRP Systems for Strengthening Concrete Structures.

E. International Concrete Repair Institute (ICRI)
1. ICRI Technical Guideline No. 310.2-1997 (formerly No. 03732), Guideline for Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays.

1.4 MATERIAL QUALIFICATIONS

A. Materials for the FRP system have been pre-qualified and shall be supplied by the following manufacturers:
1. Fyfe Co. LLC (8380 Miralani Drive, Suite A, San Diego, CA 92126. Tel: 858-642-0694, Fax: 858-444-2982, Email: info@fyfeco.com)
2. Approved alternate FRP manufacturer. Alternate FRP systems must provide all items listed in Section 1.5 of this specification with their bid; otherwise, they shall be considered non-compliant.

1.5 SUBMITTALS

A. Quality Control and Quality Assurance:
1. Submit product data indicating product standards, physical and chemical characteristics, technical specifications, limitations, installation instructions, maintenance instructions and general recommendations regarding each individual material.
2. Only epoxy resins will be accepted for construction of FRP systems referenced in this specification. Other resins, such as polyesters/vinyl esters, are not allowed as substitutes. The manufacturer shall clearly define the epoxy resin working time. Any batch that exceeds the batch life shall not be used.
3. The proposed FRP Systems shall be compliant with ICC AC125 and provide a current ICC Evaluation Service Report, compliant with the 2009 International Building Code (IBC).
4. Submit a list of completed surface bonded FRP composite strengthening projects completed with the manufacturer's FRP composite system in the past 3 years. The list should include at a minimum 25 projects with proposed FRP system, the dates of work, type, description and amount of work performed.
5. Surface bonded FRP composite system shall be installed by certified applicator with written consent from manufacturer that the contractor has been trained. Certified

applicator shall have a minimum of 3 years experience in performing FRP composite retrofits.

6. The Engineer may suspend the work if the Contractor substitutes an unapproved fiber reinforced composite system or unapproved personnel during construction.

B. Design and working drawings:
   1. Stamped and signed structural calculations and drawings by a professional Civil or Structural Engineer licensed in the state of California. Design shall be based on the clearly written performance criteria defined on the structural drawings.
   2. Working drawings shall detail the type, locations, dimensions, numbers of layers, and orientation of all FRP materials and coatings to be installed.
   3. A list of two different manufacturer approved testing laboratories that can perform the required ASTM D7565 and/or ASTM D3039 tests as per Section 3.3 of this specification.

C. Test Reports and Records:
   1. Provide test reports indicating Concrete Compressive Strength of samples taken from areas wall section to be demolished in accordance with ASTM C42, for each location indicated in the drawings.
   2. Provide test reports indicating Concrete Reinforcement Yield Strength of samples taken from areas wall section to be demolished in accordance with ASTM A370, for each bar size at each location indicated in the drawings.
   3. Provide Record of rebar size(s), spacing and layout of wall sections to be demolished as indicated on the drawings.

D. Product Information:
   1. Provide an ICC Evaluation Service Report, compliant with the 2009 IBC, for the proposed products.
   2. Provide approved UL rated assembly data for any required fire-resistant finishes (e.g. 2-hour/4-hour rated assembly per ASTM E119, Class 1 Flame & Smoke per ASTM E84).
   3. Properties of the composite materials as determined by independent laboratory testing in accordance with ASTM D7565 and/or ASTM D3039 (tensile modulus, stress and strain).
   4. Large-scale structural testing results of the proposed composite system from independent laboratories on similar structural sections.
   5. Installation procedures, maintenance instructions, and general recommendations regarding each material to be used.
   6. Manufacturer's Material Safety Data Sheets (MSDS) for all materials to be used.
   7. Manufacturer's product data sheet indicating physical, mechanical and chemical characteristics of all materials used in the FRP system.
   8. Written verification from the manufacturer that their applicator has received the required certifications and training.
   9. Certification by the manufacturer that the supplied products comply with local regulations controlling use of volatile organic compounds (VOC's).
   10. Products that require the use of respirators do not comply with local regulations controlling use of VOC's and shall not be allowed.

1.6 PERFORMANCE

A. Design the composite system to achieve the structural performance shown on the structural drawings. Design calculations for the composite system shall be submitted for approval by the engineer of record, and shall be stamped by a registered Civil or Structural Engineer licensed in

the state of California. The composite system must meet the performance demand as stated in the drawings. The modulus (E) and associated area (A) of the FRP system shall be based on published design values consistent with long term durability exposure testing. All calculations must be performed as per AC 125.

B. Calculations shall conform to the requirements set forth in the bid documents and be based on the design modulus and associated area of the composite to be installed. FRP design values must be lower than the calculated mean determined from the test results received from the ASTM D7565 and/or ASTM D3039 field test specimens (See Section 3.3 of this specification).

1.7 PRODUCT DELIVERY, HANDLING AND STORAGE

A. Deliver epoxy materials in factory-sealed containers with the manufacturer's labels intact and legible with verification of date of manufacture and shelf life.

B. Store materials in a protected area at a temperature between 40°F and 100°F.

C. Products shall be stored according to the manufacturer's requirements and shall avoid contact with soil and moisture. Products shall be stored to avoid UV exposure.

1.8 COORDINATE WITH OTHER TRADES

A. Prior to construction, the trades shall be briefed on any new or unusual construction procedures to ensure that they are aware of special conditions (e.g. new penetrations, construction anomalies).

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS & COMPOSITE STRENGTHENING SYSTEM

A. Approved Tyfo® Fibrwrap® System(s) to be supplied by Fyfe Co. LLC (8380 Miralani Drive, Suite A, San Diego, CA 92126. Tel: 858-642-0694, Fax: 858-444-2982, Email: info@fyfeco.com). Products include:
   1. Composite fabric: SCH fiber – primary carbon fiber, unidirectional.
   2. Epoxy saturant/primer: Tyfo® S epoxy is used as a primer and is also combined with the fiber to form the Tyfo® Fibrwrap® System.
   3. Primer/Filler: Thickened Tyfo® S, WS, WP or TC thickened epoxy for protective seal coat, filling voids and primer where needed.
   4. Finishes: Tyfo® A, Tyfo® U, Tyfo® HS. Alternate finishes must be approved by the owner.
   5. Field thickened epoxy matrix, which is compatible with composite system's resin matrix, may be used to patch "bugholes" up to 1.5" in depth and to fill voids.

B. Approved alternative FRP Manufacturer
   1. The manufacturer shall provide specific information on physical, mechanical and chemical properties of fiber, epoxy resin and FRP composite.

2.2 CERTIFIED APPLICATORS

1. Installations of the FRP Systems shall be performed by certified applicators only. Certified applicators shall have the minimum experience and written consent as recommended by the FRP manufacturer (See Sections 1.5.5 & 1.5.17 of this specification).
2. Installer must provide a five (5) year bonded warranty by an "A" VIII rated surety (as defined by A.M. Best Co.) and licensed and admitted to provide surety bonds in the State of California for 10% of the contract amount.

2.3 OTHER MATERIALS

1. Contractor to provide compatible primer, filler and other materials recommended by the manufacturer as needed for the proper installation of the complete surface bonded FRP composite system.

2.4 APPLICATION

A. Surface Preparation

1. Wall surfaces shall be prepared for bonding by means of abrasive blasting or grinding to remove existing laitance and expose aggregate minimum ICRI CSP-2 concrete surface profile. All contact surfaces shall then be cleaned by hand or compressed air. One prime coat of the manufacturer's epoxy shall be applied and allowed to cure for a minimum of one hour. Prior to the application of the saturated composite fabric, fill any uneven surfaces with the manufacturer's thickened epoxy. Provide anchorage as detailed on construction drawings, if required.
2. Round off sharp and chamfered corners (to be wrapped around) to a minimum radius of 0.75" by means of grinding or forming with the system's thickened epoxy. Variations in the radius along the edge shall not exceed 0.5" for each 12" of length.

PART 3 - INSTALLATION

1. Preparation work for project: Visit site to ensure that all patch work is complete and cured. Review project specifications in detail.
   a. Verify ambient and concrete temperatures. No work shall proceed if the temperature of the concrete surface is less than 40°F or greater than 100°F or as specified on the epoxy component labels. The ambient temperature and temperature of the components shall be between 40°F and 100°F, unless provisions have been made to ensure components' temperature is maintained within this range or the range specified by the manufacturer.
   b. Prepare the epoxy matrix by combining components at a weight (or volume) ratio specified by the manufacturer. The components of epoxy resin shall be mixed with a mechanical mixer until uniformly mixed, typically 5 minutes at 400-600 rpm.
2. Components that have exceeded their shelf life shall not be used.
3. Saturation of the fabric shall be performed and monitored according to the manufacturer's specified fiber-epoxy resin ratio. Fabric shall be completely saturated prior to application to contact surface in order to ensure complete impregnation. Saturation shall be supervised and checked by the certified installer. Both the epoxy resin and fabric shall be measured accurately, combined, and applied uniformly at the rates shown on the approved working drawings and per manufacturer's recommendations.

4. All cutting of fabrics, mixing of epoxy and combination thereof shall take place in a protected area away from critical structure functions and any electrical equipment.
5. Prepare surfaces as required, including corner preparation.
   a. Remove dust and debris by hand or with compressed air as per specification.
   b. Clean up and protect area adjacent to element where FRP composite is being applied.
   c. Using a roller or trowel, apply one prime coat of epoxy resin to the substrate in accordance with manufacturer's recommendations. Allow primer to become tacky to the touch.
   d. Fill any uneven surfaces or recesses with thickened epoxy.
6. Apply saturated fabric to substrate surface by hand lay-up, using methods that produce a uniform, constant tensile force that is distributed across the entire width of the fabric, and ensure proper orientation of the fabric. Under certain application conditions, the system may be placed entirely by hand methods assuring a uniform, even final appearance. Gaps between composite bands may not exceed 0.5" width in the fabric's transverse joint unless otherwise noted on project drawings. A lap length of at least 6" is required at all necessary overlaps in the primary fiber direction of the fabric.
7. Apply subsequent layers, continuously or spliced, until designed number of layers is achieved, per project drawings.
8. Using a roller or hand pressure, release or roll out entrapped air, and ensure that each individual layer is firmly embedded and adhered to the preceding layer or substrate.
9. Detail all fabric edges, including termination points and edges, with thickened epoxy.
10. Finish: All edges and seams must be feathered. Use system as directed by the manufacturer. Finish as specified between 24 and 72 hours after final application of epoxy. If after 72 hours the epoxy is cured, the surface must be roughened by hand sanding or brush blasting, prior to finishing.
11. System may incorporate structural fasteners but limitations and detailing must be verified with composite system manufacturer.

3.2 INSPECTION AND TESTING

A. Field Inspection
   1. The contractor shall monitor the mixing of all epoxy components for proper ratio and adherence to manufacturer's recommendations. Record batch numbers for fabric and epoxy used each day, and note locations of installation. Measure square footage of fabric and volume of epoxy used each day. Complete report and submit to Owner, engineer-of-record and FRP composite system manufacturer.
   2. A Certified Special Inspector shall periodically observe all aspects of preparation, mixing, and application. All FRP composite applied areas shall be inspected, in accordance with the manufacturer's specifications for voids, bubbles, and delaminations. All defective areas shall be repaired as specified in Section 3.4 "Required Remediation".
   3. The contractor shall provide a report signed by a registered professional engineer certifying that the installation is acceptable, complete with the testing reports and photographs.

B. In-situ Testing and Recording
   1. ASTM D7522 and/or ASTM D4541 – Adhesion Tests
      a. Direct tension adhesion testing of cored samples shall be conducted using the method described by ASTM D7522 and/or ASTM D4541. A minimum of three

tests shall be performed for each day of production or for each 500 ft² (45m²) of FRP application, whichever is less. Pull-off tests shall be performed on a representative adjacent area to the area being strengthened whenever possible. Tests shall be performed on each type of substrate or for each surface preparation technique used.

b. The prepared surface of the bonded FRP system shall be allowed to cure a minimum of 72 hours before execution of the direct tension pull-off test. The locations of the pull-off tests shall be representative and on flat surfaces. If no adjacent areas exist, the tests shall be conducted on areas of the FRP system subjected to relatively low stress during service. The minimum acceptable value for any single tension test is 175 psi. The average of the tests at each location shall not be less than 200 psi. Additional tests may be performed to qualify the work.

c. Test locations shall be filled with thickened epoxy after the values have been recorded and verified by the special instructor and the test dollies have been removed.

2. Record size, spacing, layout and quantity of concrete reinforcement where indicated on the drawings. Submit Report of findings at each location.

C. Laboratory Testing

1. FRP Sampling
   a. Record lot number of fabric and epoxy resin used, and location of installation. Measure square footage of fabric and volume of epoxy used each day. Label each sample from each day's production.
   b. A "sample batch" shall consist of two 12" by 12" samples of cured composite. A minimum of two "sample batches" shall be made daily. The two "sample batches" will be taken at appropriate times during the day as to ensure the maximum material deviance in the components of the FRP composite.
2. Concrete Sampling
   a. Obtain and prepare a minimum of 4 concrete core samples, free of reinforcement, at each location where indicated on the drawings, in accordance with ASTM C42.
3. Concrete Reinforcing Sampling
   a. Obtain and prepare a minimum of three samples for each bar size and at each location where indicated on the drawing in accordance ASTM A370.
4. Preparation of Samples
   a. Prepare sample on a smooth, flat, level surface covered with polyethylene sheeting, or 16 mil plastic film, prime with epoxy resin. Then place **one** layer of saturated fabric and apply additional topping of epoxy. Cover with plastic film and squeegee out all bubbles.
   b. Samples shall be stored in a sample box and not moved for a minimum 48 hours after casting. The prepared, identified samples shall be given to a pre-approved and experienced testing laboratory. The laboratory shall then precondition samples for 48 hours at 140°F before testing.
5. ASTM D7565 and/or ASTM D3039 – Tension Tests
   a. Testing specimens shall be cut from samples and tested for ultimate tensile strength, tensile modulus and percentage elongation as per ASTM D7565 and/or ASTM D3039 in the longitudinal fiber direction.
   b. Test a minimum of 15% of all samples as per ICC AC178. If one coupon fails, specimens from the same 12" x 12" sample will be tested. If these specimens also fail, the other 12" x 12" sample from the same "sample batch" will be tested. In

the extreme case that this sample also fails, the remaining "sample batch" for that day will be tested and appropriate remediation shall be taken to ensure integrity of the system at locations from the failed "sample batch". In addition, 25% of the remaining samples shall be tested by the same criteria as per ICC AC178.

6. Testing results shall be made available within 3 weeks of sample submission.

D. Acceptance Criteria
   1. FRP design values must be lower than the calculated mean determined from the test results received from the ASTM D7565 and/or ASTM D3039 field test specimens. Acceptable minimum values for ultimate tensile strength, tensile modulus, and elongation shall not be below the submitted design values.
      a. Any values below the submitted design values will require remediation.
   2. Report Concrete Compressive Stress of concrete core samples in accordance with ASTM C42.
   3. Report Concrete Reinforcement yield strength in accordance with ASTM A370 (A9).

3.3 REQUIRED REMEDIATION

A. Small voids and bubbles (on the order of 3" diameter) shall be injected or back filled with epoxy.

B. Voids and delaminations on the order of 6" in diameter or an area of 5" x 5" shall be reported to the engineer of record and remediation shall be submitted by the contractor for approval.

C. In the event that laboratory testing determines a "sample batch" to possess insufficient material properties, remedial measures shall be taken. Any structural member where the installed FRP composite system has material properties determined to be below the minimum specified values, additional layers shall be installed until the composite thickness is increased by the same percentage as the deficiency of the material's tensile modulus. Or any other remediation directed by the engineer.

3.4 MAKE GOOD

A. Make good at no cost to the Owner, any damage to the new or existing structures, property or services caused by the installation and testing of the FRP composite.

3.5 CLEAN UP

A. Remove all surplus material, equipment and debris from the site on completion of the work. Leave the site clean.

END OF SECTION 030130

SECTION 055000 - METAL FABRICATIONS

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 Cabinets and Countertop
   2. Stainless Steel Dishtable
   3. Stainless Steel Tray Slide
   4. Metal Bollards

1.3 ACTION SUBMITTALS

A. Shop Drawings: Show fabrication and installation details for metal fabrications.

   1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

1.4 INFORMATIONAL SUBMITTALS

A. Mill Certificates: Signed by manufacturers of stainless-steel certifying that products furnished comply with requirements.

B. Welding certificates.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:
   1. AWS D1.6, "Structural Welding Code - Stainless Steel."

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

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

2.2 FERROUS METALS

A. Stainless-Steel Sheet, Strip, and Plate: ASTM A 240/A 240M or ASTM A 666, Type 304 or Type 316L.

B. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304 or Type 316L.

2.3 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Low-Emitting Materials: 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."

2.4 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

2.5 STAINLESS STEEL CABINETS AND COUNTERTOPS

A. Countertops:
   a. Dishtable: Stainless Steel: 304 or 316 grade, 16 gauge stainless, 2” high edge, integrally rolled, and tall sloped-top backsplash to accommodate faucet and sprayer. Backsplash to be cut to accommodate rolling counter door. Integral dish sink 22”x33”x12”deep. See drawings.
   b. Kitchen worktable with cabinets: 304 or 316 grade, 16 gauge stainless, eased square edge, integrally rolled, and 4” integrally rolled backsplash.

B. Cabinet Hardware And Accessories
   1. General: Provide cabinet hardware and accessory materials associated with architectural cabinets.
   2. Provide recessed finger pulls for sliding doors.
   3. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
   4. Satin Stainless Steel: BHMA 630.
   5. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

C. Stainless Steel Cabinets
   1. Grade: Custom.
   2. 16 gauge stainless.
   3. Type of Cabinet Construction: Sliding doors, exposed legs 6” tall, fully enclosed stainless steel case, one interior shelf.

D. Stainless Steel Dishtable
   1. Table is open underneath. Provide stainless steel legs and bracing.

E. Stainless Steel Tray Glide
   1. Heavy duty.
   2. Pre-fabricated 3-rail tray slide brackets and rails. Provide closed, finished ends on rails.

F. Miscellaneous Materials
   1. 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.
   2. Adhesives, General: Do not use adhesives that contain urea formaldehyde.

3. 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) and in compliance with LEED criteria for certification:

G. Fabrication, General
1. 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. Where field cutting is required, provide protection and contain and dispose of all dust against infiltration into soil.
2. 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.

2.6 METAL BOLLARDS

A. Fabricate metal bollards from Schedule 80 steel pipe

1. Cap bollards with 1/4-inch- (6.4-mm-) thick steel plate.

B. Prime bollards with zinc-rich primer**.**

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.

3.2 INSTALLING METAL BOLLARDS

A. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.

B. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches (75 mm) above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.

C. Fill bollards solidly with concrete.

3.3 ADJUSTING AND CLEANING, GENERAL

3.4 INSTALLING METAL CABINETS AND COUNTERTOPS

A. Preparation
   1. Before installing cabinets, examine shop-fabricated work for completion and complete work as required, including removal of packing.

B. Installation
   1. Assemble cabinets 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.
   2. Install cabinets 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.
   3. Anchor to substrates. Secure with countersunk, concealed as required for complete installation.
   4. 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.
      a. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
      b. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.
   5. Countertops: Install in accordance with manufacturer recommendations. Weld stainless steel joints for smooth joint with mitered interior corners.

C. Adjusting And Cleaning
   1. Repair damaged and defective cabinets and counters, where possible, to eliminate functional and visual defects; where not possible to repair, replace items. Adjust joinery for uniform appearance.
   2. Clean, lubricate, and adjust hardware.
   3. Clean cabinets and counters on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 055000

SECTION 081113 - HOLLOW METAL DOORS, FRAMES, AND WINDOWS

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 hollow-metal work.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.4 COORDINATION

A. Coordinate anchorage installation 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.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, core descriptions, and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door type.
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 accessories.
6. Details of removable stops, and glazing.

C. 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 final Door Hardware Schedule.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch-high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, is Steelcraft. Other acceptable companies are as follows:

1. Steelcraft, and Ingersoll Rand company
2. Amweld International, LLC.
3. Ceco Door Products; an Assa Abloy Group company.
4. Curries Company; an Assa Abloy Group company.
5. Republic Doors and Frames.

B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.2 INTERIOR DOORS AND FRAMES

A. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Heavy-Duty Doors, Frames and Windows: SDI A250.8, Level 2.

1. Physical Performance: Level B according to SDI A250.4.
2. Doors:

a. Type: As indicated in the Door and Frame Schedule.
b. Thickness: 1-3/4 inches
c. Face: Uncoated, cold-rolled steel sheet, minimum thickness of 0.042 inch (1.0 mm).
d. Edge Construction: Model 1, Full Flush.
e. Core: Manufacturer's standard polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core at manufacturer's discretion.

3. Frames and Windows:

a. Materials: Uncoated steel sheet, minimum thickness of 0.053 inch (1.3 mm).
b. Construction: Welded.

4. Exposed Finish: Prime.

2.3 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 (51 mm) wide by 10 inches (254 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. 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, minimum thickness of 0.042 inch (1.0 mm), 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 (51-mm) height adjustment. Terminate bottom of frames at finish floor surface.

2.4 MATERIALS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

C. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.

D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

E. Power-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.

F. Grout: ASTM C 476, except with a maximum slump of 4 inches (102 mm), as measured according to ASTM C 143/C 143M.

G. Glazing: Comply with requirements in Section 088000 "Glazing."

2.5 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 metal thickness. 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. Hollow-Metal Doors:

1. Steel-Stiffened Door Cores: Provide minimum thickness 0.026 inch (0.66 mm), 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 weld to face sheets no more than 5 inches (127 mm) o.c. Fill spaces between stiffeners with glass- or mineral-fiber insulation.
2. Vertical Edges for Single-Acting Doors: Bevel edges 1/8 inch in 2 inches (3.2 mm in 51 mm).
3. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets.
4. Bottom Edge Closures: Close bottom edges of doors with end closures or channels of same material as face sheets.

C. Hollow-Metal Frames and Windows: 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. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
2. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
3. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
4. Jamb Anchors: Provide number and spacing of anchors as follows:

a. Masonry Type: Locate anchors not more than 16 inches (406 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c., to match coursing, 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 one 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 one additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 96 inches (2438 mm) high.

c. Compression Type: Not less than two anchors in each frame.
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.
e. Glazing Stops: Provide screw-applied glazing stops; coordinate with Section 088000 "Glazing" and with glazing system indicated. Provide glazing stops to match frames. Finish glazing stops to match window units.

5. Head Anchors: Two anchors per head for frames more than 42 inches (1067 mm) wide and mounted in metal-stud partitions.
6. Door Silencers: Except on weather-stripped frames, 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.

7. Terminated Stops: Terminate stops 1” above finish floor with a 45-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.

D. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.

E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
1. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

F. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with mitered hairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
2. Provide fixed frame moldings on secure side of interior doors and frames.
3. Provide loose stops and moldings on inside of hollow-metal work.
4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.6 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

2.7 ACCESSORIES

A. Louvers: Provide louvers for interior doors, where indicated, which 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 or inverted-Y blades.

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. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work, and present it to the Owner’s Project Manager.

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.

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 SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

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. 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.
   b. Install frames with removable stops located on secure side of opening.
   c. Install door silencers in frames before grouting.

d. Remove temporary braces necessary for installation only after frames have been properly set and secured.
e. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.

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 power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside 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 mineral-fiber insulation.
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. 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 Steel Doors:

a. Between Door and Frame Jambs and Head: 1/8 inch (3.2 mm) plus or minus 1/32 inch (0.8 mm).
b. Between Edges of Pairs of Doors: 1/8 inch (3.2 mm) to 1/4 inch (6.3 mm) plus or minus 1/32 inch (0.8 mm).
c. At Bottom of Door: 3/4 inch (19.1 mm).
d. Between Door Face and Stop: 1/16 inch (1.6 mm) to 1/8 inch (3.2 mm) plus or minus 1/32 inch (0.8 mm).

D. Glazing: Comply with installation requirements in Section 088000 "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 (51 mm) o.c. from each corner.

2. Fully tempered clear glazing in top half of Office door: 22”wide x 34”high.

3. Fully tempered clear glazing in Office window.

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 Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

E. Factory-Finish Touchup: Clean abraded areas and repair with same material used for factory finish according to manufacturer's written instructions.

F. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 081113

SECTION 083323 - OVERHEAD COILING 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. Service doors.
2. Counter doors.

B. Related Sections:
1. Section 099123 "Interior Painting" for finish painting of factory-primed doors.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design overhead coiling doors, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance, Exterior Doors: Exterior overhead coiling doors shall withstand the wind loads, the effects of gravity loads, and loads and stresses within limits and under conditions indicated according to SEI/ASCE 7.

1. Wind Loads: In accordance with ASCE 7-05 and the following design parameters.

a. Basic Wind Speed: 90 mph.
b. Importance Factor: 1.15.
c. Exposure Category: C.

2. Deflection Limits: Design overhead coiling doors to withstand design wind load without evidencing permanent deformation or disengagement of door components.

C. Operability under Wind Load: Design overhead coiling doors to remain operable under design wind load, acting inward and outward.

D. Seismic Performance: Overhead coiling doors shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the emergency-egress-door component will be fully operational after the seismic event."
2. Seismic Component Importance Factor: 1.5.

E. Operation Cycles: Provide overhead coiling door components and operators capable of operating for not less than number of cycles indicated for each door. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

1.4 ACTION SUBMITTALS

A. Product Data: For each type and size of overhead coiling door and accessory. Include the following:

1. Construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
2. Rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
3. For fire-rated doors, description of fire-release system including testing and resetting instructions.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Show locations of replaceable fusible links.
3. Wiring Diagrams: For power, signal, and control wiring.

C. Delegated-Design Submittal: For overhead coiling doors indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of seismic restraints.
2. Summary of forces and loads on walls and jambs.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For overhead coiling doors to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.

B. Source Limitations: Obtain overhead coiling doors from single source from single manufacturer.

1. Obtain operators and controls from overhead coiling door manufacturer.

C. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

PART 2 - PRODUCTS

2.1 DOOR CURTAIN MATERIALS AND CONSTRUCTION

A. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:

1. Steel Door Curtain Slats: Zinc-coated (galvanized), cold-rolled structural steel sheet; complying with ASTM A 653/A 653M, with G90 (Z275) zinc coating; nominal sheet thickness (coated) of 0.028 inch (0.71 mm) and as required to meet requirements.
2. Stainless-Steel Door Curtain Slats: ASTM A 666, Type 304; sheet thickness of 0.025 inch (0.64 mm) and as required to meet requirements.
3. Metal Interior Curtain-Slat Facing: Match metal of exterior curtain-slat face.
4. Gasket Seal: Provide insulated slats with manufacturer's standard interior-to-exterior thermal break or with continuous gaskets between slats.

B. Endlocks and Windlocks for Service Doors: Malleable-iron casings galvanized after fabrication, secured to curtain slats with galvanized rivets or high-strength nylon. Provide locks on not less than alternate curtain slats for curtain alignment and resistance against lateral movement.

C. Endlocks for Counter Doors: Manufacturer's standard locks on not less than alternate curtain slats for curtain alignment and resistance against lateral movement.

D. Bottom Bar for Service Doors: Consisting of two angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch (38 by 38 by 3 mm) thick; fabricated from manufacturer's standard hot-dip galvanized steel, stainless steel, or aluminum extrusions to match curtain slats and finish.

E. Bottom Bar for Counter Doors: Manufacturer's standard continuous channel or tubular shape, fabricated from manufacturer's standard hot-dip galvanized steel, stainless steel, or aluminum extrusions to match curtain slats and finish.

F. Astragal for Interior Doors: Equip each door bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.

G. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain, and a continuous bar for holding windlocks.

1. Removable Posts and Jamb Guides for Counter Doors: Manufacturer's standard.

2.2 HOOD

A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.

1. Galvanized Steel (Exterior Overhead Service Door): Nominal 0.028-inch- (0.71-mm-) thick, hot-dip galvanized steel sheet with G90 (Z275) zinc coating, complying with ASTM A 653/A 653M.
2. Stainless Steel (Counter Service door): 0.025-inch- (0.64-mm-) thick stainless-steel sheet, Type 304, complying with ASTM A 666.
3. Exterior Door: Fabricate with a perimeter sealant-joint-bead profile for applying joint sealant. Hood to mount on interior.

2.3 COUNTER DOORS

A. Integral Frame, Hood, and Fascia for Counter Door: Welded sheet metal assembly of the following sheet metal:
1. Stainless Steel: 0.062-inch- (1.59-mm-) thick stainless-steel sheet, Type 304, complying with ASTM A 666.

B. Integral Metal Sill for Counter Door: Fabricate sills as integral part of frame assembly of Type 304 stainless steel in manufacturer's standard thickness. Metal sill to overhang both sides of wall.

C. Include integral stainless steel jamb wraps, if not by manufacturer, then by Contractor.

D. Lawrence Counter Service Door Model CD.

2.4 OVERHEAD ROLLING SERVICE DOORS

A. Lawrence Service Door Model SD

2.5 LOCKING DEVICES

A. Locking Device Assembly: Slide lock.

2.6 CURTAIN ACCESSORIES

A. Weatherseals: Equip each exterior door with weather-stripping gaskets fitted to entire perimeter of door for a weathertight installation, unless otherwise indicated.

1. At door head, use 1/8-inch- (3-mm-) thick, replaceable, continuous sheet secured to inside of hood.
2. At door jambs, use replaceable, adjustable, continuous, flexible, 1/8-inch- (3-mm-) thick seals of flexible vinyl, rubber, or neoprene.

B. Push/Pull Handles: Equip each push-up-operated or emergency-operated door with lifting handles on each side of door, finished to match door.

1. Provide pull-down straps or pole hooks for doors more than 84 inches (2130 mm) high.

2.7 COUNTERBALANCING MECHANISM

A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. (2.5 mm/m) of span under full load.

C. Spring Balance: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.

D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.

E. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.8 MANUAL DOOR OPERATORS

A. Equip door with manufacturer's recommended manual door operator unless another type of door operator is indicated.

B. Push-up Door Operation: Design counterbalance mechanism so required lift or pull for door operation does not exceed 25 lbf (111 N).

C. Chain-Hoist Operator: Consisting of endless steel hand chain, chain-pocket wheel and guard, and gear-reduction unit with a maximum 25 lbf (111 N) force for door operation. Provide alloy-steel hand chain with chain holder secured to operator guide.

2.9 DOOR ASSEMBLY

A. Service and Counter Door: Overhead coiling door formed with curtain of interlocking metal slats.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Lawrence Roll-Up Doors, Inc. See attached cutsheets.

B. Door Curtain Slats: Flat profile slats

C. Curtain Jamb Guides: Galvanized steel with exposed finish matching curtain slats.

D. Hood: Match curtain material and finish.

   1. Shape for Overhead rolling door: Round.
   2. Shape for Rolling Counter door: Square
   3. Mounting: Face of wall.

E. Integral Frame, Hood, and Fascia for Counter Door: Stainless steel.

   1. Mounting: Face of wall; stainless steel frame around jambs.

F. Locking Devices: Equip door with locking device assembly.

   1. Locking Device Assembly: slide lock

G. Manual Door Operator:

   1. Chain-hoist operator for overhead rolling door.
   2. Push-up operation for rolling counter doors.

H. Door Finish:
   1. Factory Prime Finish: Manufacturer's standard color.
   2. Stainless-Steel Finish: No. 4 (polished directional satin).
   3. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face.

2.10 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.

2.11 STEEL AND GALVANIZED-STEEL FINISHES

A. Overhead rolling door.

B. Factory Prime Finish: Manufacturer's standard primer, compatible with field-applied finish. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

2.12 STAINLESS-STEEL FINISHES

A. Rolling counter doors.

B. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

C. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1. Run grain of directional finishes with long dimension of each piece.
2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
3. Directional Satin Finish: No. 4.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.

B. Examine locations of electrical connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

B. Install overhead coiling doors, hoods, and operators at the mounting locations indicated for each door.

C. Accessibility: Install overhead coiling doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

3.3 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Perform installation and startup checks according to manufacturer's written instructions.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Test door closing when activated by detector or alarm-connected fire-release system. Reset door-closing mechanism after successful test.

3.4 ADJUSTING

A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.

B. Lubricate bearings and sliding parts as recommended by manufacturer.

C. Adjust seals to provide weathertight fit around entire perimeter.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

END OF SECTION 083323

SECTION 085113 - ALUMINUM WINDOWS

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 aluminum windows for exterior locations.

B. Related Sections:

1. Section 088000 "Glazing".

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

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 and discuss the finishing of aluminum windows that is required to be coordinated with the finishing of other aluminum work for color and finish matching.
3. Review, discuss, and coordinate the interrelationship of aluminum windows with other exterior wall components. Include provisions for anchorage, flashing, sealing perimeters, and protecting finishes.
4. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.
5. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for aluminum windows.

B. Shop Drawings: Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.

C. Samples: For each exposed product and for each color specified, 2 by 4 inches (50 by 100 mm) in size.

D. Samples for Initial Selection: For units with factory-applied color finishes.

1. Include similar Samples of hardware and accessories involving color selection.

E. Samples for Verification: For aluminum windows and components required, showing full range of color variations for finishes, and prepared on Samples of size indicated below:

1. Exposed Finishes: 2 by 4 inches (50 by 100 mm).
2. Exposed Hardware: Full-size units.

F. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer and Installer.

B. Product Test Reports: For each type of aluminum window, for tests performed by a qualified testing agency.

C. Field quality-control reports.

D. Sample Warranties: For manufacturer's warranties.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by test reports, and calculations.

B. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.

C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of typical wall area as shown on Drawings.
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.

1.7 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

    a. Failure to meet performance requirements.
    b. Structural failures including excessive deflection, water leakage, condensation, and air infiltration.
    c. Faulty operation of movable sash and hardware.
    d. Deterioration of materials and finishes beyond normal weathering.
    e. Failure of insulating glass.

2. Warranty Period:

    a. Window: 10 years from date of Substantial Completion.
    b. Glazing Units: 10 years from date of Substantial Completion.
    c. Aluminum Finish: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide the following:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Vistawall, Series 3000, 2" x 4 ½" center glaze stack system for 1" glazing and associated metal trim. See 088000 Glazing Section.
    a. Other acceptable manufacturers:
        1) U.S. Aluminum, Series 451 center glaze and Series 7300 HC75
        2) Kawneer Trifab VG 451 and Series 7225 non-thermal windows.

B. Source Limitations: Obtain aluminum windows from single source from single manufacturer.

2.2 WINDOW PERFORMANCE REQUIREMENTS

A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

1. Window Certification: AMMA certified with label attached to each window.

B. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of 0.30 Btu/sq. ft. x h x deg F (1.71 W/sq. m x K).

C. Condensation-Resistance Factor (CRF): Provide aluminum windows tested for thermal performance according to AAMA 1503, showing a CRF of 45.

D. Thermal Movements: Provide aluminum windows, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of

joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

E. Outside-Inside Transmission Class (OITC): Rated for not less than 22 OITC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 1332.

F. Windborne-Debris Resistance: Capable of resisting impact from windborne debris based on testing glazed windows identical to those specified, according to ASTM E 1886 and testing information in ASTM E 1996 and requirements of authorities having jurisdiction.

G. All window frames shall be provided with full sill, jamb and header bearing on either existing concrete wall or new Kynar finished aluminum extrusion. Thickness to match published window frame thickness. Contractor shall submit for approval shop drawings for all window opening modifications required for window installation prior to any ordering or fabricating any materials. Contractor shall use approved sealant (compatible with Kynar finish) – color to match frames.

2.3 ALUMINUM WINDOWS

A. Operating Types: Provide the following operating types in locations indicated on Drawings:
   1. Awning: Project out.
   2. Hopper: Project in.
   3. Fixed.

B. Frames and Sashes: Aluminum extrusions complying with AAMA/WDMA/CSA 101 /I.S.2/A440.

   1. Thermally Improved Construction: Fabricate frames, sashes, and muntins 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.

C. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.

   1. See Section 088000 “Glazing”.

D. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.

E. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.

   1. Exposed Fasteners: Do not use exposed fasteners to the greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

2.4 ACCESSORIES

A. As necessary to match existing adjacent windows.

2.5 FABRICATION

A. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.

B. Glaze aluminum windows in the factory.

C. Weather strip each operable sash to provide weathertight installation.

D. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.

E. Provide water-shed members above side-hinged sashes and similar lines of natural water penetration.

F. Mullions: Provide mullions and cover plates, 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 wind loads of window units.

G. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.

2.6 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual" 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.

2.7 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.

1. Finish and color to match existing adjacent windows.

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 the Work.

B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.

C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E 2112.

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 to produce weathertight construction.

C. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.

D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

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.
2. Air-Infiltration Testing:

    a. Test Pressure: That required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance class indicated.
    b. Allowable Air-Leakage Rate: 1.5 times the applicable AAMA/WDMA/CSA 101/ I.S.2/A440 rate for product type and performance class rounded down to one decimal place.

3. Water-Resistance Testing:

    a. Test Pressure: Two-thirds times test pressure required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance grade indicated.
    b. Allowable Water Infiltration: No water penetration.

4. Testing Extent: All new windows. Windows shall be tested after perimeter sealants have cured.
5. Test Reports: Prepared according to AAMA 502.

C. Remove and replace noncomplying windows 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.

E. Prepare test and inspection reports.

3.4 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.

B. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

1. Keep protective films and coverings in place until final cleaning.

C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

D. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions.

END OF SECTION 085113

SECTION 087111 - DOOR HARDWARE (DESCRIPTIVE SPECIFICATION)

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. Mechanical door hardware for the following:

a. Swinging doors.

B. Related Sections:
1. Section 081113 "Hollow Metal Doors and Frames"

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and an Architectural Hardware Consultant who is available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
1. Scheduling Responsibility: Preparation of door hardware and keying schedules.

B. Source Limitations: Obtain each type of door hardware from a single manufacturer.

C. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines

1. 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 (22.2 N).
2. Comply with the following maximum opening-force requirements:

a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.

3. Adjust door closer sweep periods so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.

1.5 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.

C. Deliver keys to Owner by registered mail or overnight package service.

1.6 COORDINATION

A. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

B. 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.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. Provide door hardware for each door as scheduled in Part 3 "Door Hardware Schedule" Article to comply with requirements in this Section.

1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated.
2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.

2.2 HINGES

A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Baldwin Hardware Corporation.
b. Bommer Industries, Inc.
c. Cal-Royal Products, Inc.
d. Hager Companies.
e. IVES Hardware; an Ingersoll-Rand company.
f. Lawrence Hardware Inc.
g. McKinney Products Company; an ASSA ABLOY Group company.
h. PBB, Inc.
i. Stanley Commercial Hardware; Div. of The Stanley Works.

B. Plain-Bearing Hinges: Grade 3 (standard weight).

1. Mounting: Match existing
2. Base and Pin Metal: Steel with steel pin.
3. Pins: Non-rising loose.

4. Tips: Match existing
5. Corners: Match existing

2.3 MECHANICAL LOCKS AND LATCHES

A. Lock Functions: As indicated in door hardware schedule.

B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
1. Mortise Locks: Minimum 3/4-inch (19-mm) latchbolt throw.

C. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.

D. Mortise Locks: BHMA A156.13; stamped steel case with steel or brass parts; Series 1000.

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. Accurate Lock & Hardware Co.
b. Adams Rite Manufacturing Co.; an ASSA ABLOY Group company.
c. Arrow USA; an ASSA ABLOY Group company.
d. Best Access Systems; Div. of Stanley Security Solutions, Inc.
e. Cal-Royal Products, Inc.
f. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company.
g. Falcon Lock; an Ingersoll-Rand company.
h. Marks USA.
i. PDQ Manufacturing.

j. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
k. Schlage Commercial Lock Division; an Ingersoll-Rand company.
l. Yale Security Inc.; an ASSA ABLOY Group company.
m. <Insert manufacturer's name>.

2.4 LOCK CYLINDERS

A. Lock Cylinders: Tumbler type.

1. Manufacturers: Subject to compliance with requirements, match building standard.

B. Standard Lock Cylinders: BHMA A156.5; permanent cores that are removable; face finished to match lockset.
1. Type: Match existing lock type.

C. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.

D. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

2.5 OPERATING TRIM

A. Operating Trim: BHMA A156.6; stainless steel, unless otherwise indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Burns Manufacturing Incorporated.
b. Don-Jo Mfg., Inc.
c. Forms + Surfaces.
d. Hager Companies.
e. Hiawatha, Inc.
f. IVES Hardware; An Ingersoll-Rand Company.
g. Rockwood Manufacturing Company.
h. Trimco.

B. Push-Pull Plates: 1/8 inch (3.2 mm) thick, 3-1/2 inches wide by 15-3/4 inches high (89 mm wide by 400 mm high)] with square corners, beveled edges, and raised integral lip; secured with exposed screws.

2.6 SURFACE CLOSERS

A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. 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.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Arrow USA; an ASSA ABLOY Group company.
    b. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company.
    c. DORMA Architectural Hardware; Member of The DORMA Group North America.
    d. Dor-O-Matic; an Ingersoll-Rand company.
    e. K2 Commercial Hardware; a Black & Decker Corp. company.
    f. LCN Closers; an Ingersoll-Rand company.
    g. Norton Door Controls; an ASSA ABLOY Group company.
    h. Rixson Specialty Door Controls; an ASSA ABLOY Group company.
    i. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
    j. Yale Security Inc.; an ASSA ABLOY Group company.

2.

B. Surface Closer with Cover: Heavy duty Modern Type with mechanism enclosed in cover.

1. Mounting: Hinge side.
2. Type: Hold open.
3. Backcheck: Factory preset, effective between 60 and 85 degrees of door opening.
4. Cover Material: Plated steel

2.7 MECHANICAL STOPS AND HOLDERS

A. Floor-Mounted Stops: BHMA A156.16; aluminum base metal.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Architectural Builders Hardware Mfg., Inc.
    b. Baldwin Hardware Corporation.
    c. Burns Manufacturing Incorporated.
    d. Cal-Royal Products, Inc.
    e. Don-Jo Mfg., Inc.
    f. Door Controls International, Inc.
    g. Hager Companies.
    h. Hiawatha, Inc.
    i. IVES Hardware; an Ingersoll-Rand company.
    j. Rockwood Manufacturing Company.
    k. Stanley Commercial Hardware; Div. of The Stanley Works.
    l. Trimco.

B. Dome-Type Floor Stop: Heavy duty with minimum 1-inch- (25-mm-) high bumper for doors without threshold and 1-3/8-inch- (35-mm-) high bumper for doors with threshold.

2.8 THRESHOLDS

A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following (see drawings):

a. Schluter.

2.9 METAL PROTECTIVE TRIM UNITS

A. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch- (1.3-mm-) thick stainless steel; with manufacturer's standard machine or self-tapping screw fasteners.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Baldwin Hardware Corporation.
b. Burns Manufacturing Incorporated.
c. Don-Jo Mfg., Inc.
d. Hiawatha, Inc.
e. IPC Door and Wall Protection Systems, Inc.; Div. of InPro Corporation.
f. IVES Hardware; an Ingersoll-Rand company.
g. Pawling Corporation.
h. Rockwood Manufacturing Company.
i. Trimco.

B. Kick Plates: 12 inches (305 mm)] high by door width with allowance for frame stops.

2.10 AUXILIARY DOOR HARDWARE

A. Auxiliary Hardware: BHMA A156.16.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following;

a. Baldwin Hardware Corporation.
b. Cal-Royal Products, Inc.
c. Don-Jo Mfg., Inc.
d. Hager Companies.
e. Rockwood Manufacturing Company.
f. Stanley Commercial Hardware; Div. of The Stanley Works.
g. Trimco.

B. Silencers for Metal Door Frames: Grade 1; neoprene or rubber; minimum diameter 1/2 inch (13 mm); fabricated for drilled-in application to frame.

2.11 FABRICATION

A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except as otherwise approved by Architect.

1. Manufacturer's identification is permitted on rim of lock cylinders only.

B. Base Metals: Produce door hardware units of base metal indicated, 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.

C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.

2. Spacers or Sex Bolts: For through bolting of hollow-metal doors.

2.12 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. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.

3.3 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.

B. 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.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

C. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

D. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."

E. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.

3.4 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.

1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

3.5 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.

3.6 DOOR HARDWARE SCHEDULE

Door Hardware Set No.1
Locations: Door #112, 112D, 118B each to have the following:

Qty.	Item	Manufacturer	Finish
1	Lockable latchset	Match Existing	Match Existing
1-1/2 pair	Hinges	Match Existing	Match Existing
1	Stop	Match Existing	Match Existing
1	Closer	Match Existing	Match Existing
2	Kickplates	Match Existing	Match Existing

Door Hardware Set No.2
Locations: Door #113, 116, 202 each to have the following:

Qty.	Item	Manufacturer	Finish
1	Push/Pull	Match Existing	Match Existing
1-1/2 pair	Hinges	Match Existing	Match Existing
1	Stop	Match Existing	Match Existing
1	Closer	Match Existing	Match Existing
2	Kickplates	Match Existing	Match Existing

END OF SECTION 087111

SECTION 088000 - GLAZING

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 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.

B. Related Sections:

1.3 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

1.4 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Delegated Design: Design glass, including comprehensive engineering analysis according to ASTM E 1300 by a qualified professional engineer, using the following design criteria:

1. Design Wind Pressures:
   a. Basic Wind Speed: 90 mph.
   b. Importance Factor: 1.15.
   c. Exposure Category: C.
2. 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.

3. Thickness of Patterned Glass: Base design of patterned glass on thickness at thinnest part of the glass.
4. 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.

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.

1.5 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 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.

1.6 ACTION SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Glass Samples: For each type of the following products; 12 inches (300 mm) square.
1. Patterned glass (for obscuring restroom windows).
2. Tinted glass.

C. Glazing Accessory Samples: For gaskets sealants and colored spacers, in 12-inch (300-mm) lengths.

D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

E. 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.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For installers.

B. Product Certificates: For glass and glazing products, from manufacturer.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for glazing sealants and glazing gaskets.

1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.

D. Preconstruction adhesion and compatibility test report.

E. Warranties: Sample of special warranties.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved by coated-glass manufacturer.

B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

C. 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 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."

H. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of 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.

1.9 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.

1.10 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).

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

A. Exterior window glazing shall be laminated, with tempered layer on exterior.

B. 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 mm.

C. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

D. Windborne-Debris-Impact Resistance: Provide exterior glazing that passes basic-protection testing requirements in ASTM E 1996 for the following when tested according to ASTM E 1886.
1. Basic Wind Speed: 90 mph.
2. Importance Factor: 1.15.
3. Exposure Category: C.

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.

4. Large-Missile Test: For glazing located within 30 feet (9.1 m) of grade.
5. Small-Missile Test: For glazing located more than 30 feet (9.1 m) above grade.
6. Large-Missile Test: For all glazing, regardless of height above grade.

E. 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.
2. For laminated-glass lites, properties are based on products of construction indicated.
3. 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).
4. 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.
5. 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. Low-E Tinted Float Glass: Class 2, complying with other requirements specified.

1. Glazing shall be Low-E glass, Tint Color: Gray.

C. Patterned Glass: ASTM C 1036, Type II, Class 1 (clear), Form 3; Quality-Q6, Finish F1 (patterned one side).

2.3 LAMINATED GLASS

A. 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 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. Total thickness: 1 inch.
4. Interlayer Color: Clear.

B. 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.

C. Glass: Comply with applicable requirements in "Glass Products" Article as indicated by designations in "Laminated-Glass Types" Article.

2.4 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:

1. Neoprene complying with ASTM C 864.
2. Silicone complying with ASTM C 1115.
3. Thermoplastic polyolefin rubber complying with ASTM C 1115.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned neoprene 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.

2.5 GLAZING SEALANTS

A. General:

1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Sealants used inside the weatherproofing system, shall have a VOC content of not more than 250 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
4. Sealants used inside the weatherproofing system 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."

5. Colors of Exposed Glazing Sealants: 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 one of 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.

2.6 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.

2.7 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.

2.8 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.

2.9 MONOLITHIC-GLASS TYPES

A. Glass Type GL-1 Interior windows: Clear fully tempered float glass.

1. Thickness: 6.0 mm.
2. Provide safety glazing labeling.

2.10 LAMINATED GLASS TYPES

A. Glass Type GL-2: Low-e-coated, laminated vision glass with one ply of fully tempered, tinted float glass on exterior side and one ply of non-tempered obscure glass on interior side.

1. Total thickness: 1 inch
2. Interlayer Thickness: 0.090 inch (2.29 mm).
3. Low-E Coating
4. 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 092216 - NON-STRUCTURAL METAL FRAMING

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. Non-load-bearing steel framing systems for interior gypsum board assemblies.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATION SUBMITTALS

A. Evaluation Reports: from ICC-ES.

PART 2 - PRODUCTS

2.1 FRAMING SYSTEMS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
2. Protective Coating: ASTM A 653/A 653M, G40 (Z120), ASTM A 653/A 653M, G60 (Z180), Coating with equivalent corrosion resistance of ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized.

C. Studs and Runners: ASTM C 645.

1. Steel Studs and Runners:

a. Minimum Base-Metal Thickness: As indicated on Drawings.
b. Depth: As indicated on Drawings.

2. Dimpled Steel Studs and Runners:

a. Minimum Base-Metal Thickness: As indicated on Drawings.
b. Depth: As indicated on Drawings.

D. Slip-Type Head Joints: Where indicated, provide one of the following:

1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch- (51-mm-) deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches ,(305 mm) of the top of studs to provide lateral bracing.
2. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch- (51-mm-) deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
3. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

a. Products: Subject to compliance with requirements, provide one of the following:

1) Dietrich Metal Framing; SLP-TRK Slotted Deflection Track.
2) MBA Building Supplies; FlatSteel Deflection Track, Slotted Deflecto Track.
3) Steel Network Inc. (The); VertiClip SLD VertiTrack VTD Series.
4) Superior Metal Trim; Superior Flex Track System (SFT).
5) Telling Industries; Vertical Slip Track, Vertical Slip Track II.

E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Minimum Base-Metal Thickness: 0.033 inch (0.84 mm).

F. Cold-Rolled Channel Bridging: Steel, 0.053-inch (1.34-mm) minimum base-metal thickness, with minimum 1/2-inch- (13-mm-) wide flanges.

1. Depth: 1-1/2 inches (38 mm).
2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches (38 by 38 mm), 0.068-inch- (1.72-mm-) thick, galvanized steel.

G. Hat-Shaped, Rigid Furring Channels: ASTM C 645.

1. Minimum Base-Metal Thickness: 0.018 inch (0.45 mm).
2. Depth: As indicated on Drawings.

H. Cold-Rolled Furring Channels: 0.053-inch (1.34-mm) uncoated-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges.

1. Depth: As indicated on Drawings.

2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum uncoated-steel thickness of 0.033 inch (0.8 mm).
3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.

2.2 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that 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: Provide one of the following:

1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.
2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch (3.2 mm) thick, in width to suit steel stud size.

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 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754, except comply with framing sizes and spacing indicated.
1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Install bracing at terminations in assemblies.

D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.3 INSTALLING FRAMED ASSEMBLIES

A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

B. Install studs so flanges within framing system point in same direction.

C. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

    a. Install two studs at each jamb unless otherwise indicated.
    b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (13-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.
    c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Curved Partitions:

    a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
    b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches (150 mm) o.c.

D. Direct Furring:

1. Screw to framing.
2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.

E. 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.

END OF SECTION 092216

SECTION 092900 - GYPSUM BOARD

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 gypsum board.
2. Tile backing panels.

B. Related Requirements:
1. Section 092216 "Non-Structural Metal Framing"
2. Section 093000 "Tiling"

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch- (300-mm-) long length for each trim accessory indicated.

1.4 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.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Low-Emitting Materials: For ceiling and wall assemblies, provide materials and construction identical to those tested in assembly and complying 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, GENERAL

A. Regional Materials: Gypsum panel products shall be manufactured within 500 miles (800 km) of Project site.

B. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. American Gypsum.
2. CertainTeed Corp.
3. Georgia-Pacific Gypsum LLC.
4. Lafarge North America Inc.
5. National Gypsum Company.
6. PABCO Gypsum.
7. Temple-Inland.
8. USG Corporation.

B. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Thickness: 5/8 inch (15.9 mm).
2. Long Edges: Tapered.

C. Abuse-Resistant Gypsum Board: ASTM C 1629/C 1629M, Level 1 (In Kitchen and Office, except where FRP occurs).

1. Core: 5/8 inch (15.9 mm), Type X.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

D. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.

1. Core: 5/8 inch (15.9 mm), Type X.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.4 TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Board: ASTM C 1178/C 1178M, with manufacturer's standard edges.

1. Products: Subject to compliance with requirements, provide the following:
   a. Georgia-Pacific Gypsum LLC; DensShield Tile Backer.

2. Core: 5/8 inch (15.9 mm), Type X.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.5 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
2. Shapes:

   a. Cornerbead.
   b. Bullnose bead.
   c. LC-Bead: J-shaped; exposed long flange receives joint compound.
   d. L-Bead: L-shaped; exposed long flange receives joint compound.
   e. U-Bead: J-shaped; exposed short flange does not receive joint compound.

2.6 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.

2. Fill Coat: For second coat, use drying-type, all-purpose compound.
3. Finish Coat: For third coat, use drying-type, all-purpose compound.

D. Joint Compound for Tile Backing Panels:

1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.

2.7 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

1. Laminating adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Laminating adhesive 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. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.

D. 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.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. Wallboard Type: As indicated on Drawings.
2. Abuse-Resistant Type: As indicated on Drawings.
3. Moisture- and Mold-Resistant Type: At walls with plumbing fixtures and showers except where tile occurs.
4. Glass-Mat Interior Type: Backer board to be used at all wall tile locations.

B. Single-Layer Application:
   1. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
      a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
   2. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

3.4 APPLYING TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Panels: Comply with manufacturer's written installation instructions and install at locations indicated to receive tile. Install with 1/4-inch (6.4-mm) gap where panels abut other construction or penetrations.

B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.5 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.

3.6 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
   1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
   2. Level 2: Panels that are substrate for tile.
   3. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.

E. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.

3.7 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 093000 - TILING

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. Ceramic tile.
2. Waterproof membrane.
3. Tile backing panels.
4. Metal edge strips.

B. Related Sections:
1. Section 092900 "Gypsum Board”

1.3 DEFINITIONS

A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.

B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in "American National Standard Specifications for Installation of Ceramic Tile."

C. Module Size: Actual tile size plus joint width indicated.

D. Face Size: Actual tile size, excluding spacer lugs.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. 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.

C. Samples for Initial Selection: For each type of tile and grout indicated. Include Samples of accessories involving color selection.

D. Samples for Verification:

1. Full-size units of each type and composition of tile and for each color and finish required.
2. Full-size units of each type of trim and accessory for each color and finish required.
3. Metal edge strips in 6-inch (150-mm) lengths.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Product Certificates: For each type of product, signed by product manufacturer.

C. Material Test Reports: For each tile-setting and -grouting product.

1.6 QUALITY ASSURANCE

A. Source Limitations for Tile: Obtain tile of each type and color or finish from one source or producer.

1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from one manufacturer and each aggregate from one source or producer.

C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer for each product:
1. Waterproof membrane.
2. Crack isolation membrane.
3. Joint sealants.
4. Cementitious backer units.
5. Metal edge strips.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

D. Store liquid materials in unopened containers and protected from freezing.

E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

1. Provide tile complying with Standard grade requirements unless otherwise indicated.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCA installation methods specified in tile installation schedules, and other requirements specified.

C. FloorScore Compliance: Tile for floors shall comply with requirements of FloorScore Standard.

D. Low-Emitting Materials: Tile flooring systems 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. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

F. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.

1. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.

2.2 TILE PRODUCTS

A. Tile Type CT-1: Factory-mounted unglazed ceramic mosaic tile; floor.

1. Basis-of-Design Product: Subject to compliance with requirements, provide a Daltile porcelain tile, Owner to select style and color.
2. The terms "porcelain" and "natural clay" describe the basic material that the tile is made of and have nothing to do with color. See Evaluations. Note that if a manufacturer does not state that the tile is porcelain, it probably is not.
3. Module Size: 2 by 2 inches (50.8 by 50.8 mm).
4. Thickness: 1/4 inch (6.35 mm).
5. Face: Pattern of design indicated.
6. Surface: Smooth, without abrasive admixture.
7. Tile Color and Pattern: As selected by Owner.
8. Grout Color: As selected by Owner from manufacturer's full range.
9. 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:

B. Tile Type CT-2 & 3: Unglazed tile; floor and wall.

1. Basis-of-Design Product: Subject to compliance with requirements, provide a Daltile porcelain tile, Owner to select style and color.
2. Composition: Porcelain.
3. Face Size: 12 x 12 inches and 8x8 inches.
4. Thickness: 5/16 inch (6.35 mm).
5. Face: Plain with square edges.
6. Tile Color and Pattern: As selected by Owner.
7. Grout Color: As selected by Owner from manufacturer's full range.
8. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:

    a. Base Cove: Cove, module size same width as adjoining flat tile, 6" high.
    b. Base for Thin-Set Mortar Installations without tile on wall above: Top bullnose, module size same as adjoining flat tile.
    c. Wainscot Cap for Thin-Set Mortar Installations: Top bullnose, module size 6" high by same width as adjoining flat tile.
    d. External Corners for Thin-Set Mortar Installations: Surface bullnose, module size same as adjoining flat tile.
    e. Internal Corners: Field-butted square corners. For coved base and cap, use angle pieces designed to fit with stretcher shapes.
    f. At floor drains where floor slopes, cut tiles cleanly and carefully, creating a neat pattern around drain.

2.3 TILE BACKING PANELS

A. See Section 092900 "Gypsum Board"

2.4 WATERPROOF MEMBRANE

A. General: Manufacturer's standard product, selected from the following, that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

B. Fluid-Applied Membrane: Liquid-latex rubber or elastomeric polymer.

1. Products: Subject to compliance with requirements, and adherence to TCA guidelines, provide one of (but not limited to) the following:

a. Boiardi Products; a QEP company; Elastiment 644 Membrane Waterproofing System.
b. Bonsal American; an Oldcastle company; B 6000 Waterproof Membrane.
c. Bostik, Inc.; Durabond D-222 Duraguard Membrane, Hydroment Gold.
d. C-Cure; Pro-Red Waterproofing Membrane 63.
e. Custom Building Products; Redgard Waterproofing and Crack Prevention Membrane.
f. Jamo Inc.; Waterproof.
g. Laticrete International, Inc.; Latapoxy 24hr HydroProofing, Laticrete Watertight Floor N' Wall Waterproofing.
h. MAPEI Corporation; Mapelastic HPG.
i. Southern Grouts & Mortars, Inc.; Southcrete 1100 Crack Suppression and Waterproofing.
j. TEC; a subsidiary of H. B. Fuller Company; HydraFlex - Waterproofing Crack Isolation Membrane.

2.5 SETTING MATERIALS

A. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Boiardi Products; a QEP company.
b. Bonsal American; an Oldcastle company.
c. Bostik, Inc.
d. C-Cure.
e. Custom Building Products.
f. Jamo Inc.
g. Laticrete International, Inc.
h. MAPEI Corporation.
i. Mer-Kote Products, Inc.
j. Southern Grouts & Mortars, Inc.
k. Summitville Tiles, Inc.
l. TEC; a subsidiary of H. B. Fuller Company.

2. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
3. Provide prepackaged, dry-mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid-latex additive at Project site.
4. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

2.6 GROUT MATERIALS

A. Sand-Portland Cement Grout: ANSI A108.10, composed of white or gray cement and white or colored aggregate as required to produce color indicated.

B. Water-Cleanable Epoxy Grout: ANSI A118.3, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D.

1. Basis-of-Design Product: Subject to compliance with requirements, provide comparable product by one of the following:
   a. Laticrete International, Inc.
   b. MAPEI Corporation.

2. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 deg F (60 deg C) and 212 deg F (100 deg C), respectively, and certified by manufacturer for intended use.

2.7 ELASTOMERIC SEALANTS

A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements.
1. 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."
2. Use primers, backer rods, and sealant accessories recommended by sealant manufacturer.

B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.

C. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. DAP Inc.; Titanium Enriched Kitchen and Bath Sealant or 100 percent Silicone Kitchen and Bath Sealant.
   b. Dow Corning Corporation; Dow Corning 786.
   c. GE Silicones; a division of GE Specialty Materials; Sanitary 1700.
   d. Laticrete International, Inc.; Latasil Tile & Stone Sealant.

e. Pecora Corporation; Pecora 898 Sanitary Silicone Sealant.
f. Tremco Incorporated; Tremsil 600 White.

D. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

E. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; stainless-steel, ASTM A 666, 300 Series exposed-edge material.

F. Temporary Protective Coating: Either product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.

1. Petroleum paraffin wax, fully refined and odorless, containing at least 0.5 percent oil with a melting point of 120 to 140 deg F (49 to 60 deg C) per ASTM D 87.
2. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as temporary protective coating for tile.

G. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

H. Grout Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Bonsal American; an Oldcastle company; Grout Sealer.
b. Bostik, Inc.; CeramaSeal Grout & Tile Sealer, Magic Seal, Silox 8, Siloxane 220.
c. C-Cure; Penetrating Sealer 978.
d. Custom Building Products; Grout and Tile Sealer.
e. Jamo Inc.; Penetrating Sealer.
f. MAPEI Corporation; KER 004, Keraseal Penetrating Sealer for Unglazed Grout and Tile.
g. Southern Grouts & Mortars, Inc.; Silicone Grout Sealer.
h. Summitville Tiles, Inc.; SL-15, Invisible Seal Penetrating Grout and Tile Sealer.
i. TEC; a subsidiary of H. B. Fuller Company; TA-257 Silicone Grout Sealer.

2.8 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
2. Verify that concrete substrates for tile floors installed with bonded mortar bed or thin-set mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.

    a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
    b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.

3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot (1:50) toward drains.

C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

D. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.3 TILE INSTALLATION

A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.

E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.

F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:

1. Ceramic Mosaic Tile: 1/16 inch (1.6 mm).
2. Paver Tile: 1/4 inch (6.35 mm).
3. Decorative Thin Wall Tile: 1/16 inch (1.6 mm).

G. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

H. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.

I. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.

J. Grout Sealer: Apply grout sealer to grout joints according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.4 TILE BACKING PANEL INSTALLATION

A. Install cementitious backer units and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use latex-portland cement mortar for bonding material unless otherwise directed in manufacturer's written instructions.

3.5 WATERPROOFING INSTALLATION

A. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness and bonded securely to substrate.

B. Do not install tile or setting materials over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.6 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove grout residue from tile as soon as possible.
2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
3. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.

B. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.

C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.7 INTERIOR TILE INSTALLATION SCHEDULE

1. Tile Installation F122: Thin-set mortar on waterproof membrane; TCA F122.

2. Tile Installation F125A: Thin-set mortar on crack isolation membrane; TCA F125A.

B. Interior Wall Installations, Masonry or Concrete:

1. Tile Installation W211: Cement mortar bed (thickset) bonded to substrate; TCA W211 and ANSI A108.1A or ANSI A108.1B or ANSI A108.1C.

a. Tile Type: Ceramic

C. Shower Receptor and Wall Installations, Concrete or Masonry:

1. Tile Installation B421: Thin-set mortar on waterproof membrane; TCA B421.

a. Tile Type: Ceramic.
b. Thin-Set Mortar: Latex-portland cement mortar.

D. Shower Receptor and Wall Installations, Metal Studs or Furring:

1. Tile Installation B420-11: Thin-set mortar on coated glass-mat, water-resistant backer board; TCA B420.

a. Tile Type: Ceramic

END OF SECTION 093000

SECTION 096519 - RESILIENT TILE FLOORING

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. Vinyl composition floor tile.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

   1. Show details of special patterns.

C. Samples for Verification: Full-size units of each color and pattern of floor tile required.

   1. For heat-welding bead, manufacturer's standard-size Samples, but not less than 9 inches long, of each color required.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.6 MATERIALS MAINTENANCE SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

   1. Floor Tile: Furnish 1 box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation indicated.

1. Engage an installer who employs workers for this Project who are trained or certified by manufacturer for installation techniques required.

B. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

1.9 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Close spaces to traffic during floor tile installation.

D. Close spaces to traffic for 48 hours after floor tile installation.

E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. FloorScore Compliance: Resilient tile flooring shall comply with requirements of FloorScore Standard.

B. Low-Emitting Materials: Flooring system 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 VINYL COMPOSITION FLOOR TILE

A. Products: Subject to compliance with requirements, provide the following:
   1. Mannington Mills, Inc.; style as indicated on drawings.

B. Tile Standard: ASTM F 1066.

C. Wearing Surface: Smooth.

D. Thickness: 0.125 inch.

E. Size: 12 by 12 inches.

F. Colors and Patterns: To be selected by Owner.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile and substrate conditions indicated.

   1. Adhesives shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

      a. VCT and Asphalt Tile Adhesives: Not more than 50 g/L.

   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. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.

C. Access Flooring Panels: Remove protective film of oil or other coating using method recommended by access flooring manufacturer.

D. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

E. Do not install floor tiles until they are same temperature as space where they are to be installed.

1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

F. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

1. Lay tiles square with room axis in pattern indicated.

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles with grain running in one direction in pattern of colors and sizes indicated.

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.

G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.

B. Perform the following operations immediately after completing floor tile installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect floor tile products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor tile surfaces before applying liquid floor polish.

1. Apply two coat(s).

E. Cover floor tile until Substantial Completion.

END OF SECTION 096519

GENERALSECTION 096723 - RESINOUS FLOORING

PART 1 -

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. Industrial resinous flooring systems.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include manufacturer's technical data, application instructions, and recommendations for each resinous flooring component required.

B. Samples for Initial Selection: For each type of exposed finish required.

C. Samples for Verification: For each resinous flooring system required, 6 inches (150 mm) square, applied to a rigid backing by Installer for this Project.

1.4 INFORMATIONAL SUBMITTALS

A. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

B. Material Certificates: For each resinous flooring component, from manufacturer.

C. Material Test Reports: For each resinous flooring system.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For resinous flooring to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of flooring systems required for this Project.

1. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated.

B. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, grouting coats, and topcoats, from single source from single manufacturer. Provide secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from source recommended by manufacturer of primary materials.

1.7 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 and mixing with other components.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring application.

B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring application.

C. Close spaces to traffic during resinous flooring application and for not less than 24 hours after application unless manufacturer recommends a longer period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with location requirements (use manufacturer within 500 miles of project), provide product indicated on Drawings by the following company, or a similar manufacturer and product subject to approval:
1. Dur-A-Flex, Inc.

2.2 MATERIALS

A. VOC Content of Liquid-Applied Flooring Components: Use Zero VOC product.

B. Low-Emitting Materials: Flooring system 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."

2.3 INDUSTRIAL RESINOUS FLOORING

A. Resinous Flooring: Abrasion-, impact- and chemical-resistant, industrial-aggregate-filled, resin-based, monolithic floor surfacing designed to produce a seamless floor and integral cove base.

B. System Characteristics:

1. Color and Pattern: Owner to select.
2. Wearing Surface: Owner to select.

C. Primer: Water based, 50 percent solids, 4 mils thickness.

D. Body Coats:

1. Resin: Epoxy.
2. Formulation Description: 100 percent solids.
3. Application Method: Self-leveling slurry and Troweled at ramp at flooring transitions.

a. Thickness of Coats: 1/8” (125) mils
b. Number of Coats: One.

E. Topcoat: Sealing or finish coats. (Armor Top)

1. Resin: Urethane.
2. Formulation Description: 95 percent solids.
3. Type: Clear.
4. Finish: Gloss.
5. Thickness of Coats: 3 mils
6. Number of Coats: One.

F. System Physical Properties: Provide resinous flooring system with the following minimum physical property requirements when tested according to test methods indicated:

1. Compressive Strength: per ASTM C 579.
2. Tensile Strength: per ASTM C 307.
3. Flexural Modulus of Elasticity: per ASTM C 580.
4. Water Absorption: per ASTM C 413.
5. Coefficient of Thermal Expansion: per ASTM C 531.
6. Indentation: percent maximum per MIL-D-3134.
7. Impact Resistance: No chipping, cracking, or delamination and not more than 1/16-inch (1.6-mm) permanent indentation per MIL-D-3134.
8. Resistance to Elevated Temperature: No slip or flow of more than 1/16 inch (1.6 mm) per MIL-D-3134.
9. Abrasion Resistance: maximum weight loss per ASTM D 4060.
10. Flammability: Self-extinguishing per ASTM D 635.
11. Critical Radiant Flux: 0.22 W/sq. cm or greater per NFPA 253.
12. Hardness: Shore D per ASTM D 2240.
13. Bond Strength: 100 percent concrete failure per ACI 503R.

G. System Chemical Resistance: Test specimens of cured resinous flooring system are unaffected when tested according to ASTM C 267 for immersion for no fewer than seven days:

2.4 ACCESSORIES

A. Primer: Type recommended by manufacturer for substrate and body coats indicated.

1. Formulation Description: water based.

B. Waterproofing Membrane: Type recommended by manufacturer for substrate and primer and body coats indicated.

1. Formulation Description: 100 percent solids.

C. Reinforcing Membrane: Flexible resin formulation that is recommended by manufacturer for substrate and primer and body coats indicated and that prevents substrate cracks from reflecting through resinous flooring.

1. Formulation Description: 100 percent solids.

a. Provide fiberglass scrim embedded in reinforcing membrane.

D. Patching and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended by manufacturer for application indicated.

PART 3 - EXECUTION

3.1 PREPARATION

A. General: Prepare and clean substrates according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry substrate for resinous flooring application.

B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.

1. Roughen concrete substrates as follows:

a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
b. Comply with ASTM C 811 requirements unless manufacturer's written instructions are more stringent.

2. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written instructions.

3. Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.

    a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with application of resinous flooring only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) of slab area in 24 hours.
    b. Perform plastic sheet test, ASTM D 4263. Proceed with application only after testing indicates absence of moisture in substrates.
    c. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

4. Alkalinity and Adhesion Testing: Verify that concrete substrates have pH within acceptable range. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.

C. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.

D. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.

E. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written instructions.

3.2 APPLICATION

A. General: Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.

1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.
2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.
3. At substrate expansion and isolation joints, comply with resinous flooring manufacturer's written instructions.

B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.

C. Apply waterproofing membrane, where indicated, in manufacturer's recommended thickness.

1. Apply waterproofing membrane to integral cove base substrates.

D. Apply reinforcing membrane to substrate cracks.

E. Integral Cove Base: Apply cove base mix to wall surfaces before applying flooring. Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, troweling, sanding, and topcoating of cove base. Round internal and external corners.

1. Integral Cove Base: 4 inches (100 mm) high where noted on drawings.

F. Apply self-leveling slurry body coats in thickness indicated for flooring system.

1. Broadcast aggregates at rate recommended by manufacturer and, after resin is cured, remove excess aggregates to provide surface texture indicated.

G. Apply troweled or screeded body coats in thickness indicated for flooring system to ramp up to ceramic tile at higher finished floor height. Hand or power trowel and grout to fill voids. When cured, remove trowel marks and roughness using method recommended by manufacturer.

H. Apply grout coat, of type recommended by resinous flooring manufacturer, to fill voids in surface of final body coat and to produce wearing surface indicated.

I. Apply topcoats in number indicated for flooring system and at spreading rates recommended in writing by manufacturer.

3.3 FIELD QUALITY CONTROL

A. Core Sampling: At the direction of Owner and at locations designated by Owner, take one core sample per 1000 sq. ft. (92.9 sq. m) of resinous flooring, or portion of, to verify thickness. For each sample that fails to comply with requirements, take two additional samples. Repair damage caused by coring and correct deficiencies.

B. Material Sampling: Owner may at any time and any number of times during resinous flooring application require material samples for testing for compliance with requirements.

1. Owner will engage an independent testing agency to take samples of materials being used. Material samples will be taken, identified, sealed, and certified in presence of Contractor.
2. Testing agency will test samples for compliance with requirements, using applicable referenced testing procedures or, if not referenced, using testing procedures listed in manufacturer's product data.
3. If test results show applied materials do not comply with specified requirements, pay for testing, remove noncomplying materials, prepare surfaces coated with unacceptable materials, and reapply flooring materials to comply with requirements.

3.4 PROTECTION

A. Protect resinous flooring from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by resinous flooring manufacturer.

END OF SECTION 096723

SECTION 099123 - PAINTING

PART 1 GENERAL

A. SUMMARY

1. Paint all exposed exterior concrete wall surfaces of the Armory including, but not limited to concrete eyebrows and plastered areas.
2. Surface treatment includes surface preparation, priming and coats of paint as specified in this Section. Number of coats specified is a minimum. Uniform coverage is required, free from defects and blemishes.
3. Preparation shall include any and all abatement required to provide approved substrate for painting. Substrate shall be jointly inspected by N.A.C.E. certified coating inspector, abatement contractor, general contractor, painting contractor and ECI.
4. Work will be rejected if Quality Assurance requirements are not met. Contractor's attention is directed to Section 099123 part I.6 Quality Assurance.

B. SECTION INCLUDES

1. Submittals.
2. Quality Assurance.
3. Material and Equipment.
4. Painting Maintenance.
5. Preparation.
6. Application.

C. DO NOT PAINT

1. Surfaces concealed within soffit and furred spaces.

D. SUBMITTALS

1. Material List. Submit copies of complete material list and color samples together with statement of intended use for each material in accordance with Section 01300. Do not apply material without written approval from the Project Manager.
2. Samples. Submit sample draw sheets for each color proposed for use.

E. QUALITY ASSURANCE

1. Painting shall not be started without approval in writing by the Contracting Officer's Representative, based on recommendations of the N.A.C.E. Inspector.

2. Painting started without approval in writing by the Contracting Officer's Representative shall be removed at Contractor's expense with no compensation for costs or lost time. This requirement applies to all surfaces for receiving their first coat of primer. It does not apply to subsequent coats over the first coat of primer.

3. Wherever the term N.A.C.E. Inspector is used, it shall mean a N.A.C.E. Certified Coating Inspector - Level 3, (passed Peer Review). No other level of N.A.C.E. Inspector shall be substituted. N.A.C.E. refers to the National Association of Corrosion Engineers.

4. The Military Department shall employ a N.A.C.E. Inspector to perform work as specified herein.

5. The N.A.C.E. Inspector shall inspect, and reject or approve surface preparation. Surface preparation inspection shall be performed by the N.A.C.E. Inspector in person. The entire job shall be inspected. It may be inspected in parts.

6. The Contractor shall coordinate the surface preparation inspection or inspections as follows: All contractors involved in surface abatement, surface repairs, surface preparation, painting, and the COR and ECI shall be given ample notice and opportunity to be present for the N.A.C.E. Inspector's surface preparation inspection or inspections. The Contractor shall encourage all parties to discuss any issues relating to the quality of the surface preparation.

7. The N.A.C.E. Inspector shall communicate to the COR what parts of the job have surface preparation that are of acceptable quality and are ready to receive their first coat of primer.

8. The Contractor shall wait for approval in writing by the Contracting Officer's Representative stating what parts of the building are approved for receiving their first coat of primer, and shall not start applying primer or paint until such approval has been received.

9. The N.A.C.E. Inspector shall be responsible for inspecting all primer coats and subsequent paint coats for quality of application. The N.A.C.E. Inspector may delegate this work to other persons deemed qualified by the N.A.C.E. Inspector. An organized record of these inspections shall be maintained, be kept current, and shall include date, inspector, area of job inspected, coat layer inspected and result. Submit this record to the COR as part of the close-out documents.

10. Regulations. Materials and processes shall comply with California Air Quality Management standards and all applicable local restrictions

11. Qualification of manufacturer. Products used in the work of this Section shall be produced

by manufacturers regularly engaged in manufacture of similar items and with a history of successful production of architectural coatings.

12. Manufacturers Standards. Comply with manufacturer's written recommendations and instructions.

F. DELIVERY AND STORAGE

1. Deliver, store and protect products in accordance with Section 01600.

PART 2 PRODUCTS

A. QUALITY

1. Provide the best quality grade of specified coating types as regularly produced by recognized paint manufacturers.

2. Materials not bearing manufacturer's identification as best quality products are not acceptable.

B. DURABILITY

1. Paints and finishes shall be durable, washable and shall stand up under washing required to remove pencil marks, ink, ordinary soil, etc., without showing discoloration, loss of gloss, staining, peeling or other damage.

C. PAINT COLOR

1. Paint color shall match existing building wall color scheme.

D. PAINTING SCHEDULE

1. References to specific manufacturers are intended to establish a standard. V.O.C. content shall be less than the maximum specified by the local air quality control district.

E. ACRYLIC SYSTEM

1. Metal Surfaces. Paint metal surfaces as defined below:

a. Exterior metal (new), ferrous:

1. Prime Coat: ICI 3210 Gripper or equal.

2. First Coat: ICI 4216 Lifemaster Pro or equal.

3. Second Coat: ICI 4216 Lifemaster Pro or equal.

b. Exterior metal (existing), ferrous:

1. Prime Coat: Primer compatible with existing paint.
2. First Coat: ICI 4216 Lifemaster Pro or equal.
3. Second Coat: ICI 4216 Lifemaster Pro or equal.

c. Exterior metal (new), galvanized:

1. Prime Coat: ICI 3210 Gripper or equal.
2. First Coat: ICI 2402 Dulux Pro Satin or equal.
3. Second Coat: ICI 2402 Dulux Pro Satin or equal.

d. Exterior metal (existing, galvanized:

1. Prime Coat: primer compatible with existing paint.
2. First Coat: ICI 2402 Dulux Pro Satin or equal.
3. Second Coat: ICI 2402 Dulux Pro Satin or equal.

e. Interior Concrete Surfaces:

1. Prime Coat: ICI 3210 Gripper or equal.
2. First Coat: ICI 1402 Dulux Pro Satin or equal.
3. Second Coat: ICI 1402 Dulux Pro Satin or equal.

f. Interior Concrete Surfaces (previously painted surfaces:

1. Prime Coat: primer compatible with existing paint.
2. First Coat: ICI 1402 Dulux Pro Satin or equal.
3. Second Coat: ICI 1402 Dulux Pro Satin or equal.

F. Above manufacturer product numbers are intended for contractor's general reference. Product number update will be the contractor's responsibility. Contractor shall use the latest product number edition. Submit most current product data in accordance with Section 01300.

PART 3 EXECUTION

A. GENERAL

1. Comply with this Section and manufacturer's specifications.

B. PROTECTION

1. The Contractor shall provide protective devices, such as tarpaulins, screens or covers, as necessary to prevent damage to the work and to other property or persons from all cleaning and painting operations.

2. Paint or paint stains which result in an unsightly appearance on surfaces not designated to be painted shall be removed or obliterated by the Contractor at his expense and to the satisfaction of the COR.

C. SURFACE PREPARATION

1. Existing surfaces. Thoroughly clean all grease, dirt, dust or other foreign matter from existing surfaces requiring paint. Cleaning shall consist of high pressure water blasting using suitable pressure washer equipment. Pressure washer operating pressure shall be between 1500 and 4000 PSI depending upon the surface to be cleaned. Surfaces shall be cleaned as required under criteria of the proposed paint manufacturer. Perform all other preparation and cleaning of surfaces as required by the painting manufacturer.

2. Apply paints and finishes only when surfaces are dry and properly prepared, and surrounding conditions are satisfactory for painting.

3. Remove blistering, cracking, flaking, and peeling or other deteriorated coatings on areas required to receive painting by coating manufacturer's recommendations.

4. Edges of chipped paint shall be feather edged and sanded smooth in accordance with trade standards and coating manufacturer's recommendations by lead abatement contractor. Edges shall be sealed to prevent flaking and peeling.

5. Slick surfaces shall be roughened and damaged areas such as, but not limited to, nail holes, cracks, chips, and spalls, shall be repaired with suitable material to match adjacent undamaged areas.

6. Rusty metal surfaces shall be cleaned by solvent and wire brush or other mechanical cleaning, to provide surfaces suitable for repainting. Treat all bare and clean metal with Primer Pre-treatment prior to priming.

D. MIXING AND THINNING

1. General. Unless otherwise recommended by the manufacturer or restricted by Air Quality Management rules, paints may be thinned immediately prior to application with not more than 1-pint of suitable thinner per gallon when necessary to suit conditions of surface, temperature, weather, and application methods. The use of thinner shall not relieve the Contractor from obtaining complete hiding, full film thickness, or required gloss, and shall not adversely affect the VOC limits of the paints. Paints of different manufacturers shall not be mixed. Maintain containers used in storage, mixing, and application of paint in a clean condition, free from foreign materials and residue.

E. APPLICATION EQUIPMENT

1. Spray Equipment shall be proper type for work as specified.

2. Roller Equipment shall be type that will produce finish work equal to best brush applied work.

3. Mechanical Equipment shall be operated to insure good visibility and control of paint film.

F. APPLICATION METHODS

1. Wood Primer (Smooth surface only). Shall be applied by brush only.

2. Stipple Enamel shall be applied by brush, then back rolled.

3. Coating application shall conform to approved coating manufacturer’s written application instructions.

4. All other application; other than as specified above, shall be applied by brush, roller, spray, or airless equipment.

5. Primer coats shall be continuous over areas requiring work of this section.

G. QUALITY CONTROL

1. To insure proper quality control and record keeping, comply with Sections 01400 and 01700.

2. ECI shall test preparation per ASTM D3359 on paint remaining on prepared painted surfaces. This test shall occur, as a minimum, one test for the first 100 square feet primed and one test every 500 square feet thereafter. Testing shall also occur at locations of visible damage.

H. APPLICATION

1. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, curtains, ropiness, improper cutting in, overspray, or other surface deviations and imperfections are not acceptable.

2. Undercoats shall be provided with a difference in shade in order to distinguish between coats.

3. Topcoats shall be applied to all surfaces as designated in items II.5 and II.6, and shall match color of existing finish coat and closely match approved samples. Remove, refinish or repaint work not in compliance with requirements.

I. CLEAN-UP

1. During the progress of the work, the contractor shall remove daily from the job site discarded painting materials and debris generated by him/her. Cloths, cotton waste and other debris that might constitute a fire hazard shall be placed in closed metal containers and removed at the end of each day. All window glass, hardware, floors, walks etc., shall be cleaned of paint residue to the satisfaction of the COR or his Representative. Upon completion of the work, the contractor's equipment and all debris shall be removed from the job site.

END OF SECTION 09910

BUILDING VALUE SINCE 1906

B-5181

Reversible Folding Shower Seat

Information

News & Views
New Products
Product & Service Information
Specifications, Parts & Instructions
General Information
Contact Us
Careers
Authorized User Sign-In

Search

Model No./Keywords

Go

Vhdufk#Wlsv

Uhsuhvhqwdwlyh#)
Glvwulexwru#Vhdufk

Meets the needs of the physically disabled and elderly.

Complies with ADA Accessibility Guidelines.

Seat is constructed of durable, water-resistant, ivory-colored 1/2" (13mm) thick solid phenolic.

Seat is reversible for left-or right-hand field installation.

Frame and mounting brackets are stainless steel with self-locking mechanism.

Seat is available in 18 Bobrick solid phenolic colors on special order.

BUILDING VALUE SINCE 1906

Home Hand Dryers Soap Dispensers Toilet Partitions Washroom Accessories

Product Specifications
Technical Data Sheets
CAD Drawings
Advisory Bulletins
More Info

B-822

Lavatory-Mounted Soap Dispenser

Top-filling design for ease of maintenance and labor savings.

Vandal-resistant locking cover and free-turning spout.

Corrosion-resistant.

Bright-polished 4" (100mm) spout, cover and escutcheon.

Impact-resistant ABS body and shank; shatter-resistant polyethylene container.

Capacity: 34-fl oz (1.0-L).

Maximum mounting thickness: 4" (100mm).

Information

News & Views
New Products
Product & Service Information
Specifications, Parts & Instructions
General Information
Contact Us
Careers
Authorized User Sign-In

Search

Model No./Keywords

Go

Vhdufk#Wlsv

Uhsuhvhqwdwlyh#)
Glvwulexwru#Vhdufk

BUILDING VALUE SINCE 1906

B-165 3636

Series Channel-Framed Mirrors

Information

News & Views
New Products
Product & Service Information
Specifications, Parts & Instructions
General Information
Contact Us
Careers
Authorized User Sign-In

Search

Model No./Keywords

Go

Vhdufk#Wlsv

Uhsuhvhqwdwlyh#)
Glvwulexwru#Vhdufk

Custom Size 165 3636 Available

Contact your local Bobrick Representative for further information

Click here.

or

Alternate Bobrick Model B-165 2436

Click here.

or

Alternate Gamco Model C-Series

Click here.

BUILDING VALUE SINCE 1906

Home Hand Dryers Soap Dispensers Toilet Partitions Washroom Accessories

Product Specifications
Technical Data Sheets
CAD Drawings
Barrier Free Guidelines
Dimensional Drawings
Advisory Bulletins
More Info

B-290 1836

Series Angle-Framed Mirrors

One-piece roll formed frame is 3/4" x 3/4" (19 x 19mm), type 304 stainless steel angle with satin finish.

Type 304 stainless steel provides superior corrosion resistance compared to 400 Series stainless steel against environmental moisture, hose-down maintenance and strong cleaning solutions.

Frame corners are heliarc welded, ground and polished smooth.

Beveled edges of frame hug mirror; provides gapless fit for improved appearance, and safety when cleaning mirror.

No. 1 quality 1/4" (6mm) glass mirror eletrolytically copper-plated; warranted against silver spoilage for 15 years.

Mirror back is protected by 3/16" (5mm) thick water-resistant, polyethylene padding.

Galvanized steel back attached to frame with concealed screws.

Secured to concealed wall hanger with theft-resistant locking device.

18" Width x 36" Height (46 x 91cm)

Information

News & Views
New Products
Product & Service Information
Specifications, Parts & Instructions
General Information
Contact Us
Careers
Authorized User Sign-In

Search

Model No./Keywords

Go

Vhdufk#Wlsv

Uhsuhvhqwdwlyh#)
Glvwulexwru#Vhdufk

BUILDING VALUE SINCE 1906

Home | Hand Dryers | Soap Dispensers | Toilet Partitions | Washroom Accessories

- Product Specifications
- Technical Data Sheets
- CAD Drawings
- Advisory Bulletins

B-3699

ClassicSeries® Surface-Mounted Paper Towel Dispenser/Waste Receptacle

- **Satin-finish stainless steel.**
- **Stainless steel skirt for surface mounting.**
- **Seamless beveled flange.**
- **Dispenses 350 C-fold or 475 multifold towels.**
- **Knob-latch retains door.**
- **Removable waste container has 2-gal. (7.6-L) capacity.**

Information

- News & Views
- New Products
- Product & Service Information
- Specifications, Parts & Instructions
- General Information
- Contact Us
- Careers
- Authorized User Sign-In

Search

Model No./Keywords

Go

Vhdufk#Wlsv

Uhsuhvhqwdwlyh#)
Glvwulexwru#Vhdufk

BUILDING VALUE SINCE 1906

Home | Hand Dryers | Soap Dispensers | Toilet Partitions | Washroom Accessories

- Product Specifications
- Technical Data Sheets
- Barrier Free Guidelines
- More Info

B-682

Hat and Coat Hook

Bright-polished stainless steel.

Hook: 1" W, 6-1/4" H (25 x 160mm); projects 3" (75mm) from wall.

Information

- News & Views
- New Products
- Product & Service Information
- Specifications, Parts & Instructions
- General Information
- Contact Us
- Careers
- Authorized User Sign-In

Search

Model No./Keywords

Go

Vhdufk#Wlsv

Uhsuhvhqwdwlyh#)
Glvwulexwru#Vhdufk

BUILDING VALUE SINCE 1906

B-270

ConturaSeries® Surface-Mounted Sanitary Napkin Disposal

Satin-finish stainless steel.

Cover is drawn, one-piece construction; secured to cabinet with full-length stainless steel piano-hinge.

Information

News & Views
New Products
Product & Service Information
Specifications, Parts & Instructions
General Information
Contact Us
Careers
Authorized User Sign-In

Search

Model No./Keywords

Go

Vhdufk#Wlsv

Uhsuhvhqwdwlyh#)
Glvwulexwru#Vhdufk

BUILDING VALUE SINCE 1906

Product Specifications
Technical Data Sheets
CAD Drawings
Advisory Bulletins

B-221

ClassicSeries® Surface-Mounted Seat-Cover Dispenser

Satin-finish stainless steel.

Dispenses 250 single- or half-fold toilet seat covers.

Fills from bottom.

Information

News & Views
New Products
Product & Service Information
Specifications, Parts & Instructions
General Information
Contact Us
Careers
Authorized User Sign-In

Search

Model No./Keywords

Go

Vhdufk#Wlsv

Uhsuhvhqwdwlyh#)
Glvwulexwru#Vhdufk

BUILDING VALUE SINCE 1906

Home | Hand Dryers | Soap Dispensers | Toilet Partitions | Washroom Accessories

Product Specifications
Technical Data Sheets
Advisory Bulletins

204-3

Vinyl Shower Curtain

Opaque, matte white vinyl 008" (0.2mm) thick.

Contains antibacterial and flame-retardant agents.

Nickel-plated brass grommets along top, one every 6" (150mm).

Bottom and sides are hemmed.

Hooks not included.

Curtain 70" W, 72" H (1780 x 1830mm).

Requires 12 hooks

Information

News & Views
New Products
Product & Service Information
Specifications, Parts & Instructions
General Information
Contact Us
Careers
Authorized User Sign-In

Search

Model No./Keywords

Go

Vhdufk#Wlsv

Uhsuhvhqwdwlyh#)
Glvwulexwru#Vhdufk

BUILDING VALUE SINCE 1906

Technical Data Sheets
CAD Drawings
Dimensional Drawings
Advisory Bulletins

B-204-1

Shower Curtain Hook

Stainless steel.

For 1" and 1-1/4" (25 and 30mm) diameter shower curtain rods.

Information

News & Views
New Products
Product & Service Information
Specifications, Parts & Instructions
General Information
Contact Us
Careers
Authorized User Sign-In

Search

Model No./Keywords

Go

Vhdufk#Wlsv
Uhsuhvhqwdwlyh#)
Glvwulexwru#Vhdufk

BUILDING VALUE SINCE 1906

Home Hand Dryers Soap Dispensers Toilet Partitions Washroom Accessories

Product Specifications

Technical Data Sheets

B-6047x36

ClassicSeries® Extra-Heavy-Duty Shower Curtain Rod

Satin-finish stainless steel.

18-gauge (1.2mm), 1-1/4" (30mm) diameter rod.

Flanges are 2-1/2" (65mm) square.

36" (915mm) length.

Information

News & Views
New Products
Product & Service Information
Specifications, Parts & Instructions
General Information
Contact Us
Careers
Authorized User Sign-In

Search

Model No./Keywords

Go

Vhdufk#Wlsv

Uhsuhvhqwdwlyh#)
Glvwulexwru#Vhdufk

BUILDING VALUE SINCE 1906

Home Hand Dryers Soap Dispensers Toilet Partitions Washroom Accessories

Product Specifications

Technical Data Sheets

B-6047x60

ClassicSeries® Extra-Heavy-Duty Shower Curtain Rod

Satin-finish stainless steel.

18-gauge (1.2mm), 1-1/4" (30mm) diameter rod.

Flanges are 2-1/2" (65mm) square.

60" (1525mm) length.

Information

News & Views
New Products
Product & Service Information
Specifications, Parts & Instructions
General Information
Contact Us
Careers
Authorized User Sign-In

Search

Model No./Keywords

Go

Vhdufk#Wlsv

Uhsuhvhqwdwlyh#)
Glvwulexwru#Vhdufk

BUILDING VALUE SINCE 1906

Home Hand Dryers Soap Dispensers Toilet Partitions Washroom Accessories

Product Specifications

Technical Data Sheets

B-6047x72

ClassicSeries® Extra-Heavy-Duty Shower Curtain Rod

- Satin-finish stainless steel.
- 18-gauge (1.2mm), 1-1/4" (30mm) diameter rod.
- Flanges are 2-1/2" (65mm) square.
- 72" (1830mm) length.

Information

News & Views
New Products
Product & Service Information
Specifications, Parts & Instructions
General Information
Contact Us
Careers
Authorized User Sign-In

Search

Model No./Keywords

Go

Vhdufk#Wlsv

Uhsuhvhqwdwlyh#)
Glvwulexwru#Vhdufk

ACCESSIBILITY PROFESSIONALS
www.FreedomShowers.com
1-877-947-7769

Description:

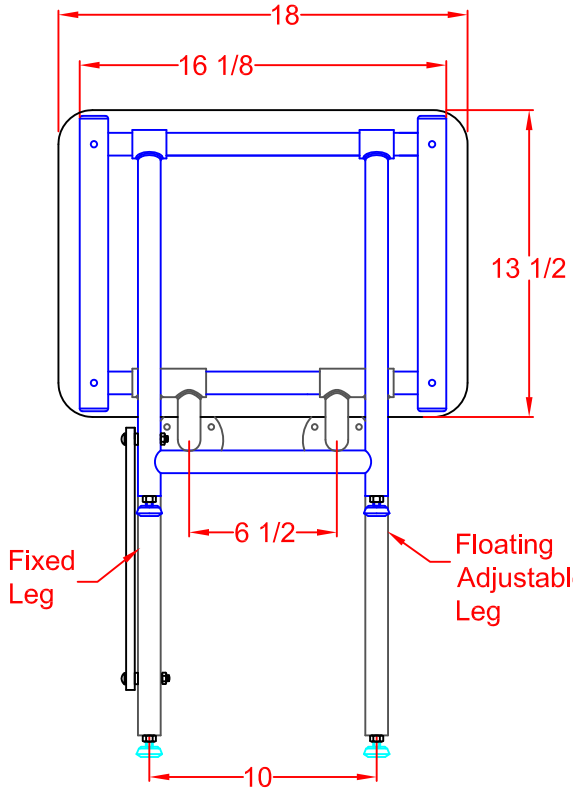
APCSSB2-180150-NW
18" x 15" BENCH SEAT with Swing Down Leg

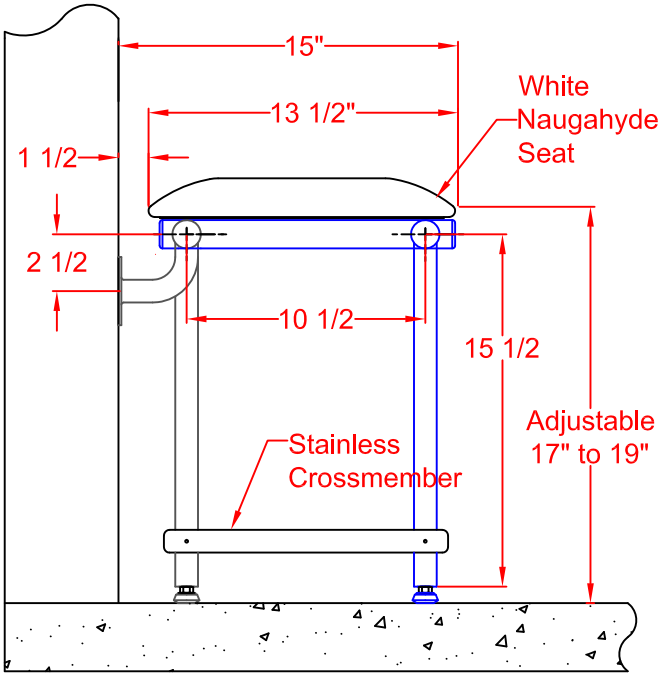
Accessibility Professionals

Customer Part #

10-01-2011

BENCH SEAT
MODEL # APCSSB2-180150-NW
with Swing Down Leg
(with White Naugahyde Seat)





OPERATION:
Seat is automatically held in a raised position by a stainless cross member attached to the front and rear support legs. When the seat is lowered into its down position the Swing Down Leg automatically aligns the front and rear support legs with the help of the stainless cross member.

ARCHITECTURAL SPECIFICATIONS:
Frame: Type 304 (18-8) S.S. tube, 1-1/4" (32mm) x 18ga. (1.2mm) sq. main frame with 1" (25mm) x 18ga. (1.2mm) rd. cross members. Leg: "H" - shaped yoke of type 304 (18-8) S.S. tubing, 1" (25mm) x 18ga. (1.2mm) rd. tubing, Heliarc welded to 1-1/4" (32mm) rd. x 12ga.(2.7mm) frame hinge
The Swing Down Legs automatically level when the seat is lowered to a horizontal sitting position. The seat automatically locks itself when swung into its "up" position with the use of the stainless cross member.

MATERIALS:
FRAME: Type 304 (18-8) S.S. tubing, 1-1/4" (32mm) x 18ga. (1.2mm) sq. main frame with 1" (25mm) x 18ga. (1.2mm) rd. cross-members.

WALL FLANGES (2): Type 304 (18-8) S.S., 10ga. (3.4 mm) x 3" (76mm) dia. heliarc welded to 1" (25mm) rd. x 18ga. (1.2mm) 90 degree leg supports, and to 1-1/4" (32mm) rd. x 12ga. (2.7mm) frame hinge couplings. Three mounting holes in each flange.

SWING DOWN LEG: "H" shaped yoke of type 304 (18-8) S.S. 1" Dia. (25mm) x 18ga. (1.2mm) rd. tubing, heliarc welded to 1-1/4" (32mm) rd. x 12ga. (2.7mm) frame hinge couplings.

SEAT CHOICES:(Designate when ordering)

NW or NA - White (NW) or Almond (NA) Naugahyde covering 2" (51mm) foam mounted on 1/2" (13mm) marine plywood.

PW or PT - White (PW) or Teak (PT) Finish Phenolic 1/2" (13mm) x 3" (76mm) slats bolted to frame with S.S. screws.

HW - White High Density Polyethelene (HDPE) 1/2" (13mm) thick, bolted to frame with S.S. screws.

INSTALLATION:
All Shower Seats must only be installed using suitable fasteners and sufficient in-wall backing materials. ADA mounting height for lowered seat is 17" (432mm) to 19" (482mm).

BUILDING VALUE SINCE 1906

Home Hand Dryers Soap Dispensers Toilet Partitions Washroom Accessories

Product Specifications
Technical Data Sheets
CAD Drawings
Barrier Free Guidelines
Dimensional Drawings
Advisory Bulletins
More Info

B-294 1630 Series Tilting Mirrors

Tilt forward to provide full visibility for wheelchair users or return to upright position.

Frame is 3/4" x 3/4" (19 x 19mm), type 304 stainless steel satin finish.

Beveled edges of frame hug mirror; provides gapless fit for improved appearance and safety when cleaning mirror.

No. 1 quality, 1/4" (6mm) glass mirror electrolytically copper-plated.

Top of mirror tilts 7" (180mm) from wall with self-locking mechanisms.

Bottom of mirror mounts to wall with full-length stainless steel hinge.

16" Width x 30" Height (41 x 76cm)

Information

News & Views
New Products
Product & Service Information
Specifications, Parts & Instructions
General Information
Contact Us
Careers
Authorized User Sign-In

Search

Model No./Keywords

Go

Vhdufk#Wlsv

Uhsuhvhqwdwlyh#)
Glvwulexwru#Vhdufk

BUILDING VALUE SINCE 1906

B-212

Clothes Hook and Bumper

Solid aluminum casting, matte finish.

Rubber bumper protects wall or partition surfaces.

Unit projects 3-3/4" (95mm).

BUILDING VALUE SINCE 1906

B-3944

ClassicSeries® Recessed Paper Towel Dispenser/Waste Receptacle

- **Satin-finish stainless steel.**
- **Seamless beveled flange.**
- **Dispenses 600 C-fold or 800 multifold towels.**
- **Removable waste receptacle is locked into cabinet.**
- **Receptacle is 8" (205mm) deep with capacity of 12-gal. (45.4-L).**
- **Extends 4-1/8" (105mm) from wall.**
- **Reusable Heavy-Gauge Vinyl Liner: Order Part No. 3944-12**

Information

News & Views
New Products
Product & Service Information
Specifications, Parts & Instructions
General Information
Contact Us
Careers
Authorized User Sign-In

Search

Model No./Keywords

Go

Vhdufk#Wlsv

Uhsuhvhqwdwlyh#)
Glvwulexwru#Vhdufk

BUILDING VALUE SINCE 1906

Product Specifications
Technical Data Sheets
CAD Drawings
Advisory Bulletins

B-3949

ClassicSeries® Surface-Mounted Paper Towel Dispenser/Waste Receptacle

Satin-finish stainless steel.

Seamless beveled flange.

Stainless steel skirt for surface mounting.

Dispenses 600 C-fold, or 800 multifold towels.

Removable waste receptacle is locked into cabinet.

Receptacle is 8" (205mm) deep with capacity of 12-gal. (45.4-L).

Reusable Heavy-Gauge Vinyl Liner: Order Part No. 3944-12

Information

News & Views
New Products
Product & Service Information
Specifications, Parts & Instructions
General Information
Contact Us
Careers
Authorized User Sign-In

Search

Model No./Keywords
Go

Vhdufk#Wlsv
Uhsuhvhqwdwlyh#)
Glvwulexwru#Vhdufk

BUILDING VALUE SINCE 1906

- Product Specifications
- Technical Data Sheets
- CAD Drawings
- Barrier Free Guidelines
- Advisory Bulletins

B-2888

ClassicSeries® Surface-Mounted Multi-Roll Toilet Tissue Dispenser

Satin-finish stainless steel with stainless steel dispensing mechanism.

Door has flat face with protruding tumbler lock.

Holds two rolls up to 5-1/4" (133mm) dia. (1800 sheets).

Extra roll automatically drops in place when bottom roll is depleted.

Theft-resistant, heavy-duty spindles.

Information

News & Views
New Products
Product & Service Information
Specifications, Parts & Instructions
General Information
Contact Us
Careers
Authorized User Sign-In

Search

Model No./Keywords

Go

Vhdufk#Wlsv

Uhsuhvhqwdwlyh#)
Glvwulexwru#Vhdufk

SECTION 123661 - SIMULATED STONE COUNTERTOPS

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-surface-material countertops and backsplashes.

1.3 ACTION SUBMITTALS

A. Product Data: For countertop materials and sinks.

B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.

C. Samples for Initial Selection: For each type of material exposed to view.

D. Samples for Verification: For the following products:

   1. Countertop material, 6 inches (150 mm) square.

1.4 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions of countertops by field measurements before countertop fabrication is complete.

1.5 COORDINATION

A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 - PRODUCTS

2.1 SOLID-SURFACE-MATERIAL COUNTERTOPS

A. Configuration: Provide countertops with the following front and backsplash style:

1. Front: Radius edge with apron, 2 inches (50 mm) high with 3/8-inch (9.5-mm) radius.
2. Backsplash: Straight, slightly eased at corner.
3. Endsplash: Matching backsplash.

B. Countertops: 3/4-inch- (19-mm-) thick, solid surface material with front edge built up with same material.

C. Backsplashes: 3/4-inch- (19-mm-) thick, solid surface material.

D. Fabrication: Fabricate tops in one piece with shop-applied edges and backsplashes unless otherwise indicated. Comply with solid-surface-material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
1. Install integral sink bowls in countertops in the shop.

2.2 COUNTERTOP MATERIALS

A. Composite Wood and Agrifiber Products: Provide products that 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."

B. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

C. Adhesives: Adhesives shall not contain urea formaldehyde.

D. Adhesives: 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."

E. Solid Surface Material: Homogeneous solid sheets of filled plastic resin complying with ANSI SS1.

1. Manufacturers: Subject to compliance with requirements, provide Corian.
2. Integral Sink Bowls: Comply with ISSFA-2 and ANSI Z124.3, Type 5 or Type 6, without a precoated finish. Coordinate size of sink bowl with countertop detail on drawings.
3. Colors and Patterns: To be selected by Owner.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install countertops level to a tolerance of 1/8 inch in 8 feet (3 mm in 2.4 m).

B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Pre-drill holes for screws as recommended by manufacturer. Align adjacent

surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

1. Install backsplashes and endsplashes to comply with manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
2. Seal edges of cutouts in particleboard subtops by saturating with varnish.

END OF SECTION 123661

SECTION 220517 - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sleeves.
2. Sleeve-seal systems.
3. Grout.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.

C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

D. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.

E. Galvanized-Steel-Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

2.2 SLEEVE-SEAL SYSTEMS

A. Manufacturers: Subject to compliance with requirements, provide Advance Products & Systems or comparable product by one of the following:

1. CALPICO, Inc.
2. Metraflex Company (The).
3. Pipeline Seal and Insulator, Inc.
4. Proco Products, Inc.

B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.

1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Plastic.
3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.3 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.

1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.

2. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

D. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint.

E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials.

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.

B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.3 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Exterior Concrete Walls above Grade:

   a. Piping Smaller Than 6 inches: Galvanized-steel wall sleeves.

2. Interior Partitions:

   a. Piping Smaller Than 6 inches: PVC-pipe sleeves.

END OF SECTION 220517

SECTION 220518 - ESCUTCHEONS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Escutcheons.
2. Floor plates.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

A. One-Piece, Cast-Brass Type: With polished, chrome-plated finish and setscrew fastener.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with chrome-plated finish and spring-clip fasteners.

C. One-Piece, Stamped-Steel Type: With chrome-plated finish and spring-clip fasteners.

2.2 FLOOR PLATES

A. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. Escutcheons for New Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.

b. Chrome-Plated Piping: One-piece, cast-brass type with polished, chrome-plated finish.
c. Insulated Piping: One-piece, stamped-steel type.
d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
e. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.

C. Install floor plates for piping penetrations of equipment-room floors.

D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. New Piping: One-piece, floor-plate type.

3.2 FIELD QUALITY CONTROL

A. Replace broken and damaged escutcheons and floor plates using new materials.

END OF SECTION 220518

SECTION 220523 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Brass ball valves.
2. Bronze ball valves.
3. Iron, single-flange butterfly valves.
4. Bronze swing check valves.
5. Bronze gate valves.
6. Bronze globe valves.

B. Related Sections:

1. Division 22 plumbing piping Sections for specialty valves applicable to those Sections only.
2. Division 22 Section "Identification for Plumbing Piping and Equipment" for valve tags and schedules.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of valve indicated.

1.3 QUALITY ASSURANCE

A. ASME Compliance: ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.

B. NSF Compliance: NSF 61 for valve materials for potable-water service.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Refer to valve schedule articles for applications of valves.

B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

C. Valve Sizes: Same as upstream piping unless otherwise indicated.

D. Valve Actuator Types:

1. Handwheel: For valves other than quarter-turn types.
2. Handlever: For quarter-turn valves NPS 6 and smaller.

E. Valves in Insulated Piping: With 2-inch stem extensions and the following features:

1. Gate Valves: With rising stem.
2. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
3. Butterfly Valves: With extended neck.

F. Valve-End Connections:

1. Flanged: With flanges according to ASME B16.1 for iron valves.
2. Solder Joint: With sockets according to ASME B16.18.
3. Threaded: With threads according to ASME B1.20.1.

2.2 BRASS BALL VALVES

A. Two-Piece, Full-Port, Brass Ball Valves with Brass Trim:

1. Manufacturers: Subject to compliance with requirements, provide product by one of the following:

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Jenkins Valves.
c. DynaQuip Controls.
d. Flow-Tek, Inc.; a subsidiary of Bray International, Inc.
e. Hammond Valve.
f. Jamesbury; a subsidiary of Metso Automation.
g. Jomar International, LTD.
h. Kitz Corporation.
i. Legend Valve.
j. Marwin Valve; a division of Richards Industries.
k. Milwaukee Valve Company.
l. NIBCO INC.
m. Red-White Valve Corporation.
n. RuB Inc.
o. Approved equal.

2. Description:

a. Standard: MSS SP-110.
b. SWP Rating: 150 psig.
c. CWP Rating: 600 psig.
d. Body Design: Two piece.
e. Body Material: Forged brass.
f. Ends: Threaded.
g. Seats: PTFE or TFE.
h. Stem: Brass.

i. Ball: Chrome-plated brass.
j. Port: Full.

2.3 BRONZE BALL VALVES

A. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:

1. Manufacturers: Subject to compliance with requirements, provide product by one of the following:

a. American Valve, Inc.
b. Conbraco Industries, Inc.; Apollo Valves.
c. Crane Co.; Crane Valve Group; Crane Valves.
d. Hammond Valve.
e. Lance Valves; a division of Advanced Thermal Systems, Inc.
f. Legend Valve.
g. Milwaukee Valve Company.
h. NIBCO INC.
i. Red-White Valve Corporation.
j. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
k. Approved equal.

2. Description:

a. Standard: MSS SP-110.
b. SWP Rating: 150 psig.
c. CWP Rating: 600 psig.
d. Body Design: Two piece.
e. Body Material: Bronze.
f. Ends: Threaded.
g. Seats: PTFE or TFE.
h. Stem: Bronze.
i. Ball: Chrome-plated brass.
j. Port: Full.

2.4 IRON, SINGLE-FLANGE BUTTERFLY VALVES

A. 200 CWP, Iron, Single-Flange Butterfly Valves with EPDM Seat and Aluminum-Bronze Disc:

1. Manufacturers: Subject to compliance with requirements, provide product by one of the following:

a. ABZ Valve and Controls; a division of ABZ Manufacturing, Inc.
b. Conbraco Industries, Inc.; Apollo Valves.
c. Cooper Cameron Valves; a division of Cooper Cameron Corporation.
d. Crane Co.; Crane Valve Group; Jenkins Valves.
e. Crane Co.; Crane Valve Group; Stockham Division.
f. DeZurik Water Controls.
g. Flo Fab Inc.

h. Hammond Valve.
i. Kitz Corporation.
j. Legend Valve.
k. Milwaukee Valve Company.
l. NIBCO INC.
m. Norriseal; a Dover Corporation company.
n. Red-White Valve Corporation.
o. Spence Strainers International; a division of CIRCOR International, Inc.
p. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
q. Approved Equal.

2. Description:

a. Standard: MSS SP-67, Type I.
b. CWP Rating: 200 psig.
c. Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
d. Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
e. Seat: EPDM.
f. Stem: One- or two-piece stainless steel.
g. Disc: Aluminum bronze.

B. 200 CWP, Iron, Single-Flange Butterfly Valves with NBR Seat and Aluminum-Bronze Disc:

1. Manufacturers: Subject to compliance with requirements, provide product by one of the following:

a. ABZ Valve and Controls; a division of ABZ Manufacturing, Inc.
b. Conbraco Industries, Inc.; Apollo Valves.
c. Cooper Cameron Valves; a division of Cooper Cameron Corporation.
d. Crane Co.; Crane Valve Group; Jenkins Valves.
e. Crane Co.; Crane Valve Group; Stockham Division.
f. DeZurik Water Controls.
g. Flo Fab Inc.
h. Hammond Valve.
i. Kitz Corporation.
j. Legend Valve.
k. Milwaukee Valve Company.
l. NIBCO INC.
m. Norriseal; a Dover Corporation company.
n. Red-White Valve Corporation.
o. Spence Strainers International; a division of CIRCOR International, Inc.
p. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
q. Approved Equal.

2. Description:

a. Standard: MSS SP-67, Type I.
b. CWP Rating: 200 psig.
c. Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.

d. Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
e. Seat: NBR.
f. Stem: One- or two-piece stainless steel.
g. Disc: Aluminum bronze.

2.5 BRONZE SWING CHECK VALVES

A. Class 125, Bronze Swing Check Valves with Bronze Disc:

1. Manufacturers: Subject to compliance with requirements, provide product by one of the following:

a. American Valve, Inc.
b. Crane Co.; Crane Valve Group; Crane Valves.
c. Crane Co.; Crane Valve Group; Jenkins Valves.
d. Crane Co.; Crane Valve Group; Stockham Division.
e. Hammond Valve.
f. Kitz Corporation.
g. Milwaukee Valve Company.
h. NIBCO INC.
i. Powell Valves.
j. Red-White Valve Corporation.
k. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
l. Zy-Tech Global Industries, Inc.
m. Approved equal.

2. Description:

a. Standard: MSS SP-80, Type 3.
b. CWP Rating: 200 psig.
c. Body Design: Horizontal flow.
d. Body Material: ASTM B 62, bronze.
e. Ends: Threaded.
f. Disc: Bronze.

2.6 BRONZE GATE VALVES

A. Class 125, NRS Bronze Gate Valves:

1. Manufacturers: Subject to compliance with requirements, provide product by one of the following:

a. American Valve, Inc.
b. Crane Co.; Crane Valve Group; Crane Valves.
c. Crane Co.; Crane Valve Group; Jenkins Valves.
d. Crane Co.; Crane Valve Group; Stockham Division.
e. Hammond Valve.
f. Kitz Corporation.
g. Milwaukee Valve Company.

h. NIBCO INC.
i. Powell Valves.
j. Red-White Valve Corporation.
k. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
l. Zy-Tech Global Industries, Inc.
m. Approved equal.

2. Description:

a. Standard: MSS SP-80, Type 1.
b. CWP Rating: 200 psig.
c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
d. Ends: Threaded or solder joint.
e. Stem: Bronze.
f. Disc: Solid wedge; bronze.
g. Packing: Asbestos free.
h. Handwheel: Malleable iron, bronze, or aluminum].

2.7 BRONZE GLOBE VALVES

A. Class 125, Bronze Globe Valves with Bronze Disc:

1. Manufacturers: Subject to compliance with requirements, provide product by one of the following:

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Stockham Division.
c. Hammond Valve.
d. Kitz Corporation.
e. Milwaukee Valve Company.
f. NIBCO INC.
g. Powell Valves.
h. Red-White Valve Corporation.
i. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
j. Zy-Tech Global Industries, Inc.
k. Approved equal.

2. Description:

a. Standard: MSS SP-80, Type 1.
b. CWP Rating: 200 psig.
c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
d. Ends: Threaded or solder joint.
e. Stem and Disc: Bronze.
f. Packing: Asbestos free.
g. Handwheel: Malleable iron, bronze, or aluminum.

PART 3 - EXECUTION

3.1 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

3.2 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.3 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:

1. Shutoff Service: Ball, butterfly, or gate valves.
2. Throttling Service: Globe, ball, or butterfly valves.
3. Pump-Discharge Check Valves:

    a. NPS 2 and Smaller: Bronze swing check valves with bronze or nonmetallic disc.

B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP class or CWP ratings may be substituted.

C. Select valves, except wafer types, with the following end connections:

1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.

3.4 DOMESTIC, HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2 and Smaller:

1. Bronze and Brass Valves: May be provided with solder-joint ends instead of threaded ends.
2. Bronze Angle Valves: Class 125, bronze disc.
3. Ball Valves: Two piece, full port, bronze with bronze trim.
4. Bronze Swing Check Valves: Class 125, bronze disc.
5. Bronze Gate Valves: Class 125, NRS.

6. Bronze Globe Valves: Class 125, bronze disc.

END OF SECTION 220523

SECTION 220529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Fastener systems.
4. Pipe positioning systems.
5. Equipment supports.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE.

1. Design supports for multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
3. Design seismic-restraint hangers and supports for piping and equipment.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication and installation details and include calculations for the following; include Product Data for components:

1. Trapeze pipe hangers.
2. Equipment supports.

C. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.5 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pre-galvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Stainless-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

C. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.4 PIPE POSITIONING SYSTEMS

A. Description: IAPMO PS 42, positioning system of metal brackets, clips, and straps for positioning piping in pipe spaces; for plumbing fixtures in commercial applications.

2.5 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.6 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, non-shrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Non-staining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.

2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

D. Pipe Positioning-System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture.

E. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

F. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

G. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

H. Install lateral bracing with pipe hangers and supports to prevent swaying.

I. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, 2-1/2 in and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

J. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

K. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

L. Insulated Piping:

1. Attach clamps and spacers to piping.

a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
b. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

3.2 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports and metal trapeze pipe hangers and attachments for general service applications.

F. Use stainless-steel pipe hangers and stainless-steel attachments for hostile environment applications.

G. Use copper-plated pipe hangers and stainless-steel attachments for copper piping and tubing.

H. Use padded hangers for piping that is subject to scratching.

I. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of non-insulated or insulated, stationary pipes ½ in to 30 in.
2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F, pipes 4 in to 24 in, requiring up to 4 inches of insulation.
3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes ¾ in to 36 in, requiring clamp flexibility and up to 4 inches of insulation.
4. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of non-insulated, stationary pipes ½ in to 8 in.
5. U-Bolts (MSS Type 24): For support of heavy pipes ½ in to 30 in.
6. Pipe Saddle Supports (MSS Type 36): For support of pipes 4 in to 36 in, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
7. Pipe Stanchion Saddles (MSS Type 37): For support of pipes 4 in to 36 in, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
8. Single-Pipe Rolls (MSS Type 41): For suspension of pipes 1 in to 30 in, from two rods if longitudinal movement caused by expansion and contraction might occur.
9. Complete Pipe Rolls (MSS Type 44): For support of pipes 2 in to 42 in if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.

J. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers ¾ in to 24 in.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers ¾ in to 24 in if longer ends are required for riser clamps.

K. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.

L. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:

    a. Light (MSS Type 31): 750 lb.
    b. Medium (MSS Type 32): 1500 lb.
    c. Heavy (MSS Type 33): 3000 lb.

8. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
9. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.

M. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

N. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
2. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
3. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.

O. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

P. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

Q. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION 220529

SECTION 220553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.

1.2 ACTION SUBMITTAL

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Material and Thickness: Aluminum, 0.032-inch or anodized aluminum, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
3. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
4. Fasteners: Stainless-steel rivets or self-tapping screws.
5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.
2. Letter Color: Black.
3. Background Color: White.
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering

for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

7. Fasteners: Stainless-steel rivets or self-tapping screws.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.

D. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pre-tensioned Pipe Labels: Pre-coiled, semi-rigid plastic formed to partially cover circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches high.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

A. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 20 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

B. Pipe Label Color Schedule:

1. Low-Pressure, Compressed-Air Piping:

   a. Background Color: White.
   b. Letter Color: Black.

2. Medium-Pressure, Compressed-Air Piping:

   a. Background Color: White.
   b. Letter Color: Black.

3. Domestic Water Piping:

   a. Background Color: White.
   b. Letter Color: Black.

END OF SECTION 220553

SECTION 220719 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes insulating the following plumbing piping services:

1. Domestic hot-water and cold-water piping.
2. Supplies and drains for handicap-accessible lavatories and sinks.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

B. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Supply and Drain Protective Shielding Guards: ICC A117.1.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Piping Insulation Schedule, General," and "Indoor Piping Insulation Schedule," articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Mineral-Fiber, Preformed Pipe Insulation:

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. Fibrex Insulations Inc.; Coreplus 1200.
b. Johns Manville; Micro-Lok.
c. Knauf Insulation; 1000-Degree Pipe Insulation.
d. Manson Insulation Inc.; Alley-K.
e. Owens Corning; Fiberglas Pipe Insulation.

2. Type I, 850 Deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.2 INSULATING CEMENTS

A. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449.

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. Ramco Insulation, Inc.; Ramcote 1200 and Quik-Cote.

2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

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. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.
b. Eagle Bridges - Marathon Industries; 225.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.
d. Mon-Eco Industries, Inc.; 22-25.

e. One or both subparagraphs below may be required to comply with Project requirements or authorities having jurisdiction.

2. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive 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."

2.4 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.

2.5 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

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. ABI, Ideal Tape Division; 428 AWF ASJ.
b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
c. Compac Corporation; 104 and 105.
d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.

2. Width: 3 inches
3. Thickness: 11.5 mils
4. Adhesion: 90 ounces force/inch.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use de-mineralized water.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches o.c.

a. For below-ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Cleanouts.

3.3 PENETRATIONS

A. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

B. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.
2. Seal penetrations through fire-rated assemblies.

3.4 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.

3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
6. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.

3.5 INSTALLATION OF MINERAL-FIBER PREFORMED PIPE INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

C. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.6 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation.

C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.7 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

3.8 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Hot and Re-circulated Hot Water: Insulation shall be the following:
1. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

B. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities: Insulation shall be the following:
1. Molded Vinyl: Truebro Lav Guard , white

END OF SECTION 220719

SECTION 221116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes aboveground domestic water pipes, tubes, and fittings inside buildings.

1.2 ACTION SUBMITTALS

A. Product Data: For transition fittings and dielectric fittings.

1.3 INFORMATIONAL SUBMITTALS

A. System purging and disinfecting activities report.

B. Field quality-control reports.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

B. Potable-water piping and components shall comply with NSF 14 and NSF 61. Plastic piping components shall be marked with "NSF-pw."

2.2 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.

B. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.

C. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

D. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.

E. Copper Unions:

1. MSS SP-123.
2. Cast-copper-alloy, hexagonal-stock body.
3. Ball-and-socket, metal-to-metal seating surfaces.
4. Solder-joint or threaded ends.

2.3 PIPING JOINING MATERIALS

A. Solder Filler Metals: ASTM B 32, lead-free alloys.

B. Flux: ASTM B 813, water flushable.

C. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

2.4 TRANSITION FITTINGS

A. General Requirements:

1. Same size as pipes to be joined.
2. Pressure rating at least equal to pipes to be joined.
3. End connections compatible with pipes to be joined.

B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.

2.5 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:

1. Standard: ASSE 1079.
2. Pressure Rating: 125 psig minimum at 180 deg F.
3. End Connections: Solder-joint copper alloy and threaded ferrous.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install domestic water piping level and plumb.

C. Install seismic restraints on piping.

D. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

E. 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.

F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

G. Install piping to permit valve servicing.

H. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.

I. Install piping free of sags and bends.

J. Install fittings for changes in direction and branch connections.

K. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

L. Install sleeves for piping penetrations of walls, ceilings, and floors.

M. Install sleeve seals for piping penetrations of concrete walls and slabs.

N. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Division 22 Section "Escutcheons for Plumbing Piping."

3.2 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 pipes, tubes, 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.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

D. Brazed Joints for Copper Tubing: Comply with CDA's "Copper Tube Handbook," "Brazed Joints" chapter.

E. Soldered Joints for Copper Tubing: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

F. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

3.3 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric couplings.

3.4 HANGER AND SUPPORT INSTALLATION

A. Vertical Piping: MSS Type 8 or 42, clamps

B. Support vertical piping and tubing at base and at each floor.

C. Install supports for vertical copper tubing.

D. Install supports for vertical steel piping.

3.5 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:
   1. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
   2. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code. Comply with requirements for connection sizes in Division 22 plumbing fixture Sections.

3.6 IDENTIFICATION

A. Identify system components.

B. Label pressure piping with system operating pressure.

3.7 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

   1. Piping Inspections:

      a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.

b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.

c. Re-inspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for re-inspection.
d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

2. Piping Tests:

a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
d. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
f. Prepare reports for tests and for corrective action required.

B. Domestic water piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.8 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.

a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide hot-water flow in each branch.
b. Adjust calibrated balancing valves to flows indicated.

5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.9 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:

   a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
   b. Fill and isolate system according to either of the following:

      1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
      2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.

   c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
   d. Repeat procedures if biological examination shows contamination.
   e. Submit water samples in sterile bottles to authorities having jurisdiction.

B. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.

C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.10 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

C. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing.

D. Aboveground domestic water piping, NPS 2 and smaller , shall be the following:
1. Hard copper tube, ASTM B 88, Type L; cast or wrought-copper, solder-joint fittings; and brazed or soldered joints.

E. Aboveground domestic water piping, NPS 2-1/2 to NPS 4, shall be the following:

1. Hard copper tube, ASTM B 88, Type L; cast or wrought-copper, solder-joint fittings; and brazed or soldered joints.

END OF SECTION 221116

SECTION 221119 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Wall hydrants.
   2. Drain valves.
   3. Water-hammer arresters.
   4. Trap-seal primer valves.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

A. Potable-water piping and components shall comply with NSF 61.

2.2 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig unless otherwise indicated.

2.3 WALL HYDRANTS

A. Moderate-Climate Wall Hydrants Insert drawing designation if any:

   1. Standard: ASME A112.21.3M for concealed-outlet, self-draining wall hydrants.
   2. Pressure Rating: 125 psig.
   3. Operation: Loose key.

4. Inlet: NPS 3/4 or NPS 1.
5. Outlet:

    a. Concealed, with integral vacuum breaker or nonremovable hose-connection vacuum breaker complying with ASSE 1011 or backflow preventer complying with ASSE 1052.
    b. Garden-hose thread complying with ASME B1.20.7.

6. Box: Deep, flush mounted with cover.
7. Box and Cover Finish: Chrome plated.
8. Outlet:

    a. Concealed, with integral vacuum breaker or nonremovable hose-connection vacuum breaker complying with ASSE 1011 or backflow preventer complying with ASSE 1052.
    b. Garden-hose thread complying with ASME B1.20.7.

9. Nozzle and Wall-Plate Finish: Polished nickel bronze.
10. Operating Keys(s): Two with each wall hydrant.

2.4 DRAIN VALVES

A. Ball-Valve-Type, Hose-End Drain Valves:

1. Standard: MSS SP-110 for standard-port, two-piece ball valves.
2. Pressure Rating: 400-psig minimum CWP.
3. Size: NPS 3/4.
4. Body: Copper alloy.
5. Ball: Chrome-plated brass.
6. Seats and Seals: Replaceable.
7. Handle: Vinyl-covered steel.
8. Inlet: Threaded or solder joint.
9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

2.5 WATER-HAMMER ARRESTERS

A. Water-Hammer Arresters:

1. Manufacturers: Subject to compliance with requirements provide products by one of the following:

    a. AMTROL, Inc.
    b. Josam Company.
    c. Precision Plumbing Products, Inc.
    d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
    e. Watts Drainage Products.
    f. Zurn Industries, LLC; Plumbing Products Group; Specification Drainage Products.

2. Standard: ASSE 1010 or PDI-WH 201.
3. Type: Metal bellows.
4. Size: ASSE 1010, Sizes AA and A through F, or PDI-WH 201, Sizes A through F.

2.6 TRAP-SEAL PRIMER DEVICE

A. Drainage-Type, Trap-Seal Primer Device:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.

2. Standard: ASSE 1044, lavatory P-trap with NPS 3/8 minimum, trap makeup connection.
3. Material: Chrome-plated, cast brass.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install water-hammer arresters in water piping according to PDI-WH 201.

B. Install drainage-type, trap-seal primer valves as lavatory trap with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting.

3.2 CONNECTIONS

A. Comply with requirements for piping specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

3.3 FIELD QUALITY CONTROL

A. Domestic water piping specialties will be considered defective if they do not pass tests and inspections.

B. Prepare test and inspection reports.

END OF SECTION 221119

SECTION 221316 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipe, tube, and fittings.
2. Specialty pipe fittings.

1.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Soil, waste, and vent piping and support and installation shall withstand the effects of earthquake motions.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For waste and vent piping, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Detailed description of piping anchorage devices on which the certification is based and their installation requirements.

1.5 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 74, Service class.

B. Gaskets: ASTM C 564, rubber.

2.3 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

B. CISPI, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. ANACO-Husky.
b. Dallas Specialty & Mfg. Co.
c. Fernco Inc.
d. Matco-Norca, Inc.
e. MIFAB, Inc.
f. Mission Rubber Company; a division of MCP Industries, Inc.
g. Stant.
h. Tyler Pipe.

2. Standards: ASTM C 1277 and CISPI 310.
3. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

C. Heavy-Duty, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. ANACO-Husky.
b. Clamp-All Corp.
c. Dallas Specialty & Mfg. Co.
d. MIFAB, Inc.
e. Mission Rubber Company; a division of MCP Industries, Inc.
f. Stant.
g. Tyler Pipe.

2. Standards: ASTM C 1277 and ASTM C 1540.
3. Description: Stainless-steel shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.4 SPECIALTY PIPE FITTINGS

A. Transition Couplings:

1. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.
2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
3. Unshielded, Non-pressure Transition Couplings:

    a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

        1) Dallas Specialty & Mfg. Co.
        2) Fernco Inc.
        3) Mission Rubber Company; a division of MCP Industries, Inc.
        4) Plastic Oddities; a division of Diverse Corporate Technologies, Inc.

    b. Standard: ASTM C 1173.
    c. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
    d. Sleeve Materials:

        1) For Cast-Iron Soil Pipes: ASTM C 564, rubber.
        2) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

4. Shielded, Non-pressure Transition Couplings:

    a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

        1) Cascade Waterworks Mfg. Co.
        2) Mission Rubber Company; a division of MCP Industries, Inc.

    b. Standard: ASTM C 1460.
    c. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. 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 coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

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 above accessible ceilings to allow sufficient space for ceiling panel removal.

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. Install seismic restraints on piping.

I. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

J. Install soil and waste drainage and vent piping at the following minimum slopes unless otherwise indicated:
   1. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
   2. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

K. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

L. Install aboveground copper tubing according to CDA's "Copper Tube Handbook."

M. Plumbing Specialties:

   1. Install backwater valves in sanitary waste gravity-flow piping.
   2. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary drainage gravity-flow piping.

3. Install drains in sanitary drainage gravity-flow piping.

N. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

O. Install sleeves for piping penetrations of walls, ceilings, and floors.

P. Install sleeve seals for piping penetrations of concrete walls and slabs.

Q. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Division 22 Section "Escutcheons for Plumbing Piping."

3.2 JOINT CONSTRUCTION

A. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

B. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

3.3 SPECIALTY PIPE FITTING INSTALLATION

A. Transition Couplings:

1. Install transition couplings at joints of piping with small differences in OD's.
2. In Drainage Piping: Shielded, non-pressure transition couplings.

3.4 HANGER AND SUPPORT INSTALLATION

A. Support horizontal piping and tubing within 12 inches of each fitting and coupling.

B. Support vertical piping and tubing at base and at each floor.

C. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.

D. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.5 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect drainage and vent piping to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.

2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.

3.6 IDENTIFICATION

A. Identify exposed sanitary waste and vent piping.

3.7 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Re-inspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for re-inspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping except outside leaders on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg . Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.

6. Prepare reports for tests and required corrective action.

3.8 CLEANING AND PROTECTION

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.9 PIPING SCHEDULE

A. Aboveground, soil and waste piping NPS 4 and smaller shall be the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; CISPI and heavy-duty hubless-piping couplings; and coupled joints.

B. Aboveground, vent piping NPS 4 and smaller shall be the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; CISPI or heavy-duty hubless-piping couplings; and coupled joints.

END OF SECTION 221316

SECTION 221319 - SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following sanitary drainage piping specialties:
   1. Cleanouts.
   2. Floor drains.
   3. Miscellaneous sanitary drainage piping specialties.
   4. Flashing materials.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and accessories for grease interceptors.

1.3 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 CLEANOUTS

A. Exposed Cast-Iron Cleanouts:

   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:

      a. Josam Company; Josam Div.
      b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
      c. Watts Drainage Products Inc.
      d. Zurn Plumbing Products Group; Specification Drainage Operation.

   2. Standard: ASME A112.36.2M for cast iron for cleanout test tee.
   3. Size: Same as connected drainage piping
   4. Body Material: Hubless, cast-iron soil pipe test tee as required to match connected piping.
   5. Closure: Countersunk or raised-head, plastic plug.
   6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.

B. Cast-Iron Floor Cleanouts:

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:

    a. Josam Company; Josam Div.
    b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
    c. Watts Drainage Products Inc.
    d. Zurn Plumbing Products Group; Specification Drainage Operation.

2. Standard: ASME A112.36.2M for threaded, adjustable housing cleanout.
3. Size: Same as connected branch.
4. Type: Threaded, adjustable housing.
5. Body or Ferrule: Cast iron.
6. Outlet Connection: Threaded.
7. Closure: Plastic plug.
8. Adjustable Housing Material: Cast iron with threads.
9. Frame and Cover Material and Finish: Polished bronze.
10. Frame and Cover Shape: Round.
11. Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout.

C. Cast-Iron Wall Cleanout:

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:

    a. Josam Company; Josam Div.
    b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
    c. Watts Drainage Products Inc.
    d. Zurn Plumbing Products Group; Specification Drainage Operation.

2. Standard: ASME A112.36.2M. Include wall access.
3. Size: Same as connected drainage piping.
4. Body: Hubless, cast-iron soil pipe test tee as required to match connected piping.
5. Closure: Countersunk or raised-head, cast-iron plug.
6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
7. Wall Access: Round, flat, chrome-plated brass or stainless-steel cover plate with screw.

2.2 FLOOR DRAINS

A. Cast-Iron Floor Drains (FD):

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:
    a. Josam Company; Josam Div.
    b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
    c. Watts Drainage Products Inc.
    d. Zurn Plumbing Products Group; Specification Drainage Operation.

2. Standard: ASME A112.6.3.
3. Pattern: Floor drain.
4. Body Material: Gray iron.
5. Clamping Device: Required.
6. Outlet: Bottom.
7. Sediment Bucket: Required.
8. Top or Strainer Material: Nickel bronze.
9. Top of Body and Strainer Finish: Nickel bronze.
10. Top Shape: Round.
11. Trap Material: Cast iron.
12. Trap Pattern: Standard P-trap.
13. Trap Features: Trap-seal primer valve drain connection.

2.3 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

A. Deep-Seal Traps:

1. Description: Cast-iron or bronze casting, with inlet and outlet matching connected piping and cleanout trap-seal primer valve connection.
2. Size: Same as connected waste piping.

    a. NPS 2: 4-inch-minimum water seal.
    b. NPS 2-1/2 and Larger: 5-inch-minimum water seal.

B. Floor-Drain, Trap-Seal Primer Fittings:

1. Description: Cast iron, with threaded inlet and threaded or spigot outlet, and trap-seal primer valve connection.
2. Size: Same as floor drain outlet with NPS 1/2 side inlet.

C. Sleeve Flashing Device:

1. Description: Manufactured, cast-iron fitting, with clamping device, which forms sleeve for pipe floor penetrations of floor membrane. Include galvanized-steel pipe extension in top of fitting that will extend 2 inches above finished floor and galvanized-steel pipe extension in bottom of fitting that will extend through floor slab.
2. Size: As required for close fit to riser or stack piping.

2.4 FLASHING MATERIALS

A. Lead Sheet: ASTM B 749, Type L51121, copper bearing, with the following minimum weights and thicknesses, unless otherwise indicated:

1. General Use: 4.0-lb/sq. ft., 0.0625-inch thickness.
2. Vent Pipe Flashing: 3.0-lb/sq. ft., 0.0469-inch thickness.
3. Burning: 6-lb/sq. ft., 0.0938-inch thickness.

B. Fasteners: Metal compatible with material and substrate being fastened.

C. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.

D. Solder: ASTM B 32, lead-free alloy.

E. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:

1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
2. Locate at each change in direction of piping greater than 45 degrees.
3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
4. Locate at base of each vertical soil and waste stack.

B. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

C. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

D. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.

1. Position floor drains for easy access and maintenance.
2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:

    a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
    b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
    c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.

3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

E. Assemble open drain fittings and install with top of hub 1 inch above floor.

F. Install deep-seal traps on floor drains and other waste outlets, if indicated.

G. Install floor-drain, trap-seal primer fittings on inlet to floor drains that require trap-seal primer connection.

1. Exception: Fitting may be omitted if trap has trap-seal primer connection.
2. Size: Same as floor drain inlet.

H. Install sleeve flashing device with each riser and stack passing through floors with waterproof membrane.

I. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment to allow service and maintenance.

3.3 FLASHING INSTALLATION

A. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:

1. Lead Sheets: Burn joints of lead sheets 6.0-lb/sq. ft., 0.0938-inch thickness or thicker. Solder joints of lead sheets 4.0-lb/sq. ft., 0.0625-inch thickness or thinner.

B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.

1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches, and skirt or flange extending at least 8 inches around pipe.
2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.
3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches around specialty.

C. Set flashing on floors and roofs in solid coating of bituminous cement.

D. Secure flashing into sleeve and specialty clamping ring or device.

E. Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast-iron sleeve having calking recess.

3.4 LABELING AND IDENTIFYING

A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each grease interceptor.

B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Division 22 Section "Identification for Plumbing Piping and Equipment."

3.5 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 221319

SECTION 223400 - FUEL-FIRED, DOMESTIC-WATER HEATERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Commercial, power-burner, gas-fired, tankless domestic-water heaters.
   2. Domestic-water heater accessories.

1.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Commercial domestic-water heaters shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

   1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

1.3 ACTION SUBMITTALS

A. Product Data: For each type and size of domestic-water heater indicated.

B. Shop Drawings:

   1. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For fuel-fired, domestic-water heaters, accessories, and components, from manufacturer.

B. Product certificates.

C. Domestic-Water Heater Labeling: Certified and labeled by testing agency acceptable to authorities having jurisdiction.

D. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

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.

B. ASHRAE/IESNA Compliance: Fabricate and label fuel-fired, domestic-water heaters to comply with ASHRAE/IESNA 90.1.

C. ASME Compliance:

1. Where ASME-code construction is indicated, fabricate and label commercial, domestic-water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
2. Where ASME-code construction is indicated, fabricate and label commercial, finned-tube, domestic-water heaters to comply with ASME Boiler and Pressure Vessel Code: Section IV.

D. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61, "Drinking Water System Components - Health Effects."

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fuel-fired, domestic-water heaters that fail in materials or workmanship within specified warranty period.

1. Warranty Periods: From date of Substantial Completion.

a. Commercial, Finned-Tube, Gas-Fired, Domestic-Water Heaters:

1) Heat Exchanger: Three years.
2) Controls and Other Components: One year(s).

PART 2 - PRODUCTS

2.1 COMMERCIAL, GAS-FIRED, TANKLESS DOMESTIC-WATER HEATERS

A. Commercial, Power-Burner, Gas-Fired, Tankless, Domestic-Water Heaters:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Takagi.
b. Bock Water Heaters, Inc.
c. HESco Industries, Inc.
d. Precision Boilers.
e. PVI Industries, LLC.
f. RECO USA.

g. Sellers Engineering Co.
h. Smith, A. O. Water Products Co.; a division of A. O. Smith Corporation.
i. State Industries.

2. Standard: ANSI Z21.10.3/CSA 4.3.
3. Construction: Without hot water storage. Working pressure rating of 125 psig minimum.

a. Tappings: ASME B1.20.1, pipe thread.

b. Interior Finish: Materials complying with NSF 61, barrier materials for potable-water tank linings.
c. Jacket: Aluminum or steel, with enameled finish, or plastic.

4. Factory-Installed Appurtenances:
a. Drain Valve: Corrosion-resistant metal complying with ASSE 1005.
b. Insulation: Comply with ASHRAE/IESNA 90.1. Surround entire storage tank except connections and controls.
c. Jacket: Steel with enameled finish.
d. Burner: UL 795 for power-burner, gas-fired, domestic-water heaters and natural-gas fuel.
e. Automatic Ignition: ANSI Z21.20/CSA C22.2 No. 199, electric, automatic, gas-ignition system.
f. Temperature Control: Adjustable thermostat.
g. Safety Controls: Automatic, high-temperature-limit and low-water cutoff devices or systems.
h. Combination Temperature-and-Pressure Relief Valves: ANSI Z21.22/CSA 4.4-M. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.

5. Special Requirements: NSF 5 construction.

2.2 DOMESTIC-WATER HEATER ACCESSORIES

A. Gas Shutoff Valves: ANSI Z21.15/CSA 9.1-M, manually operated. Furnish for installation in piping.

B. Domestic-Water Heater Mounting Brackets: Manufacturer's factory-fabricated steel bracket for wall mounting, capable of supporting domestic-water heater and water.

PART 3 - EXECUTION

3.1 DOMESTIC-WATER HEATER INSTALLATION

A. Commercial, Domestic-Water Heater Mounting: Install commercial domestic-water heaters on to wall with factory mounting kit.
1. Maintain manufacturer's recommended clearances.

2. Arrange units so controls and devices that require servicing are accessible.

3.2 CONNECTIONS

A. Comply with requirements for domestic-water piping specified in Section 221116 "Domestic Water Piping."

B. Comply with requirements for gas piping specified in Section 231123 "Facility Natural-Gas Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

C. Where installing piping adjacent to fuel-fired, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.

3.3 IDENTIFICATION

A. Identify system components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.4 FIELD QUALITY CONTROL

A. 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.
2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Domestic-water heaters will be considered defective if they do not pass tests and inspections.

B. Prepare test and inspection reports.

3.5 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain commercial, gas-fired, storage, domestic-water heaters.

END OF SECTION 223400

SECTION 224213.13 - COMMERCIAL WATER CLOSETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Water closets.
2. Flushometer valves.
3. Toilet seats.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include diagrams for power, signal, and control wiring.

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For flushometer valves and electronic sensors to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 FLOOR-MOUNTED, BOTTOM-OUTLET WATER CLOSETS (WC-1)

A. Water Closets: Floor mounted, bottom outlet, top spud.

1. Manufacturers: As indicated in Plans or approved equal.
2. Bowl:

a. Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.
b. Material: Vitreous china.
c. Type: Siphon jet.
d. Style: Flushometer valve.
e. Height: As indicated on Architectural plans.
f. Rim Contour: Elongated.
g. Water Consumption: 1.28 gal. per flush.
h. Spud Size and Location: NPS 1-1/2; top.
i. Color: White.

3. Bowl-to-Drain Connecting Fitting: ASME A112.4.3.

2.2 FLOOR-MOUNTED, BOTTOM-OUTLET WATER CLOSETS (WC-2)

A. Water Closets: Floor mounted, bottom outlet, top spud, accessible.

1. Manufacturers: As indicated on Plans or approved equal.
2. Bowl:
    a. Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.
    b. Material: Vitreous china.
    c. Type: Siphon jet.
    d. Style: Flushometer valve.
    e. Height: Handicapped/elderly, complying with ICC/ANSI A117.1.
    f. Rim Contour: Elongated.
    g. Water Consumption: 1.28 gal. per flush.
    h. Spud Size and Location: NPS 1-1/2; top.
    i. Color: White.
3. Support:
    a. Standard: ASME A112.6.1M.
    b. Description: Waste-fitting assembly, as required to match drainage piping material and arrangement with faceplates, couplings gaskets, and feet; bolts and hardware matching fixture. Include additional extension coupling, faceplate, and feet for installation in wide pipe space.
    c. Water-Closet Mounting Height: Standard or Handicapped/elderly according to ICC/ANSI A117.1.

2.3 FLUSHOMETER VALVES

A. Sensor Activated Flushometer Valves:

1. Manufacturers: As indicated on Plans or approved equal.
2. Standard: ASSE 1037.
3. Minimum Pressure Rating: 125 psig.
4. Features: Include integral check stop and backflow-prevention device.
5. Material: Brass body with corrosion-resistant components.
6. Exposed Flushometer-Valve Finish: Chrome plated.
7. Panel Finish: Chrome plated or stainless steel.
8. Style: Exposed.
9. Consumption: 1.28 gal. per flush.
10. Power: Battery operated.

2.4 TOILET SEATS

A. Toilet Seats:

1. Manufacturers: As indicated on Plans or approved equal.
2. Standard: IAPMO/ANSI Z124.5.
3. Material: Plastic.

4. Type: Commercial (Standard).
5. Shape: Elongated rim, open front.
6. Hinge: Self-sustaining.
7. Hinge Material: Non-corroding metal.
8. Seat Cover: Not required.
9. Color: White.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Water-Closet Installation:

1. Install level and plumb according to roughing-in drawings.
2. Install floor-mounted water closets on bowl-to-drain connecting fitting attachments to piping or building substrate.
3. Install accessible, wall-mounted water closets at mounting height for handicapped/elderly, according to ICC/ANSI A117.1.

B. Support Installation:

1. Install supports, affixed to building substrate, for floor-mounted, back-outlet water closets.
2. Use carrier supports with waste-fitting assembly and seal.
3. Install wall-mounted, back-outlet water-closet supports with waste-fitting assembly and waste-fitting seals; and affix to building substrate.

C. Flushometer-Valve Installation:

1. Install flushometer-valve, water-supply fitting on each supply to each water closet.
2. Attach supply piping to supports or substrate within pipe spaces behind fixtures.
3. Install lever-handle flushometer valves for accessible water closets with handle mounted on open side of water closet.
4. Install actuators in locations that are easy for people with disabilities to reach.

D. Install toilet seats on water closets.

E. Wall Flange and Escutcheon Installation:

1. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations and within cabinets and millwork.
2. Install deep-pattern escutcheons if required to conceal protruding fittings.
3. Comply with escutcheon requirements specified in Division 22 Section "Escutcheons for Plumbing Piping."

F. Joint Sealing:

1. Seal joints between water closets and walls and floors using sanitary-type, one-part, mildew-resistant silicone sealant.
2. Match sealant color to water-closet color.

3.2 CONNECTIONS

A. Connect water closets with water supplies and soil, waste, and vent piping. Use size fittings required to match water closets.

B. Comply with water piping requirements specified in Division 22 Section "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Division 22 Section "Sanitary Waste and Vent Piping."

D. Where installing piping adjacent to water closets, allow space for service and maintenance.

3.3 ADJUSTING

A. Operate and adjust water closets and controls. Replace damaged and malfunctioning water closets, fittings, and controls.

B. Adjust water pressure at flushometer valves to produce proper flow.

3.4 CLEANING AND PROTECTION

A. Clean water closets and fittings with manufacturers' recommended cleaning methods and materials.

B. Install protective covering for installed water closets and fittings.

C. Do not allow use of water closets for temporary facilities unless approved in writing by Owner.

END OF SECTION 224213.13

SECTION 224213.16 - COMMERCIAL URINALS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Urinals.
2. Flushometer valves.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include diagrams for power, signal, and control wiring.

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For flushometer valves and electronic sensors to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 WALL-HUNG URINALS (UR)

A. Urinals: Wall hung, back outlet, siphon jet**,** accessible.

1. Manufacturers: As indicated in Plans or approved equal.
2. Fixture:

    a. Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.
    b. Material: Vitreous china.
    c. Type: Siphon jet.
    d. Strainer or Trapway: Manufacturer's standard strainer with integral trap.
    e. Water Consumption: Ultra low flush (0.125 gpf).
    f. Spud Size and Location: NPS 3/4; top.
    g. Outlet Size and Location: NPS 2; back.
    h. Color: White.
3. Waste Fitting:

    a. Standard: ASME A112.18.2/CSA B125.2 for coupling.
    b. Size: NPS 2.

4. Support: ASME A112.6.1M, Type I, urinal carrier with fixture support plates and coupling with seal and fixture bolts and hardware matching fixture. Include rectangular, steel uprights.

2.2 URINAL FLUSHOMETER VALVES

A. Battery-Powered, Solenoid-Actuator, Piston Flushometer Valves:

1. Manufacturers: As indicated on Plans or approved equal.
2. Standard: ASSE 1037.
3. Minimum Pressure Rating: 125 psig.
4. Features: Include integral check stop and backflow-prevention device.
5. Material: Brass body with corrosion-resistant components.
6. Exposed Flushometer-Valve Finish: Chrome plated.
7. Style: Exposed.
8. Actuator: Solenoid complying with UL 1951; listed and labeled as defined in NFPA 70, by a qualified testing agency; and marked for intended location and application.
9. Trip Mechanism: Battery-powered electronic sensor complying with UL 1951; listed and labeled as defined in NFPA 70, by a qualified testing agency; and marked for intended location and application.
10. Consumption: 0.125 gallons per flush.
11. Minimum Inlet: NPS 3/4.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before urinal installation.

B. Examine walls and floors for suitable conditions where urinals will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Urinal Installation:

1. Install urinals level and plumb according to roughing-in drawings.
2. Install wall-hung, back-outlet urinals onto waste fitting seals and attached to supports.
3. Install accessible, wall-mounted urinals at mounting height for the handicapped/elderly, according to ICC/ANSI A117.1.

B. Support Installation:

1. Install supports, affixed to building substrate, for wall-hung urinals.

2. Use off-floor carriers with waste fitting and seal for back-outlet urinals.
3. Use carriers without waste fitting for urinals with tubular waste piping.
4. Use chair-type carrier supports with rectangular steel uprights for accessible urinals.

C. Flushometer-Valve Installation:

1. Install flushometer-valve water-supply fitting on each supply to each urinal.
2. Attach supply piping to supports or substrate within pipe spaces behind fixtures.
3. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

D. Wall Flange and Escutcheon Installation:

1. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations.
2. Install deep-pattern escutcheons if required to conceal protruding fittings.
3. Comply with escutcheon requirements specified in Division 22 Section "Escutcheons for Plumbing Piping."

E. Joint Sealing:

1. Seal joints between urinals and walls and floors using sanitary-type, one-part, mildew-resistant silicone sealant.
2. Match sealant color to urinal color.

3.3 CONNECTIONS

A. Connect urinals with water supplies and soil, waste, and vent piping. Use size fittings required to match urinals.

B. Comply with water piping requirements specified in Division 22 Section "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Division 22 Section "Sanitary Waste and Vent Piping."

D. Where installing piping adjacent to urinals, allow space for service and maintenance.

3.4 ADJUSTING

A. Operate and adjust urinals and controls. Replace damaged and malfunctioning urinals, fittings, and controls.

B. Adjust water pressure at flushometer valves to produce proper flow.

C. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

3.5 CLEANING AND PROTECTION

A. Clean urinals and fittings with manufacturers' recommended cleaning methods and materials.

B. Install protective covering for installed urinals and fittings.

C. Do not allow use of urinals for temporary facilities unless approved in writing by Owner.

END OF SECTION 224213.16

SECTION 224216.13 - COMMERCIAL LAVATORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Lavatories.
2. Faucets.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include diagrams for power, signal, and control wiring of automatic faucets.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Counter cutout templates for mounting of counter-mounted lavatories.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For lavatories and faucets to include in operation and maintenance manuals.

1. In addition to items specified in Division 01 Section "Contract Closeout," include the following:

a. Servicing and adjustments of automatic faucets.

PART 2 - PRODUCTS

2.1 BATTERY POWERED SENSOR OPERATED FAUCETS (LV)

A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for faucet materials that will be in contact with potable water.

B. Lavatory Faucets (LV):

1. Manufacturers: As indicated in Plans or approved equal:

2. Standard: ASME A112.18.1/CSA B125.1.
3. General: Coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and fixture receptor.
4. Body Type: Single hole.
5. Body Material: Commercial, solid brass.
6. Finish: Polished chrome plate.
7. Maximum Flow Rate: 0.5 gpm.
8. Mounting Type: Deck, exposed.
9. Spout: Rigid type.
10. Spout Outlet: Aerator.
11. Operation: Electronic sensor..

2.2 SUPPLY FITTINGS

A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for supply-fitting materials that will be in contact with potable water.

B. Standard: ASME A112.18.1/CSA B125.1.

C. Supply Piping: Chrome-plated-brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated-brass or stainless-steel wall flange.

D. Supply Stops: Chrome-plated-brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.

E. Risers:
1. ASME A112.18.6, braided- or corrugated-stainless-steel, flexible hose riser.

2.3 WASTE FITTINGS

A. Standard: ASME A112.18.2/CSA B125.2.

B. Drain: Grid type with NPS 1-1/4 offset and straight tailpiece.

C. Trap:

1. Size: NPS 1-1/2 by NPS 1-1/4.
1. Material: Stainless-steel, two-piece trap and swivel elbow with 0.012-inch-thick stainless-steel tube to wall; and stainless-steel wall flange.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before lavatory installation.

B. Examine counters and walls for suitable conditions where lavatories will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install lavatories level and plumb according to roughing-in drawings.

B. Install supports, affixed to building substrate, for wall-mounted lavatories.

C. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Division 22 Section "Escutcheons for Plumbing Piping."

D. Seal joints between lavatories and counters and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color.

E. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible lavatories. Comply with requirements in Division 22 Section "Plumbing Piping Insulation."

3.3 CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Division 22 Section "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Division 22 Section "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Operate and adjust lavatories and controls. Replace damaged and malfunctioning lavatories, fittings, and controls.

B. Adjust water pressure at faucets to produce proper flow.

C. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

3.5 CLEANING AND PROTECTION

A. After completing installation of lavatories, inspect and repair damaged finishes.

B. Clean lavatories, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed lavatories and fittings.

D. Do not allow use of lavatories for temporary facilities unless approved in writing by Owner.

END OF SECTION 224216.13

SECTION 224216.16 - COMMERCIAL SINKS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Mop sinks.
2. Handwash sinks.
3. Supply fittings.
4. Waste fittings.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Counter cutout templates for mounting of counter-mounted lavatories.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

PART 2 - PRODUCTS

2.1 MOP SINKS (MS)

A. Mop Sinks: Floor mounted.

1. Manufacturers: As indicated on the plans or approved equal.

2. Fixture:

a. Standard: IAPMO/ANSI Z124.6.
b. Material: Molded high density composite.
c. Nominal Size: 36 by 24 by 10 inches.
d. Drain: Grid with NPS 3 outlet.

3. Mounting: On floor and flush to wall.
4. Faucet: Chrome-plated service faucet, complete with vacuum breaker, integral stops, adjustable, wall brace, pail hook, four-arm hot and cold handles and ¾” hose thread spout.

2.2 HANDWASH SINKS

A. Handwash Sinks (SK-1) Stainless steel, wall mounted.

1. Manufacturers: As indicated on the plans or approved equal.

2. Fixture:

   a. Standards: ASME A112.19.3/CSA B45.4 and NSF/ANSI 2.
   b. Type: Basin with radius corners, back for faucet, and support brackets.
   c. Nominal Size: 10 by 14 by 5 inches.

3. Faucet: As indicated on plans or approved equal.
4. Supply Fittings: Comply with requirements in "Supply Fittings" Article.
5. Waste Fittings: Comply with requirements in "Waste Fittings" Article.
6. Support: ASME A112.6.1M, Type II, sink carrier.

B. Sink Faucets (SK-2).

1. Manufacturers: As indicated on the plans or approved equal.
2. Standard: ASME A112.18.1/CSA B125.1.
3. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and sink receptor.
4. Body Type: Centerset.
5. Body Material: Commercial, solid brass.
6. Finish: [Chrome plated] [Polished chrome plate] <Insert finish>.
7. Handle(s): Lever.
8. Mounting Type: Deck, exposed.
9. Spout Type: Low flow spray valve with hold down handle.
10. Foodwaste disposer: 1.5 HP, 240V, single phase.

C. Description: Chrome-plated brass, faucet-spout outlet that produces non-aerating, laminar stream. Include external or internal thread that mates with faucet outlet for attachment to faucets where indicated and flow-rate range that includes flow of faucet.

2.3 SUPPLY FITTINGS

A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for supply-fitting materials that will be in contact with potable water.

B. Standard: ASME A112.18.1/CSA B125.1.

C. Supply Piping: Chrome-plated brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated brass or stainless-steel wall flange.

D. Supply Stops: Chrome-plated brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.

E. Operation: Loose key.

F. Risers:
1. ASME A112.18.6, braided or corrugated stainless-steel flexible hose.

2.4 WASTE FITTINGS

A. Standard: ASME A112.18.2/CSA B125.2.

B. Drain: Grid type with NPS 1-1/2 offset and straight tailpiece.

C. Trap:

1. Size: NPS 1-1/2.
2. Material: Chrome-plated and chrome-plated brass or steel wall flange.
3. Material: Stainless-steel, two-piece trap and swivel elbow with 0.012-inch-thick stainless-steel tube to wall; and stainless-steel wall flange.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before sink installation.

B. Examine walls, floors, and counters for suitable conditions where sinks will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install sinks level and plumb according to roughing-in drawings.

B. Install supports, affixed to building substrate, for wall-hung sinks.

C. Install accessible wall-mounted sinks at handicapped/elderly mounting height according to ICC/ANSI A117.1.

D. Set floor-mounted sinks in leveling bed of cement grout.

E. Install water-supply piping with stop on each supply to each sink faucet.

1. Exception: Use ball, gate, or globe valves if supply stops are not specified with sink. Comply with valve requirements specified in Division 22 Section "General-Duty Valves for Plumbing Piping."
2. Install stops in locations where they can be easily reached for operation.

F. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Division 22 Section "Escutcheons for Plumbing Piping."

G. Seal joints between sinks and counters, floors, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color.

H. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible sinks. Comply with requirements in Division 22 Section "Plumbing Piping Insulation."

3.3 CONNECTIONS

A. Connect sinks with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Division 22 Section "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Division 22 Section "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Operate and adjust sinks and controls. Replace damaged and malfunctioning sinks, fittings, and controls.

B. Adjust water pressure at faucets to produce proper flow.

3.5 CLEANING AND PROTECTION

A. After completing installation of sinks, inspect and repair damaged finishes.

B. Clean sinks, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed sinks and fittings.

D. Do not allow use of sinks for temporary facilities unless approved in writing by Owner.

END OF SECTION 224216.16

SECTION 224223 - COMMERCIAL SHOWERS, RECEPTORS, AND BASINS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Shower faucets.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

PART 2 - PRODUCTS

2.1 SHOWER FAUCETS

A. NSF Standard: Comply with NSF 61, "Drinking Water System Components - Health Effects," for shower materials that will be in contact with potable water.

B. Shower Faucets (SH-1):

   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

      a. Symmons.
      b. Chicago Faucets.
      c. American Standard America.
      d. Kohler Co.
      e. Moen Incorporated.
      f. Powers; a division of Watts Water Technologies, Inc.
      g. Zurn Industries, LLC; AquaSpec Commercial Faucet Products.

   2. Description: Single-handle, pressure-balance mixing valve with hot- and cold-water indicators; check stops; and hand-held shower head with slide bar and flexible hose.
   3. Faucet:

      a. Standards: ASME A112.18.1/CSA B125.1 and ASSE 1016.
      b. Body Material: Solid brass.
      c. Finish: Polished chrome plate.
      d. Maximum Flow Rate: 1.5 gpm unless otherwise indicated.

e. Mounting: Exposed.
f. Operation: Single-handle, twist or rotate control.
g. Antiscald Device: Integral with mixing valve.
h. Check Stops: Check-valve type, integral with or attached to body; on hot- and cold-water supply connections.

4. Supply Connections: NPS 1/2.
5. Shower Head:

a. Standard: ASME A112.18.1/CSA B125.1.
b. Shower Head Material: Metallic with chrome-plated finish.
c. Integral Volume Control: Required.
d. Slide bar: 30 inch slide bar, 5 foot flexible metal hose to accommodate full range of motion.

C. Shower Faucets (SH-2):

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Symmons.
b. Chicago Faucets.
c. American Standard America.
d. Kohler Co.
e. Moen Incorporated.
f. Powers; a division of Watts Water Technologies, Inc.
g. Zurn Industries, LLC; AquaSpec Commercial Faucet Products.

2. Description: Single-handle, thermostatic mixing valve with hot- and cold-water indicators; check stops; and shower head.
3. Faucet:

a. Standards: ASME A112.18.1/CSA B125.1 and ASSE 1016.
b. Body Material: Solid brass.
c. Finish: Polished chrome plate.
d. Maximum Flow Rate: 1.5 gpm unless otherwise indicated.
e. Mounting: Exposed.
f. Operation: Single-handle, twist or rotate control.
g. Antiscald Device: Integral with mixing valve.
h. Check Stops: Check-valve type, integral with or attached to body; on hot- and cold-water supply connections.

4. Supply Connections: NPS 1/2.
5. Shower Head:

a. Standard: ASME A112.18.1/CSA B125.1.
b. Type: Ball joint with arm and flange.
c. Shower Head Material: Metallic with chrome-plated finish.
d. Integral Volume Control: Required.
e. Shower-Arm, Flow-Control Fitting: 1.5 gpm.

2.2 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Assemble shower components according to manufacturers' written instructions.

B. Install water-supply piping with stop on each supply to each shower faucet.

1. Exception: Use ball, gate, or globe valves if supply stops are not specified with shower. Comply with valve requirements specified in Section 220523 "General-Duty Valves for Plumbing Piping."
2. Install stops in locations where they can be easily reached for operation.

C. Install shower flow-control fittings with specified maximum flow rates in shower arms.

D. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheons requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

E. Seal joints between showers and floors and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color.

3.2 CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with traps and soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.3 ADJUSTING

A. Operate and adjust showers and controls. Replace damaged and malfunctioning showers, fittings, and controls.

B. Adjust water pressure at faucets to produce proper flow.

3.4 CLEANING AND PROTECTION

A. After completing installation of showers, inspect and repair damaged finishes.

B. Clean showers, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed fixtures and fittings.

D. Do not allow use of showers for temporary facilities unless approved in writing by Owner.

END OF SECTION 224223

SECTION 230523 - GENERAL-DUTY VALVES FOR HVAC PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Brass ball valves.
2. Bronze ball valves.
3. Iron, single-flange butterfly valves.
4. Bronze swing checks valves.
5. Iron swing check valves.
6. Bronze globe valves.
7. Iron globe valves.

B. Related Sections:

1. Division 23 HVAC Piping Sections for specialty valves applicable to those Sections only.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of valve indicated.

1.3 QUALITY ASSURANCE

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance: ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Refer to HVAC valve schedule articles for applications of valves.

B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

C. Valve Sizes: Same as upstream piping unless otherwise indicated.

D. Valve Actuator Types:

1. Handwheel: For valves other than quarter-turn types.
2. Handlever: For quarter-turn valves NPS 6 and smaller.

E. Valves in Insulated Piping: With 2-inch stem extensions and the following features:
1. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
2. Butterfly Valves: With extended neck.

F. Valve-End Connections:

1. Flanged: With flanges according to ASME B16.1 for iron valves.
2. Solder Joint: With sockets according to ASME B16.18.
3. Threaded: With threads according to ASME B1.20.1.

2.2 BRASS BALL VALVES

A. Two-Piece, Full-Port, Brass Ball Valves with Brass Trim:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Jenkins Valves.
c. DynaQuip Controls.
d. Flow-Tek, Inc.; a subsidiary of Bray International, Inc.
e. Hammond Valve.
f. Jamesbury; a subsidiary of Metso Automation.
g. Jomar International, LTD.
h. Kitz Corporation.
i. Legend Valve.
j. Marwin Valve; a division of Richards Industries.
k. Milwaukee Valve Company.
l. NIBCO INC.
m. Red-White Valve Corporation.
n. RuB Inc.

2. Description:

a. Standard: MSS SP-110.
b. SWP Rating: 150 psig.
c. CWP Rating: 600 psig.
d. Body Design: Two piece.
e. Body Material: Forged brass.
f. Ends: Threaded.
g. Seats: PTFE or TFE.
h. Stem: Brass.
i. Ball: Chrome-plated brass.
j. Port: Full.

2.3 BRONZE BALL VALVES

A. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. American Valve, Inc.
    b. Conbraco Industries, Inc.; Apollo Valves.
    c. Crane Co.; Crane Valve Group; Crane Valves.
    d. Hammond Valve.
    e. Lance Valves; a division of Advanced Thermal Systems, Inc.
    f. Legend Valve.
    g. Milwaukee Valve Company.
    h. NIBCO INC.
    i. Red-White Valve Corporation.
    j. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

    a. Standard: MSS SP-110.
    b. SWP Rating: 150 psig.
    c. CWP Rating: 600 psig.
    d. Body Design: Two piece.
    e. Body Material: Bronze.
    f. Ends: Threaded.
    g. Seats: PTFE or TFE.
    h. Stem: Bronze.
    i. Ball: Chrome-plated brass.
    j. Port: Full.

2.4 IRON, SINGLE-FLANGE BUTTERFLY VALVES

A. 150 CWP, Iron, Single-Flange Butterfly Valves with EPDM Seat and Stainless-Steel Disc:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ABZ Valve and Controls; a division of ABZ Manufacturing, Inc.
    b. Bray Controls; a division of Bray International.
    c. Conbraco Industries, Inc.; Apollo Valves.
    d. Cooper Cameron Valves; a division of Cooper Cameron Corp.
    e. Crane Co.; Crane Valve Group; Jenkins Valves.
    f. Crane Co.; Crane Valve Group; Stockham Division.
    g. DeZurik Water Controls.
    h. Hammond Valve.
    i. Kitz Corporation.
    j. Milwaukee Valve Company.
    k. Mueller Steam Specialty; a division of SPX Corporation.
    l. NIBCO INC.

m. Norriseal; a Dover Corporation company.
n. Red-White Valve Corporation.
o. Spence Strainers International; a division of CIRCOR International.
p. Sure Flow Equipment Inc.
q. Tyco Valves & Controls; a unit of Tyco Flow Control.
r. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

a. Standard: MSS SP-67, Type I.
b. CWP Rating: 150 psig.
c. Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
d. Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
e. Seat: EPDM.
f. Stem: One- or two-piece stainless steel.
g. Disc: Stainless steel.

B. 200 CWP, Iron, Single-Flange Butterfly Valves with EPDM Seat and Stainless-Steel Disc:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABZ Valve and Controls; a division of ABZ Manufacturing, Inc.
b. American Valve, Inc.
c. Conbraco Industries, Inc.; Apollo Valves.
d. Cooper Cameron Valves; a division of Cooper Cameron Corp.
e. Crane Co.; Crane Valve Group; Jenkins Valves.
f. Crane Co.; Crane Valve Group; Stockham Division.
g. DeZurik Water Controls.
h. Flo Fab Inc.
i. Hammond Valve.
j. Kitz Corporation.
k. Legend Valve.
l. Milwaukee Valve Company.
m. Mueller Steam Specialty; a division of SPX Corporation.
n. NIBCO INC.
o. Norriseal; a Dover Corporation company.
p. Red-White Valve Corporation.
q. Spence Strainers International; a division of CIRCOR International.
r. Sure Flow Equipment Inc.
s. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

a. Standard: MSS SP-67, Type I.
b. CWP Rating: 200 psig.
c. Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
d. Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
e. Seat: EPDM.

f. Stem: One- or two-piece stainless steel.
g. Disc: Stainless steel.

2.5 BRONZE SWING CHECK VALVES

A. Class 125, Bronze Swing Check Valves with Bronze Disc:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Valve, Inc.
b. Crane Co.; Crane Valve Group; Crane Valves.
c. Crane Co.; Crane Valve Group; Jenkins Valves.
d. Crane Co.; Crane Valve Group; Stockham Division.
e. Hammond Valve.
f. Kitz Corporation.
g. Milwaukee Valve Company.
h. NIBCO INC.
i. Powell Valves.
j. Red-White Valve Corporation.
k. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
l. Zy-Tech Global Industries, Inc.

2. Description:

a. Standard: MSS SP-80, Type 3.
b. CWP Rating: 200 psig.
c. Body Design: Horizontal flow.
d. Body Material: ASTM B 62, bronze.
e. Ends: Threaded.
f. Disc: Bronze.

B. Class 125, Bronze Swing Check Valves with Nonmetallic Disc:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Jenkins Valves.
c. Crane Co.; Crane Valve Group; Stockham Division.
d. Hammond Valve.
e. Kitz Corporation.
f. Milwaukee Valve Company.
g. NIBCO INC.
h. Red-White Valve Corporation.
i. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

a. Standard: MSS SP-80, Type 4.

b. CWP Rating: 200 psig.
c. Body Design: Horizontal flow.
d. Body Material: ASTM B 62, bronze.
e. Ends: Threaded.
f. Disc: PTFE or TFE.

C. Class 150, Bronze Swing Check Valves with Bronze Disc:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Valve, Inc.
b. Crane Co.; Crane Valve Group; Crane Valves.
c. Crane Co.; Crane Valve Group; Jenkins Valves.
d. Crane Co.; Crane Valve Group; Stockham Division.
e. Kitz Corporation.
f. Milwaukee Valve Company.
g. NIBCO INC.
h. Red-White Valve Corporation.
i. Zy-Tech Global Industries, Inc.

2. Description:

a. Standard: MSS SP-80, Type 3.
b. CWP Rating: 300 psig.
c. Body Design: Horizontal flow.
d. Body Material: ASTM B 62, bronze.
e. Ends: Threaded.
f. Disc: Bronze.

D. Class 150, Bronze Swing Check Valves with Nonmetallic Disc:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Jenkins Valves.
c. Hammond Valve.
d. Milwaukee Valve Company.
e. NIBCO INC.
f. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

a. Standard: MSS SP-80, Type 4.
b. CWP Rating: 300 psig.
c. Body Design: Horizontal flow.
d. Body Material: ASTM B 62, bronze.
e. Ends: Threaded.
f. Disc: PTFE or TFE.

2.6 IRON SWING CHECK VALVES

A. Class 125, Iron Swing Check Valves with Metal Seats:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Jenkins Valves.
c. Crane Co.; Crane Valve Group; Stockham Division.
d. Hammond Valve.
e. Kitz Corporation.
f. Legend Valve.
g. Milwaukee Valve Company.
h. NIBCO INC.
i. Powell Valves.
j. Red-White Valve Corporation.
k. Sure Flow Equipment Inc.
l. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
m. Zy-Tech Global Industries, Inc.

2. Description:

a. Standard: MSS SP-71, Type I.
b. NPS 2-1/2 to NPS 12, CWP Rating: 200 psig.
c. Body Design: Clear or full waterway.
d. Body Material: ASTM A 126, gray iron with bolted bonnet.
e. Ends: Flanged.
f. Trim: Bronze.
g. Gasket: Asbestos free.

B. Class 125, Iron Swing Check Valves with Nonmetallic-to-Metal Seats:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Stockham Division.

2. Description:

a. Standard: MSS SP-71, Type I.
b. NPS 2-1/2 to NPS 12, CWP Rating: 200 psig.
c. Body Design: Clear or full waterway.
d. Body Material: ASTM A 126, gray iron with bolted bonnet.
e. Ends: Flanged.
f. Trim: Composition.
g. Seat Ring: Bronze.
h. Disc Holder: Bronze.
i. Disc: PTFE or TFE.
j. Gasket: Asbestos free.

C. Class 250, Iron Swing Check Valves with Metal Seats:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Jenkins Valves.
c. Crane Co.; Crane Valve Group; Stockham Division.
d. Hammond Valve.
e. Milwaukee Valve Company.
f. NIBCO INC.
g. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

a. Standard: MSS SP-71, Type I.
b. NPS 2-1/2 to NPS 12, CWP Rating: 500 psig.
c. Body Design: Clear or full waterway.
d. Body Material: ASTM A 126, gray iron with bolted bonnet.
e. Ends: Flanged.
f. Trim: Bronze.
g. Gasket: Asbestos free.

2.7 BRONZE GLOBE VALVES

A. Class 125, Bronze Globe Valves with Bronze Disc:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Stockham Division.
c. Hammond Valve.
d. Kitz Corporation.
e. Milwaukee Valve Company.
f. NIBCO INC.
g. Powell Valves.
h. Red-White Valve Corporation.
i. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
j. Zy-Tech Global Industries, Inc.

2. Description:

a. Standard: MSS SP-80, Type 1.
b. CWP Rating: 200 psig.
c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
d. Ends: Threaded or solder joint.
e. Stem and Disc: Bronze.
f. Packing: Asbestos free.
g. Handwheel: Malleable iron, bronze, or aluminum.

B. Class 125, Bronze Globe Valves with Nonmetallic Disc:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Stockham Division.
c. NIBCO INC.
d. Red-White Valve Corporation.

2. Description:

a. Standard: MSS SP-80, Type 2.
b. CWP Rating: 200 psig.
c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
d. Ends: Threaded or solder joint.
e. Stem: Bronze.
f. Disc: PTFE or TFE.
g. Packing: Asbestos free.
h. Handwheel: Malleable iron, bronze, or aluminum.

C. Class 150, Bronze Globe Valves with Nonmetallic Disc:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Hammond Valve.
c. Kitz Corporation.
d. Milwaukee Valve Company.
e. NIBCO INC.
f. Powell Valves.
g. Red-White Valve Corporation.
h. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
i. Zy-Tech Global Industries, Inc.

2. Description:

a. Standard: MSS SP-80, Type 2.
b. CWP Rating: 300 psig.
c. Body Material: ASTM B 62, bronze with integral seat and union-ring bonnet.
d. Ends: Threaded.
e. Stem: Bronze.
f. Disc: PTFE or TFE.
g. Packing: Asbestos free.
h. Handwheel: Malleable iron, bronze, or aluminum.

2.8 IRON GLOBE VALVES

A. Class 125, Iron Globe Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Crane Co.; Crane Valve Group; Crane Valves.
    b. Crane Co.; Crane Valve Group; Jenkins Valves.
    c. Crane Co.; Crane Valve Group; Stockham Division.
    d. Hammond Valve.
    e. Kitz Corporation.
    f. Milwaukee Valve Company.
    g. NIBCO INC.
    h. Powell Valves.
    i. Red-White Valve Corporation.
    j. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
    k. Zy-Tech Global Industries, Inc.

2. Description:

    a. Standard: MSS SP-85, Type I.
    b. CWP Rating: 200 psig.
    c. Body Material: ASTM A 126, gray iron with bolted bonnet.
    d. Ends: Flanged.
    e. Trim: Bronze.
    f. Packing and Gasket: Asbestos free.

B. Class 250, Iron Globe Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Crane Co.; Crane Valve Group; Crane Valves.
    b. Crane Co.; Crane Valve Group; Jenkins Valves.
    c. Crane Co.; Crane Valve Group; Stockham Division.
    d. Hammond Valve.
    e. Milwaukee Valve Company.
    f. NIBCO INC.
    g. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

    a. Standard: MSS SP-85, Type I.
    b. CWP Rating: 500 psig.
    c. Body Material: ASTM A 126, gray iron with bolted bonnet.
    d. Ends: Flanged.
    e. Trim: Bronze.
    f. Packing and Gasket: Asbestos free.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install swing check valves for proper direction of flow and in horizontal position with hinge pin level.

3.3 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:

1. Shutoff Service: Ball or butterfy valves.
2. Throttling Service, Except Steam: Globe or butterfly valves.
3. Pump-Discharge Check Valves:

    a. NPS 2 and Smaller: Bronze swing check valves with bronze or nonmetallic disc.

b. NPS 2-1/2 and Larger: Iron swing check valves with lever and weight or with spring.

B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.

C. Select valves, except wafer types, with the following end connections:

1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
3. For Copper Tubing, NPS 5 and Larger: Flanged ends.
4. For Steel Piping, NPS 2 and Smaller: Threaded ends.
5. For Steel Piping, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
6. For Steel Piping, NPS 5 and Larger: Flanged ends.

3.5 HEATING-WATER VALVE SCHEDULE

A. Pipe NPS 2 and Smaller:

1. Bronze and Brass Valves: May be provided with solder-joint ends instead of threaded ends.
2. Ball Valves: Two piece, full port, brass or bronze with stainless-steel trim.
3. Bronze Swing Check Valves: Class 150, bronze disc.
4. Bronze Globe Valves: Class 150, bronze disc.

B. Pipe NPS 2-1/2 and Larger:

1. Iron Valves, NPS 2-1/2 to NPS 4: May be provided with threaded ends instead of flanged ends.
2. Iron, Single-Flange Butterfly Valves, NPS 2-1/2 to NPS 12: 200 CWP, EPDM seat, stainless-steel disc.
3. Iron Swing Check Valves: Class 250, metal seats.
4. Iron Globe Valves: Class 250.

END OF SECTION 230523

SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Thermal-hanger shield inserts.
4. Fastener systems.
5. Equipment supports.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7-05, Section 13.6 as modified by the 2010 CBC, Chapter 16.

1. Design supports for multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
3. Design seismic-restraint hangers and supports for piping and equipment.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication and installation details and include calculations for the following; include Product Data for components:

1. Trapeze pipe hangers.
2. Equipment supports.

C. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.5 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Stainless-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

C. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 THERMAL-HANGER SHIELD INSERTS

A. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig minimum compressive strength and vapor barrier.

B. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with 100-psig minimum compressive strength.

C. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

D. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

E. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.4 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Expansion Anchors: Insert-wedge-type, steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.5 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.6 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, non-shrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Non-staining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

D. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

E. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

F. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

G. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

H. Install lateral bracing with pipe hangers and supports to prevent swaying.

I. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

J. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

K. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

L. Insulated Piping:

1. Attach clamps and spacers to piping.

   a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
   b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
   c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not less than the following:

   a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
   b. NPS 4: 12 inches long and 0.06 inch thick.
   c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
   d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
   e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.

5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 09 painting Sections.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports and metal trapeze pipe hangers and attachments for general service applications.

F. Use stainless-steel pipe hangers and stainless-steel or corrosion-resistant attachments for hostile environment applications.

G. Use copper-plated pipe hangers and copper or stainless-steel attachments for copper piping and tubing.

H. Use padded hangers for piping that is subject to scratching.

I. Use thermal-hanger shield inserts for insulated piping and tubing.

J. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of non-insulated or insulated, stationary pipes NPS 1/2 to NPS 30.
2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F, pipes NPS 4 to NPS 24, requiring up to 4 inches of insulation.
3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.
4. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of non-insulated, stationary pipes NPS 1/2 to NPS 8.
5. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
6. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
7. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
8. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction might occur.
9. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.

K. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.

L. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.

M. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:

    a. Light (MSS Type 31): 750 lb.
    b. Medium (MSS Type 32): 1500 lb.
    c. Heavy (MSS Type 33): 3000 lb.

8. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
9. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.

N. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

O. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
2. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
3. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.

P. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

Q. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION 230529

SECTION 230553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.
4. Duct labels.

1.2 ACTION SUBMITTAL

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.
2. Letter Color: White
3. Background Color: Black.
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
7. Fasteners: Stainless-steel rivets or self-tapping screws.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's unique equipment number.

C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.

B. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

C. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

D. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

E. Fasteners: Stainless-steel rivets or self-tapping screws.

F. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

G. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pre-tensioned Pipe Labels: Pre-coiled, semi-rigid plastic formed to partially cover circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches high.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

A. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

B. Pipe Label Color Schedule:

1. Heating Hot Water Piping:

a. Background Color: White.
b. Letter Color: Red.

END OF SECTION 230553

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Balancing Air Systems:

a. Constant-volume air systems.

2. Balancing Hydronic Piping Systems:

a. Constant-flow hydronic systems.

1.2 DEFINITIONS

A. AABC: Associated Air Balance Council.

B. NEBB: National Environmental Balancing Bureau.

C. TAB: Testing, adjusting, and balancing.

D. TABB: Testing, Adjusting, and Balancing Bureau.

E. TAB Specialist: An entity engaged to perform TAB Work.

1.3 INFORMATIONAL SUBMITTALS

A. Strategies and Procedures Plan: Within 60 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.

B. Certified TAB reports.

1.4 QUALITY ASSURANCE

A. TAB Contractor Qualifications: Engage a TAB entity certified by AABC, NEBB, or TABB.

1. TAB Field Supervisor: Employee of the TAB contractor and certified by AABC, NEBB, or TABB.
2. TAB Technician: Employee of the TAB contractor and who is certified by AABC, NEBB, or TABB as a TAB technician.

B. Certify TAB field data reports and perform the following:

1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.

C. TAB Report Forms: Use standard TAB contractor's forms.

D. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."

E. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

F. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.

B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.

C. Examine the approved submittals for HVAC systems and equipment.

D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.

E. Examine equipment performance data including fan and pump curves.

1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.

F. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

G. Examine test reports specified in individual system and equipment Sections.

H. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.

I. Examine terminal units, and verify that they are accessible and their controls are connected and functioning.

J. Examine strainers. Verify that startup screens are replaced by permanent screens with indicated perforations.

K. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

L. Examine operating safety interlocks and controls on HVAC equipment.

M. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

A. Prepare a TAB plan that includes strategies and step-by-step procedures.

B. Complete system-readiness checks and prepare reports. Verify the following:

1. Permanent electrical-power wiring is complete.
2. Hydronic systems are filled, clean, and free of air.
3. Automatic temperature-control systems are operational.
4. Equipment and duct access doors are securely closed.
5. Balance, smoke, and fire dampers are open.
6. Isolating and balancing valves are open and control valves are operational.
7. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
8. Windows and doors can be closed so indicated conditions for system operations can be met.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance", NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems", SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.

1. Comply with requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.

1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
2. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 230713 "Duct Insulation," Section 230716, "HVAC Piping Insulation."

C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.

B. Prepare schematic diagrams of systems' "as-built" duct layouts.

C. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

D. Verify that motor starters are equipped with properly sized thermal protection.

E. Check dampers for proper position to achieve desired airflow path.

F. Check for airflow blockages.

G. Check condensate drains for proper connections and functioning.

H. Check for proper sealing of air-handling-unit components.

I. Verify that air duct system is sealed as specified in Section 233113 "Metal Ducts."

3.5 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.

1. Measure total airflow.

a. Where sufficient space in ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow.

2. Measure fan static pressures as follows to determine actual static pressure:

a. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
b. Measure static pressure directly at the fan outlet or through the flexible connection.
c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.
d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.

3. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.

    a. Report the cleanliness status of filters and the time static pressures are measured.

4. Measure static pressures entering and leaving other devices, such as sound traps, heat-recovery equipment, and air washers, under final balanced conditions.
5. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
6. Obtain approval from Engineer for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
7. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.

B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.

1. Measure airflow of submain and branch ducts.

    a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.

2. Measure static pressure at a point downstream from the balancing damper, and adjust volume dampers until the proper static pressure is achieved.
3. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.

C. Measure air outlets and inlets without making adjustments.

1. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.

D. Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using branch volume dampers rather than extractors and the dampers at air terminals.

1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
2. Adjust patterns of adjustable outlets for proper distribution without drafts.

3.6 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

A. Prepare test reports with pertinent design data, and number in sequence starting at pump to end of system. Check the sum of branch-circuit flows against the approved pump flow rate. Correct variations that exceed plus or minus 5 percent.

B. Prepare schematic diagrams of systems' "as-built" piping layouts.

C. Prepare hydronic systems for testing and balancing according to the following, in addition to the general preparation procedures specified above:

1. Open all manual valves for maximum flow.
2. Check liquid level in expansion tank.
3. Check makeup water-station pressure gage for adequate pressure for highest vent.
4. Check flow-control valves for specified sequence of operation, and set at indicated flow.
5. Set differential-pressure control valves at the specified differential pressure. Do not set at fully closed position when pump is positive-displacement type unless several terminal valves are kept open.
6. Set system controls so automatic valves are wide open to heat exchangers.
7. Check pump-motor load. If motor is overloaded, throttle main flow-balancing device so motor nameplate rating is not exceeded.
8. Check air vents for a forceful liquid flow exiting from vents when manually operated.

3.7 PROCEDURES FOR CONSTANT-FLOW HYDRONIC SYSTEMS

A. Measure flow at all automatic flow control valves to verify that valves are functioning as designed.

B. Measure flow at all pressure-independent characterized control valves, with valves in fully open position, to verify that valves are functioning as designed.

C. Set calibrated balancing valves, if installed, at calculated presettings.

D. Measure flow at main balancing station and set main balancing device to achieve flow that is 5 percent greater than indicated flow.

E. Adjust balancing stations to within specified tolerances of indicated flow rate as follows:

1. Determine the balancing station with the highest percentage over indicated flow.

2. Adjust each station in turn, beginning with the station with the highest percentage over indicated flow and proceeding to the station with the lowest percentage over indicated flow.
3. Record settings and mark balancing devices.

F. Check settings and operation of each safety valve. Record settings.

3.8 PROCEDURES FOR MOTORS

A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:

1. Manufacturer's name, model number, and serial number.
2. Motor horsepower rating.
3. Motor rpm.
4. Efficiency rating.
5. Nameplate and measured voltage, each phase.
6. Nameplate and measured amperage, each phase.
7. Starter thermal-protection-element rating.

B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass of the controller to prove proper operation. Record observations including name of controller manufacturer, model number, serial number, and nameplate data.

3.9 TOLERANCES

A. Set HVAC system's air flow rates and water flow rates within the following tolerances:

1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
2. Air Outlets and Inlets: Plus or minus 10 percent.
3. Heating-Water Flow Rate: Plus or minus 10 percent.

3.10 REPORTING

A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.

3.11 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
2. Include a list of instruments used for procedures, along with proof of calibration.

B. Final Report Contents: In addition to certified field-report data, include the following:
1. Fan curves.
2. Manufacturers' test data.
3. Field test reports prepared by system and equipment installers.
4. Other information relative to equipment performance; do not include Shop Drawings and product data.

C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB contractor.
3. Project name.
4. Project location.
5. Architect's name and address.
6. Engineer's name and address.
7. Contractor's name and address.
8. Report date.
9. Signature of TAB supervisor who certifies the report.
10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
11. Summary of contents including the following:

    a. Indicated versus final performance.
    b. Notable characteristics of systems.
    c. Description of system operation sequence if it varies from the Contract Documents.

12. Nomenclature sheets for each item of equipment.
13. Data for terminal units, including manufacturer's name, type, size, and fittings.
14. Notes to explain why certain final data in the body of reports vary from indicated values.

D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:

1. Quantities of outdoor, supply, return, and exhaust airflows.
2. Water and steam flow rates.
3. Duct, outlet, and inlet sizes.
4. Pipe and valve sizes and locations.
5. Terminal units.
6. Balancing stations.
7. Position of balancing devices.

END OF SECTION 230593

SECTION 230713 - DUCT INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes insulating the following duct services:

1. Indoor, concealed supply air.
2. Indoor, concealed return.

B. Related Sections:
1. Division 23 Section "Metal Ducts" for duct liners.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail insulation application at elbows, fittings, dampers, specialties and flanges for each type of insulation.
3. Detail application of field-applied jackets.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Duct Insulation Schedule, General," "Indoor Duct and Plenum Insulation Schedule," and "Aboveground, Outdoor Duct and Plenum Insulation Schedule" articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type II with factory-applied vinyl jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. CertainTeed Corp.; SoftTouch Duct Wrap.
    b. Johns Manville; Microlite.
    c. Knauf Insulation; Friendly Feel Duct Wrap.
    d. Manson Insulation Inc.; Alley Wrap.
    e. Owens Corning; SOFTR All-Service Duct Wrap.

G. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. For duct and plenum applications, provide insulation with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. CertainTeed Corp.; Commercial Board.
    b. Fibrex Insulations Inc.; FBX.
    c. Johns Manville; 800 Series Spin-Glas.
    d. Knauf Insulation; Insulation Board.
    e. Manson Insulation Inc.; AK Board.
    f. Owens Corning; Fiberglas 700 Series.

2.2 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to its self and to surfaces to be insulated unless otherwise indicated.

B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.
b. Eagle Bridges - Marathon Industries; 225.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.
d. Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive 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. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-82.
b. Eagle Bridges - Marathon Industries; 225.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-50.
d. Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive 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."

2.3 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-80/30-90.
b. Vimasco Corporation; 749.

2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
5. Color: White.

C. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-10.
b. Eagle Bridges - Marathon Industries; 550.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 46-50.
d. Mon-Eco Industries, Inc.; 55-50.
e. Vimasco Corporation; WC-1/WC-5.

2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: 60 percent by volume and 66 percent by weight.
5. Color: White.

2.4 SEALANTS

A. ASJ Flashing Sealants, and Vinyl and PVC Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: White.
6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. 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."

2.5 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.

2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.
4. FSP Jacket: Aluminum-foil, fiberglass-reinforced scrim with polyethylene backing; complying with ASTM C 1136, Type II.
5. Vinyl Jacket: White vinyl with a permeance of 1.3 perms when tested according to ASTM E 96/E 96M, Procedure A, and complying with NFPA 90A and NFPA 90B.

2.6 FIELD-APPLIED FABRIC-REINFORCING MESH

A. Woven Polyester Fabric: Approximately 1 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. in. in a Leno weave, for ducts.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Mast-A-Fab.
    b. Vimasco Corporation; Elastafab 894.

2.7 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.

2.8 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. ABI, Ideal Tape Division; 428 AWF ASJ.
    b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
    c. Compac Corporation; 104 and 105.
    d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.

2. Width: 3 inches.
3. Thickness: 11.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. ABI, Ideal Tape Division; 491 AWF FSK.
    b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
    c. Compac Corporation; 110 and 111.
    d. Venture Tape; 1525 CW NT, 1528 CW, and 1528 CW/SQ.

2. Width: 3 inches.
3. Thickness: 6.5 mils.
4. Adhesion: 90 ounces force/inch width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

C. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. ABI, Ideal Tape Division; 488 AWF.
    b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0800.
    c. Compac Corporation; 120.
    d. Venture Tape; 3520 CW.

2. Width: 2 inches.
3. Thickness: 3.7 mils.
4. Adhesion: 100 ounces force/inch in width.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch in width.

2.9 SECUREMENTS

A. Aluminum Bands: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 3/4 inch wide.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. ITW Insulation Systems; Gerrard Strapping and Seals.
    b. RPR Products, Inc.; Insul-Mate Strapping, Seals, and Springs.

B. Insulation Pins and Hangers:

1. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, secured in position indicated when self-locking washer is in place. Comply with the following requirements:

    a. Products: Subject to compliance with requirements, provide one of the following:

        1) AGM Industries, Inc.; Tactoo Perforated Base Insul-Hangers.
        2) GEMCO; Perforated Base.

3) Midwest Fasteners, Inc.; Spindle.

b. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inch square.
c. Spindle: Copper- or zinc-coated, low-carbon steel, fully annealed, 0.106-inch-diameter shank, length to suit depth of insulation indicated.
d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.

2. Nonmetal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate fastened to projecting spindle that is capable of holding insulation, of thickness indicated, secured in position indicated when self-locking washer is in place. Comply with the following requirements:

a. Products: Subject to compliance with requirements, provide one of the following:

1) GEMCO; Nylon Hangers.
2) Midwest Fasteners, Inc.; Nylon Insulation Hangers.

b. Baseplate: Perforated, nylon sheet, 0.030 inch thick by 1-1/2 inches in diameter.
c. Spindle: Nylon, 0.106-inch-diameter shank, length to suit depth of insulation indicated, up to 2-1/2 inches.
d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.

3. Self-Sticking-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, secured in position indicated when self-locking washer is in place. Comply with the following requirements:

a. Products: Subject to compliance with requirements, provide one of the following:

1) AGM Industries, Inc.; Tactoo Self-Adhering Insul-Hangers.
2) GEMCO; Peel & Press.
3) Midwest Fasteners, Inc.; Self Stick.

b. Baseplate: Galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
c. Spindle: Copper- or zinc-coated, low-carbon steel, fully annealed, 0.106-inch-diameter shank, length to suit depth of insulation indicated.
d. Adhesive-backed base with a peel-off protective cover.

4. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick, galvanized-steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.

a. Products: Subject to compliance with requirements, provide one of the following:

1) AGM Industries, Inc.; RC-150.
2) GEMCO; R-150.
3) Midwest Fasteners, Inc.; WA-150.

4) Nelson Stud Welding; Speed Clips.

b. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.

5. Nonmetal Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick nylon sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches diameter.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following

1) GEMCO.
2) Midwest Fasteners, Inc.

C. Staples: Outward-clinching insulation staples, nominal ¾-inch-wide, stainless steel or Monel.

D. Wire: 0.062-inch soft-annealed, galvanized steel.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. C & F Wire.

2.10 CORNER ANGLES

A. Aluminum Corner Angles: 0.040 inch thick minimum 1 by 1 inch aluminum according to ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.

B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Keep insulation materials dry during application and finishing.

G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

H. Install insulation with least number of joints practical.

I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.

J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

K. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches o.c.
4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct flanges and fittings.

L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.3 PENETRATIONS

A. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

3.4 INSTALLATION OF MINERAL-FIBER INSULATION

A. Blanket Insulation Installation on Ducts: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

    a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
    b. On duct sides with dimensions larger than 18 inches place pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
    c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    d. Do not overcompress insulation during installation.
    e. Impale insulation over pins and attach speed washers.
    f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

4. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

B. Board Insulation Installation on Ducts: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
b. On duct sides with dimensions larger than 18 inches space pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
d. Do not overcompress insulation during installation.
e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

4. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
5. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

3.5 FIELD-APPLIED JACKET INSTALLATION

A. Where FSK jackets are indicated, install as follows:

1. Draw jacket material smooth and tight.
2. Install lap or joint strips with same material as jacket.
3. Secure jacket to insulation with manufacturer's recommended adhesive.
4. Install jacket with 1-1/2-inch laps at longitudinal seams and 3-inch-wide joint strips at end joints.
5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

3.6 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Inspect ductwork, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location(s) for each duct system defined in the "Duct Insulation Schedule, General" Article.

C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.7 DUCT INSULATION SCHEDULE, GENERAL

A. Plenums and Ducts Requiring Insulation:

1. Indoor, concealed supply and outdoor air.
2. Indoor, concealed return located in unconditioned space.

B. Items Not Insulated:

1. Fibrous-glass ducts.
2. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1.
3. Factory-insulated flexible ducts.
4. Factory-insulated plenums and casings.
5. Flexible connectors.

3.8 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

A. Concealed, Supply-Air Duct and Plenum Insulation: Mineral-fiber, 1-1/2 inches thick and 1.5-lb/cu. ft nominal density.

B. Concealed, Return-Air Duct and Plenum Insulation: Mineral-fiber, 1-1/2 inches thick and 1.5-lb/cu. ft. nominal density.

END OF SECTION 230713

SECTION 230719 - HVAC PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes insulating the following HVAC piping systems:
   1. Hydronic heating piping.

B. Related Sections:
   1. Division 23 Section "Duct Insulation."

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

   1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
   2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Products shall not contain asbestos, lead, mercury, or mercury compounds.

B. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

C. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Aeroflex USA, Inc.; Aerocel.
    b. Armacell LLC; AP Armaflex.
    c. K-Flex USA; Insul-Lock, Insul-Tube, and K-FLEX LS.

2.2 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Aeroflex USA, Inc.; Aeroseal.
    b. Armacell LLC; Armaflex 520 Adhesive.
    c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-75.
    d. K-Flex USA; R-373 Contact Adhesive.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive 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."

2.3 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-80/30-90.
    b. Vimasco Corporation; 749.

2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
5. Color: White.

C. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-10.
b. Eagle Bridges - Marathon Industries; 550.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 46-50.
d. Mon-Eco Industries, Inc.; 55-50.
e. Vimasco Corporation; WC-1/WC-5.

2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: 60 percent by volume and 66 percent by weight.
5. Color: White.

2.4 SEALANTS

A. FSK and Metal Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
b. Eagle Bridges - Marathon Industries; 405.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 95-44.
d. Mon-Eco Industries, Inc.; 44-05.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: Aluminum.
6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. 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."

2.5 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. FSK Jacket: Aluminum-foil face, fiberglass-reinforced scrim with kraft-paper backing.

C. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Johns Manville; Zeston.
    b. P.I.C. Plastics, Inc.; FG Series.
    c. Proto Corporation; LoSmoke.
    d. Speedline Corporation; SmokeSafe.

2. Adhesive: As recommended by jacket material manufacturer.
3. Color: White.
4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.

    a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

D. Aluminum Jacket: Comply with ASTM B 209, Alloy 3003, 3005, 3105, or 5005, Temper H-14.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Metal Jacketing Systems.
    b. ITW Insulation Systems; Aluminum and Stainless Steel Jacketing.
    c. RPR Products, Inc.; Insul-Mate.
2. Finish and thickness are indicated in field-applied jacket schedules.
3. Moisture Barrier for Indoor Applications: 1-mil-thick, heat-bonded polyethylene and kraft paper.
4. Moisture Barrier for Outdoor Applications: 3-mil-thick, heat-bonded polyethylene and kraft paper.
5. Factory-Fabricated Fitting Covers:

    a. Same material, finish, and thickness as jacket.
    b. Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
    c. Tee covers.
    d. Flange and union covers.
    e. End caps.
    f. Beveled collars.
    g. Valve covers.
    h. Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

E. Self-Adhesive Outdoor Jacket: 60-mil-thick, laminated vapor barrier and waterproofing membrane for installation over insulation located aboveground outdoors; consisting of a rubberized bituminous resin on a cross-laminated polyethylene film covered with aluminum-foil facing.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Polyguard Products, Inc.; Alumaguard 60.

2.6 TAPES

A. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. ABI, Ideal Tape Division; 491 AWF FSK.
   b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
   c. Compac Corporation; 110 and 111.
   d. Venture Tape; 1525 CW NT, 1528 CW, and 1528 CW/SQ.

2. Width: 3 inches.
3. Thickness: 6.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

B. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. ABI, Ideal Tape Division; 370 White PVC tape.
   b. Compac Corporation; 130.
   c. Venture Tape; 1506 CW NS.

2. Width: 2 inches.
3. Thickness: 6 mils.
4. Adhesion: 64 ounces force/inch in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch in width.

C. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. ABI, Ideal Tape Division; 488 AWF.
   b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0800.
   c. Compac Corporation; 120.
   d. Venture Tape; 3520 CW.

2. Width: 2 inches.
3. Thickness: 3.7 mils.
4. Adhesion: 100 ounces force/inch in width.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch in width.

2.7 SECUREMENTS

A. Aluminum Bands: ASTM B 209 , Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch wide with wing seal.

1. Products: Subject to compliance with requirements, provide one of the following:

a. ITW Insulation Systems; Gerrard Strapping and Seals.
b. RPR Products, Inc.; Insul-Mate Strapping, Seals, and Springs.

B. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.

C. Wire: 0.062-inch (1.6-mm) soft-annealed, galvanized steel.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. C & F Wire.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

O. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Manholes.
5. Handholes.
6. Cleanouts.

3.3 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
4. Seal jacket to wall flashing with flashing sealant.

C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

D. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Division 07 Section "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

E. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Division 07 Section "Penetration Firestopping."

3.4 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

3.5 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.6 FIELD-APPLIED JACKET INSTALLATION

A. Where FSK jackets are indicated, install as follows:

1. Draw jacket material smooth and tight.
2. Install lap or joint strips with same material as jacket.
3. Secure jacket to insulation with manufacturer's recommended adhesive.
4. Install jacket with 1-1/2-inch laps at longitudinal seams and 3-inch-wide joint strips at end joints.
5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

B. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

C. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

3.7 FINISHES

A. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

B. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

C. Do not field paint aluminum or stainless-steel jackets.

3.8 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.9 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawl spaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.10 INDOOR PIPING INSULATION SCHEDULE

A. Hydronic Heating Hot-Water Piping: Flexible elastomeric 1 inch thick.

END OF SECTION 230719

SECTION 231123 - FACILITY NATURAL-GAS PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipes, tubes, and fittings.
2. Piping specialties.
3. Piping and tubing joining materials.
4. Valves.

1.2 PERFORMANCE REQUIREMENTS

A. Minimum Operating-Pressure Ratings:

1. Piping and Valves: 100 psig minimum unless otherwise indicated.

B. Natural-Gas System Pressure within Buildings: 0.5 psig or less.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

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.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.

1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
2. Wrought-Steel Welding Fittings: ASTM A 234/A 234M for butt welding and socket welding.
3. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.

B. Corrugated, Stainless-Steel Tubing: Comply with ANSI/IAS LC 1.

1. Tubing: ASTM A 240/A 240M, corrugated, Series 300 stainless steel.
2. Coating: PE with flame retardant.

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) Flame-Spread Index: 25 or less.
2) Smoke-Developed Index: 50 or less.

3. Fittings: Copper-alloy mechanical fittings with ends made to fit and listed for use with corrugated stainless-steel tubing and capable of metal-to-metal seal without gaskets. Include brazing socket or threaded ends complying with ASME B1.20.1.
4. Striker Plates: Steel, designed to protect tubing from penetrations.
5. Manifolds: Malleable iron or steel with factory-applied protective coating. Threaded connections shall comply with ASME B1.20.1 for pipe inlet and corrugated tubing outlets.
6. Operating-Pressure Rating: 5 psig.

C. Annealed-Temper Copper Tube: Comply with ASTM B 88, Type L.

1. Copper Fittings: ASME B16.22, wrought copper, and streamlined pattern.
2. Flare Fittings: Comply with ASME B16.26 and SAE J513.

a. Copper fittings with long nuts.
b. Metal-to-metal compression seal without gasket.
c. Dryseal threads complying with ASME B1.20.3.

2.2 PIPING SPECIALTIES

A. Appliance Flexible Connectors:

1. Indoor, Fixed-Appliance Flexible Connectors: Comply with ANSI Z21.24.
2. Corrugated stainless-steel tubing with polymer coating.
3. Operating-Pressure Rating: 0.5 psig.

4. End Fittings: Zinc-coated steel.
5. Threaded Ends: Comply with ASME B1.20.1.
6. Maximum Length: 72 inches

B. Quick-Disconnect Devices: Comply with ANSI Z21.41.

1. Copper-alloy convenience outlet and matching plug connector.
2. Nitrile seals.
3. Hand operated with automatic shutoff when disconnected.
4. For indoor or outdoor applications.
5. Adjustable, retractable restraining cable.

C. Y-Pattern Strainers:

1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
2. End Connections: Threaded ends for NPS 2 and smaller.
3. Strainer Screen: 40-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
4. CWP Rating: 125 psig.

2.3 JOINING MATERIALS

A. Joint Compound and Tape: Suitable for natural gas.

B. 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.

C. Brazing Filler Metals: Alloy with melting point greater than 1000 deg F complying with AWS A5.8/A5.8M. Brazing alloys containing more than 0.05 percent phosphorus are prohibited.

2.4 MANUAL GAS SHUTOFF VALVES

A. See "Aboveground Manual Gas Shutoff Valve Schedule" Articles for where each valve type is applied in various services.

B. General Requirements for Metallic Valves, NPS 2 and Smaller: Comply with ASME B16.33.

1. CWP Rating: 125 psig.
2. Threaded Ends: Comply with ASME B1.20.1.
3. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
4. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves 1 inch and smaller.
5. Service Mark: Valves 1-1/4 inches to NPS 2 shall have initials "WOG" permanently marked on valve body.

C. One-Piece, Bronze Ball Valve with Bronze Trim: MSS SP-110.

1. Body: Bronze, complying with ASTM B 584.

2. Ball: Chrome-plated brass.
3. Stem: Bronze; blowout proof.
4. Seats: Reinforced TFE; blowout proof.
5. Packing: Separate packnut with adjustable-stem packing threaded ends.
6. Ends: Threaded, flared, or socket as indicated in "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
7. CWP Rating: 600 psig.
8. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
9. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

D. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: MSS SP-110.

1. Body: Bronze, complying with ASTM B 584.
2. Ball: Chrome-plated bronze.
3. Stem: Bronze; blowout proof.
4. Seats: Reinforced TFE; blowout proof.
5. Packing: Threaded-body packnut design with adjustable-stem packing.
6. Ends: Threaded, flared, or socket as indicated in "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
7. CWP Rating: 600 psig.
8. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
9. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

E. Two-Piece, Regular-Port Bronze Ball Valves with Bronze Trim: MSS SP-110.

1. Body: Bronze, complying with ASTM B 584.
2. Ball: Chrome-plated bronze.
3. Stem: Bronze; blowout proof.
4. Seats: Reinforced TFE.
5. Packing: Threaded-body packnut design with adjustable-stem packing.
6. Ends: Threaded, flared, or socket as indicated in "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
7. CWP Rating: 600 psig.
8. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
9. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

2.5 DIELECTRIC UNIONS

A. Dielectric Unions:

1. Description:

a. Standard: ASSE 1079.
b. Pressure Rating: 125 psig minimum at 180 deg F.
c. End Connections: Solder-joint copper alloy and threaded ferrous.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Comply with NFPA 54 for installation and purging of natural-gas piping.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction, to allow for mechanical installations.

D. 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.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Locate valves for easy access.

G. Install natural-gas piping at uniform grade of 2 percent down toward drip and sediment traps.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Verify final equipment locations for roughing-in.

K. Comply with requirements in Sections specifying gas-fired appliances and equipment for roughing-in requirements.

L. Drips and Sediment Traps: Install drips at points where condensate may collect, including service-meter outlets. Locate where accessible to permit cleaning and emptying. Do not install where condensate is subject to freezing.

1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use nipple a minimum length of 3 pipe diameters, but not less than 3 inches long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.

M. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.

N. Connect branch piping from top or side of horizontal piping.

O. Install unions in pipes NPS 2 and smaller, adjacent to each valve, at final connection to each piece of equipment.

P. Do not use natural-gas piping as grounding electrode.

Q. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

R. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

S. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.2 VALVE INSTALLATION

A. Install manual gas shutoff valve for each gas appliance ahead of corrugated stainless-steel tubing or copper connector.

B. Install underground valves with valve boxes.

3.3 PIPING JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints:

1. Thread pipe with tapered pipe threads complying with ASME B1.20.1.
2. Cut threads full and clean using sharp dies.
3. Ream threaded pipe ends to remove burrs and restore full inside diameter of pipe.
4. Apply appropriate tape or thread compound to external pipe threads unless dryseal threading is specified.
5. 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. Welded Joints:

1. Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators.
2. Bevel plain ends of steel pipe.
3. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter.

F. Flared Joints: Cut tubing with roll cutting tool. Flare tube end with tool to result in flare dimensions complying with SAE J513. Tighten finger tight, then use wrench. Do not overtighten.

3.4 HANGER AND SUPPORT INSTALLATION

A. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:

1. NPS 1 and Smaller: Maximum span, 96 inches; minimum rod size, 3/8 inch
2. NPS 1-1/4: Maximum span, 108 inches; minimum rod size, 3/8 inch.
3. NPS 1-1/2 and NPS 2: Maximum span, 108 inches; minimum rod size, 3/8 inch.

3.5 CONNECTIONS

A. Connect to utility's gas main according to utility's procedures and requirements.

B. Install natural-gas piping electrically continuous, and bonded to gas appliance equipment grounding conductor of the circuit powering the appliance according to NFPA 70.

C. Install piping adjacent to appliances to allow service and maintenance of appliances.

D. Connect piping to appliances using manual gas shutoff valves and unions. Install valve within 72 inches of each gas-fired appliance and equipment. Install union between valve and appliances or equipment.

E. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance.

3.6 LABELING AND IDENTIFYING

A. Comply with requirements in Section 220553 "Identification for Plumbing Piping and Equipment" for piping and valve identification.

3.7 FIELD QUALITY CONTROL

A. Test, inspect, and purge natural gas according to NFPA 54 and authorities having jurisdiction.

B. Natural-gas piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.8 OUTDOOR PIPING SCHEDULE

A. Underground natural-gas piping shall be one of the following:

1. PE pipe and fittings joined by heat fusion; service-line risers with tracer wire terminated in an accessible location.
2. Steel pipe with wrought-steel fittings and welded joints. Coat pipe and fittings with protective coating for steel piping.
3. Annealed-temper copper tube with wrought-copper fittings and brazed joints. Coat pipe and fittings with protective coating for copper tubing.

B. Aboveground natural-gas piping shall be[one of] the following:

1. Steel pipe with malleable-iron fittings and threaded joints.
2. Steel pipe with wrought-steel fittings and welded joints.
3. Annealed-temper copper tube with wrought-copper fittings and brazed joints.

C. Branch Piping in Cast-in-Place Concrete to Single Appliance: Annealed-temper copper tube with wrought-copper fittings and brazed joints. Install piping embedded in concrete with no joints in concrete.

D. Containment Conduit: Steel pipe with wrought-steel fittings and welded joints. Coat pipe and fittings with protective coating for steel piping.

3.9 PIPING SCHEDULE

A. Aboveground, branch piping NPS 1 and smaller shall be one of the following:
1. Annealed-temper copper tube with wrought-copper fittings and brazed joints.
2. Steel pipe with malleable-iron fittings and threaded joints.

B. Aboveground, distribution piping shall be one of the following:

1. Steel pipe with malleable-iron fittings and threaded joints.
2. Steel pipe with wrought-steel fittings and welded joints.

3.10 UNDERGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE

A. Connections to Existing Gas Piping: Use valve and fitting assemblies made for tapping utility's gas mains and listed by an NRTL.

3.11 ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE

A. Distribution piping valves for pipe sizes NPS 2 and smaller shall be one of the following:

1. One-piece, bronze ball valve with bronze trim.
2. Two-piece, full-port, bronze ball valves with bronze trim.

B. Valves in branch piping for single appliance shall be one of the following:

1. One-piece, bronze ball valve with bronze trim.
2. Two-piece, full-port, bronze ball valves with bronze trim.

END OF SECTION 231123

SECTION 232113 - HYDRONIC PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes pipe and fitting materials, joining methods, special-duty valves, and specialties for the following:

1. Hot-water heating piping.

1.2 PERFORMANCE REQUIREMENTS

A. Hydronic piping components and installation shall be capable of withstanding the following minimum working pressure and temperature:

1. Hot-Water Heating Piping: 150 psig at 200 deg F.

1.3 ACTION SUBMITTALS

A. Product Data

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label. Fabricate and stamp air separators and expansion tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

A. Drawn-Temper Copper Tubing: ASTM B 88, Type M.

B. Wrought-Copper Fittings: ASME B16.22.

1. Grooved-End Copper Fittings: ASTM B 75, copper tube or ASTM B 584, bronze casting.

2. Grooved-End-Tube Couplings: Rigid pattern, unless otherwise indicated; gasketed fitting. Ductile-iron housing with keys matching pipe and fitting grooves, EPDM gasket rated for minimum 230 deg F for use with housing, and steel bolts and nuts.

C. Wrought-Copper Unions: ASME B16.22.

2.2 STEEL PIPE AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, black steel with plain ends; type, grade, and wall thickness as indicated in Part 3 "Piping Applications" Article.

B. Cast-Iron Threaded Fittings: ASME B16.4; Classes 125 and 250 as indicated in Part 3 "Piping Applications" Article.

C. Malleable-Iron Threaded Fittings: ASME B16.3, Classes 150 and 300 as indicated in Part 3 "Piping Applications" Article.

D. Malleable-Iron Unions: ASME B16.39; Classes 150, 250, and 300 as indicated in Part 3 "Piping Applications" Article.

E. Cast-Iron Pipe Flanges and Flanged Fittings: ASME B16.1, Classes 25, 125, and 250; raised ground face, and bolt holes spot faced as indicated in Part 3 "Piping Applications" Article.

F. Wrought Cast- and Forged-Steel Flanges and Flanged Fittings: ASME B16.5, including bolts, nuts, and gaskets of the following material group, end connections, and facings:

1. Material Group: 1.1.
2. End Connections: Butt welding.
3. Facings: Raised face.

G. Grooved Mechanical-Joint Fittings and Couplings:

1. Joint Fittings: ASTM A 536, Grade 65-45-12 ductile iron; ASTM A 47/A 47M, Grade 32510 malleable iron; ASTM A 53/A 53M, Type F, E, or S, Grade B fabricated steel; or ASTM A 106, Grade B steel fittings with grooves or shoulders constructed to accept grooved-end couplings; with nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe and fittings.
2. Couplings: Ductile- or malleable-iron housing and synthetic rubber gasket of central cavity pressure-responsive design; with nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe and fittings.

2.3 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 (3.2-mm) maximum thickness unless thickness or specific material is 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.

B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

D. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for joining copper with copper; or BAg-1, silver alloy for joining copper with bronze or steel.

2.4 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:

1. Description:

a. Standard: ASSE 1079.
b. Pressure Rating: 150 psig minimum at 180 deg F.
c. End Connections: Solder-joint copper alloy and threaded ferrous.

2.5 VALVES

A. Gate, Globe, Check, Ball, and Butterfly Valves: Comply with requirements specified in Section 230523 "General-Duty Valves for HVAC Piping."

B. Automatic Temperature-Control Valves, Actuators, and Sensors: Comply with requirements specified in Section 230900 "Instrumentation and Control for HVAC."

C. Bronze, Calibrated-Orifice, Balancing Valves:

1. Body: Bronze, ball or plug type with calibrated orifice or venturi.
2. Ball: Brass or stainless steel.
3. Plug: Resin.
4. Seat: PTFE.
5. End Connections: Threaded or socket.
6. Pressure Gage Connections: Integral seals for portable differential pressure meter.
7. Handle Style: Lever, with memory stop to retain set position.
8. CWP Rating: Minimum 125 psig.
9. Maximum Operating Temperature: 250 deg F.

D. Cast-Iron or Steel, Calibrated-Orifice, Balancing Valves:

1. Body: Cast-iron or steel body, ball, plug, or globe pattern with calibrated orifice or venturi.
2. Ball: Brass or stainless steel.

3. Stem Seals: EPDM O-rings.
4. Disc: Glass and carbon-filled PTFE.
5. Seat: PTFE.
6. End Connections: Flanged or grooved.
7. Pressure Gage Connections: Integral seals for portable differential pressure meter.
8. Handle Style: Lever, with memory stop to retain set position.
9. CWP Rating: Minimum 125 psig.
10. Maximum Operating Temperature: 250 deg F.

E. Automatic Flow-Control Valves:

1. Body: Brass or ferrous metal.
2. Piston and Spring Assembly: Stainless steel, tamper proof, self cleaning, and removable.
3. Combination Assemblies: Include bonze or brass-alloy ball valve.
4. Identification Tag: Marked with zone identification, valve number, and flow rate.
5. Size: Same as pipe in which installed.
6. Performance: Maintain constant flow, plus or minus 5 percent over system pressure fluctuations.
7. Minimum CWP Rating: 175 psig.
8. Maximum Operating Temperature: 200 deg F.

2.6 AIR CONTROL DEVICES

A. Manual Air Vents:

1. Body: Bronze.
2. Internal Parts: Nonferrous.
3. Operator: Screwdriver or thumbscrew.
4. Inlet Connection: NPS 1/2.
5. Discharge Connection: NPS 1/8.
6. CWP Rating: 150 psig.
7. Maximum Operating Temperature: 225 deg F.

2.7 HYDRONIC PIPING SPECIALTIES

A. Y-Pattern Strainers:

1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
2. End Connections: Threaded ends for NPS 2 and smaller; flanged ends for NPS 2-1/2 and larger.
3. Strainer Screen: 40-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
4. CWP Rating: 125 psig.

B. Stainless-Steel Bellow, Flexible Connectors:

1. Body: Stainless-steel bellows with woven, flexible, bronze, wire-reinforcing protective jacket.
2. End Connections: Threaded or flanged to match equipment connected.

3. Performance: Capable of 3/4-inch misalignment.
4. CWP Rating: 150 psig.
5. Maximum Operating Temperature: 250 deg F.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Hot-water heating piping, aboveground, NPS 2 and smaller, shall be one of the following:

1. Type M, drawn-temper copper tubing, wrought-copper fittings, and brazed joints.
2. Schedule 40 steel pipe; Class 125, cast-iron fittings; cast-iron flanges and flange fittings; and threaded joints.

3.2 VALVE APPLICATIONS

A. Install shutoff-duty valves at each branch connection to supply mains, and at supply connection to each piece of equipment.

B. Install calibrated-orifice, balancing valves in the return pipe of each heating or cooling terminal.

3.3 PIPING INSTALLATIONS

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicate piping locations and arrangements if such 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 Coordination Drawings.

B. 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.

C. Install piping to permit valve servicing.

D. Install piping free of sags and bends.

E. Install fittings for changes in direction and branch connections.

F. Install piping to allow application of insulation.

G. Select system components with pressure rating equal to or greater than system operating pressure.

H. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.

I. Install drains, consisting of a tee fitting, NPS 3/4 ball valve, and short NPS 3/4 threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.

J. Install piping at a uniform grade of 0.2 percent upward in direction of flow.

K. Reduce pipe sizes using eccentric reducer fitting installed with level side up.

L. Install branch connections to mains using tee fittings in main pipe, with the branch connected to the bottom of the main pipe. For up-feed risers, connect the branch to the top of the main pipe.

M. Install valves according to Section 230523 "General-Duty Valves for HVAC Piping."

N. Install unions in piping, NPS 2 and smaller, adjacent to valves, at final connections of equipment, and elsewhere as indicated.

O. Install flanges in piping, NPS 2-1/2 and larger, at final connections of equipment and elsewhere as indicated.

P. Install strainers on inlet side of each control valve. Install NPS 3/4 nipple and ball valve in blowdown connection of strainers NPS 2 and larger. Match size of strainer blowoff connection for strainers smaller than NPS 2.

Q. Identify piping as specified in Section 230553 "Identification for HVAC Piping and Equipment."

R. Install sleeves for piping penetrations of walls, ceilings, and floors.

3.4 HANGERS AND SUPPORTS

A. Hanger, support, and anchor devices are specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment." Comply with the following requirements for maximum spacing of supports.

B. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal piping less than 20 feet long.
2. Adjustable roller hangers and spring hangers for individual horizontal piping 20 feet or longer.
3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet or longer, supported on a trapeze.
4. Spring hangers to support vertical runs.
5. Provide copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.

C. Install hangers for steel piping with the following maximum spacing and minimum rod sizes:

1. NPS 3/4: Maximum span, 7 feet; minimum rod size, 1/4 inch.
2. NPS 1: Maximum span, 7 feet; minimum rod size, 1/4 inch.
3. NPS 1-1/2: Maximum span, 9 feet; minimum rod size, 3/8 inch.
4. NPS 2: Maximum span, 10 feet; minimum rod size, 3/8 inch.
5. NPS 2-1/2: Maximum span, 11 feet; minimum rod size, 3/8 inch.
6. NPS 3: Maximum span, 12 feet; minimum rod size, 3/8 inch.

D. Install hangers for drawn-temper copper piping with the following maximum spacing and minimum rod sizes:

1. NPS 3/4: Maximum span, 5 feet; minimum rod size, 1/4 inch.
2. NPS 1: Maximum span, 6 feet; minimum rod size, 1/4 inch.
3. NPS 1-1/2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
4. NPS 2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
5. NPS 2-1/2: Maximum span, 9 feet; minimum rod size, 3/8 inch.
6. NPS 3: Maximum span, 10 feet; minimum rod size, 3/8 inch.

E. Support vertical runs at roof, at each floor, and at 10-foot intervals between floors.

3.5 PIPE 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. 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 complying with ASTM B 32.

D. 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.

E. 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.

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 coupling and gasket, lubricant, and bolts. Cut or roll grooves in ends of pipe based on pipe and coupling manufacturer's written instructions for pipe wall thickness. Use grooved-end fittings and rigid, grooved-end-pipe couplings.

H. Mechanically Formed, Copper-Tube-Outlet Joints: Use manufacturer-recommended tool and procedure, and brazed joints.

3.6 HYDRONIC SPECIALTIES INSTALLATION

A. Install manual air vents at high points in piping, at heat-transfer coils, and elsewhere as required for system air venting.

3.7 TERMINAL EQUIPMENT CONNECTIONS

A. Sizes for supply and return piping connections shall be the same as or larger than equipment connections.

B. Install control valves in accessible locations close to connected equipment.

C. Install bypass piping with globe valve around control valve. If parallel control valves are installed, only one bypass is required.

3.8 FIELD QUALITY CONTROL

A. Prepare hydronic piping according to ASME B31.9 and as follows:

1. Leave joints, including welds, uninsulated and exposed for examination during test.
2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
3. Flush hydronic piping systems with clean water; then remove and clean or replace strainer screens.
4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.
5. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.

B. Perform the following tests on hydronic piping:

1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
2. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.
3. Isolate expansion tanks and determine that hydronic system is full of water.
4. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the system's working pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength or 1.7 times "SE" value in Appendix A in ASME B31.9, "Building Services Piping."
5. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.
6. Prepare written report of testing.

C. Perform the following before operating the system:

1. Open manual valves fully.
2. Inspect pumps for proper rotation.
3. Set makeup pressure-reducing valves for required system pressure.

4. Inspect air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).
5. Set temperature controls so all coils are calling for full flow.
6. Inspect and set operating temperatures of hydronic equipment, such as boilers, chillers, cooling towers, to specified values.
7. Verify lubrication of motors and bearings.

END OF SECTION 232113

SECTION 233113 - METAL DUCTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Rectangular ducts and fittings.
2. Round ducts and fittings.
3. Sheet metal materials.
4. Sealants and gaskets.
5. Hangers and supports.
6. Seismic-restraint devices.

B. Related Sections:

1. Division 23 Section "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting,
2. Division 23 Section "Air Duct Accessories" for dampers and flexible ducts.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.

B. Structural Performance: Duct hangers and supports and seismic restraints shall withstand the effects of gravity and seismic loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems.

1. Seismic Hazard Level A: Seismic force to weight ratio, 0.48.
2. Seismic Hazard Level B: Seismic force to weight ratio, 0.30.
3. Seismic Hazard Level C: Seismic force to weight ratio, 0.15.

C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings:

1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.

2. Factory- and shop-fabricated ducts and fittings.
3. Duct layout indicating sizes, configuration, and static-pressure classes.
4. Elevation of top of ducts.
5. Dimensions of main duct runs from building grid lines.
6. Fittings.
7. Reinforcement and spacing.
8. Seam and joint construction.
9. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
10. Hangers and supports, including methods for duct and building attachment, seismic restraints, and vibration isolation.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
2. Suspended ceiling components.
3. Structural members to which duct will be attached.
4. Size and location of initial access modules for acoustical tile.
5. Items penetrating finished ceiling including the following:

    a. Lighting fixtures.
    b. Air outlets and inlets.
    c. Speakers.
    d. Sprinklers.
    e. Access panels.
    f. Perimeter moldings.

B. Welding certificates.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports.
3. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-up."

C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

PART 2 - PRODUCTS

2.1 RECTANGULAR DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.2 ROUND DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Lindab Inc.
    b. McGill AirFlow LLC.
    c. SEMCO Incorporated.
    d. Sheet Metal Connectors, Inc.
    e. Spiral Manufacturing Co., Inc.

B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Transverse Joints in Ducts Larger Than 60 inches in Diameter: Flanged.

C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Fabricate round ducts larger than 90 inches in diameter with butt-welded longitudinal seams.

D. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.3 SHEET METAL MATERIALS

A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G60.
2. Finishes for Surfaces Exposed to View: Mill phosphatized.

C. Carbon-Steel Sheets: Comply with ASTM A 1008/A 1008M, with oiled, matte finish for exposed ducts.

D. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304 or 316, as indicated in the "Duct Schedule" Article; cold rolled, annealed, sheet. Exposed surface finish shall be No. 2B, No. 2D, No. 3, or No. 4 as indicated in the "Duct Schedule" Article.

E. Aluminum Sheets: Comply with ASTM B 209 Alloy 3003, H14 temper; with mill finish for concealed ducts, and standard, one-side bright finish for duct surfaces exposed to view.

F. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.

G. Tie Rods: Galvanized steel, 6-mm minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.4 SEALANT AND GASKETS

A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.

B. Two-Part Tape Sealing System:

1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
2. Tape Width: 4 inches.
3. Sealant: Modified styrene acrylic.
4. Water resistant.
5. Mold and mildew resistant.
6. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
7. Service: Indoor and outdoor.
8. Service Temperature: Minus 40 to plus 200 deg F.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
10. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
11. Sealant 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. Water-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. Water resistant.
5. Mold and mildew resistant.
6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 10-inch wg positive and negative.
8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

D. Flanged Joint Sealant: Comply with ASTM C 920.

1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.
6. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealant 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. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with poly-isobutylene plasticizer.

F. Round Duct Joint O-Ring Seals:

1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg at 10-inch wg and shall be rated for 2500 Pa static-pressure class, positive or negative.
2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.5 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

B. Hanger Rods for Corrosive Environments: Electro-galvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.

C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."

D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.

E. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.

F. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

H. Trapeze and Riser Supports:

1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

2.6 SEISMIC-RESTRAINT DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cooper B-Line, Inc.; a division of Cooper Industries.
2. Ductmate Industries, Inc.
3. Hilti Corp.
4. Mason Industries.
5. TOLCO; a brand of NIBCO INC.
6. Unistrut Corporation; Tyco International, Ltd.

B. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an agency acceptable to authorities having jurisdiction.

1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.

C. Channel Support System: Shop- or field-fabricated support assembly made of slotted steel channels rated in tension, compression, and torsion forces and with accessories for attachment to braced component at one end and to building structure at the other end. Include matching components and corrosion-resistant coating.

D. Restraint Cables: ASTM A 603, galvanized-steel cables with end connections made of cadmium-plated steel assemblies with brackets, swivel, and bolts designed for restraining cable service; and with an automatic-locking and clamping device or double-cable clips.

E. Hanger Rod Stiffener: Reinforcing steel angle clamped to hanger rod.

F. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.

B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

C. Install round ducts in maximum practical lengths.

D. Install ducts with fewest possible joints.

E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.

G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

I. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.

J. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.

K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Division 23 Section "Air Duct Accessories" for fire and smoke dampers.

L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials.

3.2 INSTALLATION OF EXPOSED DUCTWORK

A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.

B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.

C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.

D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.

E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.3 ADDITIONAL INSTALLATION REQUIREMENTS FOR COMMERCIAL KITCHEN HOOD EXHAUST DUCT

A. Install commercial kitchen hood exhaust ducts without dips and traps that may hold grease, and sloped a minimum of 2 percent to drain grease back to the hood.

B. Install fire-rated access panel assemblies at each change in direction and at maximum intervals of 12 feet in horizontal ducts, and at every floor for vertical ducts, or as indicated on Drawings. Locate access panel on top or sides of duct a minimum of 1-1/2 inches from bottom of duct.

C. Do not penetrate fire-rated assemblies except as allowed by applicable building codes and authorities having jurisdiction.

3.4 DUCT SEALING

A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

B. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":

1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
2. Outdoor, Supply-Air Ducts: Seal Class A.
3. Outdoor, Exhaust Ducts: Seal Class C.
4. Outdoor, Return-Air Ducts: Seal Class C.
5. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class B.
6. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class A.
7. Unconditioned Space, Exhaust Ducts: Seal Class C.
8. Unconditioned Space, Return-Air Ducts: Seal Class B.
9. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class C.
10. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg Seal Class B.
11. Conditioned Space, Exhaust Ducts: Seal Class B.
12. Conditioned Space, Return-Air Ducts: Seal Class C.

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

1. Where practical, install concrete inserts before placing concrete.
2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
5. Do not use powder-actuated concrete fasteners for seismic restraints.

C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.

D. Hangers Exposed to View: Threaded rod and angle or channel supports.

E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.

F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.6 SEISMIC-RESTRAINT-DEVICE INSTALLATION

A. Install ducts with hangers and braces designed to support the duct and to restrain against seismic forces required by applicable building codes. Comply with SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems."

1. Space lateral supports a maximum of 40 feet o.c., and longitudinal supports a maximum of 80 feet.
2. Brace a change of direction longer than 12 feet.

B. Select seismic-restraint devices with capacities adequate to carry present and future static and seismic loads.

C. Install cables so they do not bend across edges of adjacent equipment or building structure.

D. Install cable restraints on ducts that are suspended with vibration isolators.

E. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction.

F. Attachment to Structure: If specific attachment is not indicated, anchor bracing and restraints to structure, to flanges of beams, to upper truss chords of bar joists, or to concrete members.

G. Drilling for and Setting Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcement or embedded items during drilling. Notify the Architect if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid pre-stressed tendons, electrical and telecommunications conduit, and gas lines.
2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Set anchors to manufacturer's recommended torque, using a torque wrench.
5. Install zinc-coated steel anchors for interior applications and stainless-steel anchors for applications exposed to weather.

3.7 CONNECTIONS

A. Make connections to equipment with flexible connectors complying with Division 23 Section "Air Duct Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.8 DUCT CLEANING

A. Clean new and existing duct system(s) before testing, adjusting, and balancing.

B. Use service openings for entry and inspection.

1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer
2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
3. Remove and reinstall ceiling to gain access during the cleaning process.

C. Particulate Collection and Odor Control:

1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.

D. Clean the following components by removing surface contaminants and deposits:

1. Air outlets and inlets (registers, grilles, and diffusers).
2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
3. Air-handling unit internal surfaces and components including mixing box, coil section, condensate drain pans, filters and filter sections, and condensate collectors and drains.
4. Coils and related components.
5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
6. Supply-air ducts, dampers, actuators, and turning vanes.

E. Mechanical Cleaning Methodology:

1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.

4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
5. Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
6. Provide drainage and cleanup for wash-down procedures.
7. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

3.9 START UP

A. Air Balance: Comply with requirements in Division 23 Section "Testing, Adjusting, and Balancing for HVAC."

3.10 DUCT SCHEDULE

A. Fabricate ducts with galvanized sheet steel except as otherwise indicated and as follows:

B. Supply Ducts:

1. Ducts Connected to Variable-Air-Volume Air Handling Units:

    a. Pressure Class: Positive 4-inch wg.
    b. Minimum SMACNA Seal Class: A.
    c. SMACNA Leakage Class for Rectangular: 12.
    d. SMACNA Leakage Class for Round and Flat Oval: 6.

2. Ducts Connected to Terminal Units:

    a. Pressure Class: Positive 1-inch wg.
    b. Minimum SMACNA Seal Class: A.
    c. SMACNA Leakage Class for Rectangular: 12.
    d. SMACNA Leakage Class for Round and Flat Oval: 6.

C. Return Ducts:

1. Ducts Connected to Air-Handling Units:

    a. Pressure Class: Positive or negative 1-inch wg.
    b. Minimum SMACNA Seal Class: B.
    c. SMACNA Leakage Class for Rectangular: 12.
    d. SMACNA Leakage Class for Round and Flat Oval: 6.

D. Exhaust Ducts:

1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:

a. Pressure Class: Negative 1-inch wg.
b. Minimum SMACNA Seal Class: B if negative pressure, and A if positive pressure.
c. SMACNA Leakage Class for Rectangular: 12.
d. SMACNA Leakage Class for Round and Flat Oval: 6.

2. Ducts Connected to Commercial Kitchen Hoods: Comply with NFPA 96.

a. Exposed to View: Type 304, stainless-steel sheet, No. 4 finish.
b. Concealed: Type 304, stainless-steel sheet, No. 2D finish.
c. Welded seams and joints.
d. Pressure Class: Positive or negative, 3-inch wg.
e. Minimum SMACNA Seal Class: Welded seams, joints, and penetrations.
f. SMACNA Leakage Class: 3.

E. Elbow Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."

a. Velocity 1000 fpm or Lower:

1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
2) Mitered Type RE 4 without vanes.

b. Velocity 1000 to 1500 fpm:

1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

c. Velocity 1500 fpm or Higher:

1) Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
2) Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

2. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."

a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.

c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

3. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."

a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.

1) Velocity 1000 fpm or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
2) Velocity 1000 to 1500 fpm: 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
3) Velocity 1500 fpm or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
4) Radius-to Diameter Ratio: 1.5.

b. Round Elbows, 12 inches and Smaller in Diameter: Stamped or pleated.
c. Round Elbows, 14 inches and Larger in Diameter: Standing seam.

F. Branch Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connection."

a. Rectangular Main to Rectangular Branch: 45-degree entry.
b. Rectangular Main to Round Branch: Spin in.

2. Round: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.

a. Velocity 1000 fpm or Lower: 90-degree tap.
b. Velocity 1000 to 1500 fpm: Conical tap.
c. Velocity 1500 fpm or Higher: 45-degree lateral.

END OF SECTION 233113

SECTION 233300 - AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Manual volume dampers.
   2. Flexible ducts.
   3. Duct accessory hardware.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.

   1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:

      a. Special fittings.
      b. Manual volume damper installations.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

2.2 MATERIALS

A. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G60.
2. Exposed-Surface Finish: Mill phosphatized.

B. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304, and having a No. 2 finish for concealed ducts and 1-side bright finish for exposed ducts.

C. Aluminum Sheets: Comply with ASTM B 209, Alloy 3003, Temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.

D. Extruded Aluminum: Comply with ASTM B 221, Alloy 6063, Temper T6.

E. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

F. Tie Rods: Galvanized steel, ¼-inch minimum diameter for lengths 36 inches or less; 3/8-inches minimum diameter for lengths longer than 36 inches.

2.3 MANUAL VOLUME DAMPERS

A. Standard, Steel, Manual Volume Dampers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Air Balance Inc.; a division of Mestek, Inc.
    b. American Warming and Ventilating; a division of Mestek, Inc.
    c. Flexmaster U.S.A., Inc.
    d. McGill AirFlow LLC.
    e. Nailor Industries Inc.
    f. Pottorff.
    g. Ruskin Company.
    h. Trox USA Inc.
    i. Vent Products Company, Inc.

2. Standard leakage rating.
3. Suitable for horizontal or vertical applications.
4. Frames:

    a. Frame: Hat-shaped, 0.094-inch-thick, galvanized sheet steel.
    b. Mitered and welded corners.
    c. Flanges for attaching to walls and flangeless frames for installing in ducts.

5. Blades:

    a. Multiple or single blade.
    b. Parallel- or opposed-blade design.
    c. Stiffen damper blades for stability.
    d. Galvanized-steel, 0.064 inch thick.

6. Blade Axles: Stainless steel.

7. Bearings:

    a. Stainless-steel sleeve.
    b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.

8. Tie Bars and Brackets: Galvanized steel.

B. Standard, Aluminum, Manual Volume Dampers:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

    a. Air Balance Inc.; a division of Mestek, Inc.
    b. American Warming and Ventilating; a division of Mestek, Inc.
    c. McGill AirFlow LLC.
    d. Nailor Industries Inc.
    e. Pottorff.
    f. Ruskin Company.
    g. Trox USA Inc.
    h. Vent Products Company, Inc.

2. Standard leakage rating.
3. Suitable for horizontal or vertical applications.
4. Frames: Hat-shaped, 0.10-inch-thick, aluminum sheet channels; frames with flanges for attaching to walls and flangeless frames for installing in ducts.
5. Blades:

    a. Multiple or single blade.
    b. Parallel- or opposed-blade design.
    c. Stiffen damper blades for stability.
    d. Roll-Formed Aluminum Blades: 0.10-inch-thick aluminum sheet.
    e. Extruded-Aluminum Blades: 0.050-inch-thick extruded aluminum.

6. Blade Axles: Stainless steel.
7. Bearings:

    a. Stainless-steel sleeve.
    b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.

8. Tie Bars and Brackets: Aluminum.

C. Jackshaft:

1. Size: 0.5-inch diameter.
2. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
3. Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly.

D. Damper Hardware:

1. Zinc-plated, die-cast core with dial and handle made of 3/32-inch-thick zinc-plated steel, and a ¾-inch hexagon locking nut.
2. Include center hole to suit damper operating-rod size.
3. Include elevated platform for insulated duct mounting.

2.4 TURNING VANES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ductmate Industries, Inc.
2. Duro Dyne Inc.
3. Elgen Manufacturing.
4. METALAIRE, Inc.
5. SEMCO Incorporated.
6. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.

1. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.

C. Manufactured Turning Vanes for Nonmetal Ducts: Fabricate curved blades of resin-bonded fiberglass with acrylic polymer coating; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.

D. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 4-3, "Vanes and Vane Runners," and 4-4, "Vane Support in Elbows." Vane Construction: Double wall.

2.5 FLEXIBLE DUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Flexmaster U.S.A., Inc.
2. McGill AirFlow LLC.
3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Noninsulated, Flexible Duct: UL 181, Class 1, 2-ply vinyl film supported by helically wound, spring-steel wire.

1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
2. Maximum Air Velocity: 20 m/s.
3. Temperature Range: Minus 23 to plus 71 deg C.

C. Insulated, Flexible Duct: UL 181, Class 1, aluminum laminate and polyester film with latex adhesive supported by helically wound, spring-steel wire; fibrous-glass insulation; aluminized vapor-barrier film.

1. Pressure Rating: 2500 Pa positive and 250 Pa negative.
2. Maximum Air Velocity: 4000 fpm.
3. Temperature Range: Minus 10 to plus 160 deg F.
4. Insulation R-value: Comply with ASHRAE/IESNA 90.1.

D. Flexible Duct Connectors:

1. Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action in sizes 3 through 18 inches, to suit duct size.
2. Non-Clamp Connectors: Adhesive plus sheet metal screws.

2.6 DUCT ACCESSORY HARDWARE

A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.

B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.

B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.

C. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.

1. Install steel volume dampers in steel ducts.
2. Install aluminum volume dampers in aluminum ducts.

D. Set dampers to fully open position before testing, adjusting, and balancing.

E. Install flexible connectors to connect ducts to equipment.

F. Connect terminal units to supply ducts with maximum 12-inch lengths of flexible duct. Do not use flexible ducts to change directions.

G. Connect diffusers to ducts directly or with maximum 60-inches lengths of flexible duct clamped or strapped in place.

H. Connect flexible ducts to metal ducts with adhesive plus sheet metal screws.

I. Install duct test holes where required for testing and balancing purposes.

3.2 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Operate dampers to verify full range of movement.
2. Inspect locations of access doors and verify that purpose of access door can be performed.
3. Operate fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
4. Inspect turning vanes for proper and secure installation.

END OF SECTION 233300

SECTION 233416 - CENTRIFUGAL HVAC FANS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: For each product.

1. Backward-inclined centrifugal fans (REF).
2. Forward-curved centrifugal fans (IEF).

1.2 ACTION SUBMITTALS

A. Product Data:

1. Include rated capacities, furnished specialties, and accessories for each fan.
2. Certified fan performance curves with system operating conditions indicated.
3. Certified fan sound-power ratings.
4. Motor ratings and electrical characteristics, plus motor and electrical accessories.
5. Material thickness and finishes, including color charts.
6. Dampers, including housings, linkages, and operators.

B. Shop Drawings:

1. Include plans, elevations, sections, and attachment details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For centrifugal fans to include in emergency, operation, and maintenance manuals.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Belts: One set for each belt-driven unit.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AMCA Compliance: Comply with AMCA performance requirements and bear the AMCA-Certified Ratings Seal.

B. Capacities and Characteristics
1. (REF-1):
   a. Total Airflow: 1050 cfm.
   b. External Static Pressure: 0.375 inches wg.
   c. Arrangement: Centrifugal backward-inclined.
   d. Housing Material: Aluminum with internal support structure.
   e. UL 762 Listed.
   f. Wheel Material: Aluminum.
   g. Brake Horsepower: 0.13.
   h. Drive Type: Belt.
   i. Fan Rpm: 1137.
   j. Motor Electrical Characteristics:

      1) Motor Size: 0.25 horsepower.
      2) Motor Rpm: 1137.
      3) Volts: 120.
      4) Phase: Single.
      5) Hertz: 60.

   Vibration Isolators: Neoprene isolators.

2. (IEF 1-5):
   a. Total Airflow: See drawings.
   b. External Static Pressure: See drawings.
   c. Arrangement: Inline, centrifugal, forward-curved.
   d. Housing Material: Galvanized Steel lined with ½ inch acoustical insulation.
   e. Wheel Material: Aluminum.
   f. Drive Type: Direct.
   g. Motor Electrical Characteristics: See plans.

3. Vibration Isolators: Neoprene isolators.

2.2 BACKWARD-INCLINED CENTRIFUGAL FANS

A. Manufacturers: Subject to compliance with requirements, [provide products by one of the following

1. Greenheck.
2. Aerovent; a Twin City Fan company.
3. Central Blower Company.
4. Chicago Blower Corporation.
5. Cincinnati Fan.

6. CML Northern Blower Inc.
7. Howden Buffalo Inc.
8. Loren Cook Company.
9. New York Blower Company (The).

B. Description:

1. Factory-fabricated, -assembled, -tested, and -finished, belt-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor, drive assembly, and support structure.
2. Deliver fans as factory-assembled units, to the extent allowable by shipping limitations.
3. Factory-installed and -wired disconnect switch.

C. Housings:

1. Formed panels to make curved-scroll housings with shaped cutoff.
2. Panel Bracing: Steel angle- or channel-iron member supports for mounting and supporting fan scroll, wheel, motor, and accessories.
3. Spun inlet cone with flange.
4. Outlet flange.

D. Backward-Inclined Wheels:

1. Single-width-single-inlet and double-width-double-inlet construction with curved inlet flange, backplate, backward-inclined blades, and fastened to shaft with set screws.
2. Welded or riveted to flange and backplate; cast-iron or cast-steel hub riveted to backplate.

E. Shafts:

1. Statically and dynamically balanced and selected for continuous operation at maximum rated fan speed and motor horsepower, with adjustable alignment and belt tensioning.
2. Turned, ground, and polished hot-rolled steel with keyway. Ship with protective coating of lubricating oil.
3. Designed to operate at no more than 70 percent of first critical speed at top of fan's speed range.

F. Grease-Lubricated Shaft Bearings:

1. Self-aligning, pillow-block-type, ball or roller bearings with adapter mount and two-piece, cast-iron housing.

G. Belt Drives:

1. Factory mounted, with adjustable alignment and belt tensioning.
2. Service Factor Based on Fan Motor Size: 1.5.
3. Fan Pulleys: Cast iron or cast steel with split, tapered bushing; dynamically balanced at factory.
4. Motor Pulleys: Adjustable pitch for use with motors through 5 hp; fixed pitch for use with larger motors. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.
5. Belts: Oil resistant, non-sparking, and non-static; matched sets for multiple belt drives.

6. Belt Guards: Fabricate to comply with OSHA and SMACNA requirements of diamond-mesh wire screen welded to steel angle frame or equivalent, prime coated. Secure to fan or fan supports without short circuiting vibration isolation. Include provisions for adjustment of belt tension, lubrication, and use of tachometer with guard in place.
7. Motor Mount: Adjustable for belt tensioning.

H. Accessories:

1. Access for Inspection, Cleaning, and Maintenance: Comply with requirements in ASHRAE 62.1.
2. Scroll Drain Connection: NPS 1 steel pipe coupling welded to low point of fan scroll.
3. Grease Trap: Aluminum trap for grease collection.
4. Companion Flanges: Rolled flanges for duct connections of same material as housing.
5. Discharge Dampers: Assembly with parallel blades constructed of two plates formed around and to shaft, channel frame, and sealed ball bearings; with blades linked outside of airstream to single control lever of same material as housing.
6. Inlet Screens: Grid screen of same material as housing.
7. Shaft Cooler: Metal disk between bearings and fan wheel, designed to dissipate heat from shaft.
8. Spark-Resistant Construction: AMCA 99.
9. Shaft Seals: Airtight seals installed around shaft on drive side of single-width fans.
10.

2.3 FORWARD-CURVED CENTRIFUGAL FANS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Greenheck.
2. Central Blower Company.
3. Howden Buffalo Inc.
4. Lau Industries.
5. New York Blower Company (The).

B. Description:

1. Factory-fabricated, -assembled, -tested, and -finished, belt-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor, drive assembly, and support structure.
2. Deliver fans as factory-assembled units, to the extent allowable by shipping limitations.
3. Factory-installed and -wired disconnect switch.

C. Housings:

1. Formed panels to make curved-scroll housings with shaped cutoff.
2. Panel Bracing: Steel angle- or channel-iron member supports for mounting and supporting fan scroll, wheel, motor, and accessories.
3. Horizontally split, bolted-flange housing.
4. Spun inlet cone with flange.
5. Outlet flange.

D. Forward-Curved Wheels:

1. Black-enameled or galvanized-steel construction with inlet flange, backplate, shallow blades with inlet and tip curved forward in direction of airflow.
2. Mechanically secured to flange and backplate; cast-steel hub swaged to backplate and fastened to shaft with set screws.

E. Shafts:

1. Statically and dynamically balanced and selected for continuous operation at maximum rated fan speed and motor horsepower, with adjustable alignment and belt tensioning.
2. Turned, ground, and polished hot-rolled steel with keyway. Ship with protective coating of lubricating oil.
3. Designed to operate at no more than 70 percent of first critical speed at top of fan's speed range.

F. Grease-Lubricated Shaft Bearings:

1. Self-aligning, pillow-block-type, ball or roller bearings with adapter mount and two-piece, cast-iron housing.

G. Accessories:

1. Access for Inspection, Cleaning, and Maintenance: Comply with requirements in ASHRAE 62.1.
2. Companion Flanges: Rolled flanges for duct connections of same material as housing.
3. Discharge Dampers: Assembly with parallel blades constructed of two plates formed around and to shaft, channel frame, and sealed ball bearings; with blades linked outside of airstream to single control lever of same material as housing.
4. Inlet Screens: Grid screen of same material as housing.
5. Shaft Cooler: Metal disk between bearings and fan wheel, designed to dissipate heat from shaft.
6. Spark-Resistant Construction: AMCA 99.
7. Shaft Seals: Airtight seals installed around shaft on drive side of single-width fans.

2.4 SOURCE QUALITY CONTROL

A. Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install centrifugal fans level and plumb.

B. Disassemble and reassemble units, as required for moving to the final location, according to manufacturer's written instructions.

C. Lift and support units with manufacturer's designated lifting or supporting points.

D. Equipment Mounting: Install centrifugal fans as indicated on drawings and per manufacturer recommendations.

1.

2.

E. Curb Support: Install and secure centrifugal fans on curbs, and coordinate roof penetrations and flashing with roof construction

F. Unit Support: Install centrifugal rooftop fans level on structural curbs.

G. Install units with clearances for service and maintenance.

H. Label fans according to requirements specified in Section 230553 "Identification for HVAC Piping and Equipment."

3.2 CONNECTIONS

A. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Section 233300 "Air Duct Accessories."

B. Install ducts adjacent to fans to allow service and maintenance.

C. Test and adjust controls and safeties. Controls and equipment will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION 233416

SECTION 233713 - DIFFUSERS, REGISTERS, AND GRILLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Fixed face grilles.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated, include the following:

   1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
   2. Register, and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

B. Samples: For each exposed product and for each color and texture specified.

PART 2 - PRODUCTS

2.1 REGISTERS AND GRILLES

A. Fixed Face Grille:

   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Carnes.
      b. Krueger.
      c. Nailor Industries Inc.
      d. Price Industries.
      e. Titus.
      f. Tuttle & Bailey.

   2. Material: Steel.
   3. Finish: Baked enamel, white.
   4. Face Arrangement: Perforated.
   5. Core Construction: Integral.

2.2 SOURCE QUALITY CONTROL

A. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install diffusers, registers, and grilles level and plumb.

B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.2 ADJUSTING

A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 233713

SECTION 233813 - COMMERCIAL-KITCHEN HOODS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes Type I commercial kitchen hoods.

1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Filters/baffles.
2. Fire-suppression systems.
3. Lighting fixtures.

B. Shop Drawings:

1. Show plan view, elevation view, sections, roughing-in dimensions, service requirements, duct connection sizes, and attachments to other work.
2. Show cooking equipment plan and elevation to confirm minimum code-required overhang.
3. Indicate performance, exhaust and makeup air airflow, and pressure loss at actual Project-site elevation.
4. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
5. Design Calculations: Calculate requirements for selecting seismic restraints.
6. Wiring Diagrams: Power, signal, and control wiring.
7. Piping Diagrams: Detail fire-suppression piping and components and differentiate between manufacturer-installed and field-installed piping. Show cooking equipment plan and elevation to illustrate fire-suppression nozzle locations.

1.3 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Field quality-control test reports.

1.4 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1/D 1.1M, "Structural Welding Code - Steel," for hangers and supports; and AWS D9.1/D9.1M, "Sheet Metal Welding Code," for joint and seam welding.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

PART 2 - PRODUCTS

2.1 HOOD MATERIALS

A. Stainless-Steel Sheet: ASTM A 666, Type 304.

1. Minimum Thickness: 0.050 inch.
2. Finish: Comply with SSINA's "Finishes for Stainless Steel" for recommendations for applying and designating finishes.

    a. Finish shall be free from tool and die marks and stretch lines and shall have uniform, directionally textured, polished finish indicated, free of cross scratches. Grain shall run with long dimension of each piece.

3. Concealed Stainless-Steel Surfaces: ASTM A 480/A 480M, No. 2B finish (bright, cold-rolled, unpolished finish).
4. Exposed Surfaces: ASTM A 480/A 480M, No. 2B finish (bright, cold-rolled, unpolished).

B. Zinc-Coated Steel Shapes: ASTM A 36/A 36M, zinc coated according to ASTM A 123/A 123M requirements.

C. Sealant: ASTM C 920; Type S, Grade NS, Class 25, Use NT. Elastomeric sealant shall be NSF certified for commercial kitchen hood application. Sealants, when cured and washed, shall comply with requirements in 21 CFR, Section 177.2600, for use in areas that come in contact with food.

1. Color: As selected by Architect from manufacturer's full range.
2. Backer Rod: Closed-cell polyethylene, in diameter larger than joint width.

D. Sound Dampening: NSF-certified, nonabsorbent, hard-drying, sound-deadening compound for permanent adhesion to metal in minimum 1/8-inch thickness that does not chip, flake, or blister.

E. Gaskets: NSF certified for end-use application indicated; of resilient rubber, neoprene, or PVC that is nontoxic, stable, odorless, nonabsorbent, and unaffected by exposure to foods and cleaning compounds, and that passes testing according to UL 710.

2.2 GENERAL HOOD FABRICATION REQUIREMENTS

A. Welding: Use welding rod of same composition as metal being welded. Use methods that minimize distortion and develop strength and corrosion resistance of base metal. Make ductile welds free of mechanical imperfections such as gas holes, pits, or cracks.

1. Welded Butt Joints: Full-penetration welds for full-joint length. Make joints flat, continuous, and homogenous with sheet metal without relying on straps under seams, filling in with solder, or spot welding.
2. Grind exposed welded joints flush with adjoining material and polish to match adjoining surfaces.
3. Where fasteners are welded to underside of equipment, finish reverse side of weld smooth and flush.
4. Coat concealed stainless-steel welded joints with metallic-based paint to prevent corrosion.

B. For metal butt joints, comply with SMACNA's "Kitchen Ventilation Systems & Food Service Equipment Guidelines."

C. Form metal with break bends that are not flaky, scaly, or cracked in appearance; where breaks mar uniform surface appearance of material, remove marks by grinding, polishing, and finishing.

D. Sheared Metal Edges: Finish free of burrs, fins, and irregular projections.

E. In food zones, as defined in NSF, fabricate surfaces free from exposed fasteners.

F. Cap exposed fastener threads, including those inside cabinets, with stainless-steel lock washers and stainless-steel cap (acorn) nuts.

G. Fabricate pipe slots on equipment with turned-up edges sized to accommodate service and utility lines and mechanical connections.

H. Fabricate enclosures, including panels, housings, and skirts, to conceal service lines, operating components, and mechanical and electrical devices including those inside cabinets, unless otherwise indicated.

I. Fabricate seismic restraints according to SMACNA's "Kitchen Ventilation Systems & Food Service Equipment Guidelines," Appendix A, "Seismic Restraint Details."

J. Fabricate enclosure panels to hood, ceiling and wall as follows:

1. Fabricate panels on four side(s) with same material as hood, and extend from ceiling to top of hood canopy and from canopy to wall.
2. Wall Offset Spacer: Minimum of 3 inches.
3. Wall Shelves and Overshelves: Fabricate according to SMACNA's "Kitchen Ventilation Systems & Food Service Equipment Guidelines," with minimum 0.0625-inch-thick, stainless-steel shelf tops.

2.3 TYPE I EXHAUST HOOD FABRICATION

A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product:

B. Weld all joints exposed to grease with continuous welds, and make filters/baffles or grease extractors and makeup air diffusers easily accessible for cleaning.

1. Fabricate hoods according to NSF 2, "Food Equipment."
2. Hoods shall be listed and labeled, according to UL 710, by a testing agency acceptable to authorities having jurisdiction.
3. Hoods shall be designed, fabricated, and installed according to NFPA 96.
4. Include access panels as required for access to fire dampers and fusible links.
5. Duct Collars Without Fire Dampers: Minimum 0.0598-inch- thick steel at least 3 inches long, continuously welded to top of hood and at corners.
6. Duct-Collar With Fire Dampers: Collar and damper shall comply with UL 710 testing and listing required for the entire hood.

    a. Collar: Minimum 0.0598-inch- thick stainless steel, at least 3 inches long, continuously welded to top of hood and at corners.
    b. Blades: Minimum 0.1046-inch- thick stainless steel, counterbalanced to remain closed after actuation.
    c. Blade Pivot and Spring: Stainless steel.
    d. Fusible Link: Replaceable, 212 deg F rated.

7. Makeup Air Fire Dampers: Labeled, according to UL 555, by a testing agency acceptable to authorities having jurisdiction.

    a. Fire Rating: 1-1/2 hours.
    b. Frame: SMACNA Type A, with blades in airstream; fabricated with roll-formed, galvanized steel; with mitered and interlocking corners.
    c. Blades: Roll-formed, interlocking or folded, minimum 0.034-inch- thick, galvanized-steel sheet.
    d. Horizontal Dampers: Include a blade lock and stainless-steel closure spring.
    e. Fusible Link: Replaceable, 165 deg F rated.

C. Hood Configuration: Exhaust only with makeup air supplied at external back supply plenum.

1. Makeup air shall be introduced by induction below the canopy. If makeup air is not heated, insulate interior of makeup air plenum with high-density insulation having maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.
2. Makeup air shall be introduced through an external back supply plenum extending 6 inches below the working range surface.
3. Makeup air shall be introduced through laminar-flow-type, perforated metal panels on front of hood canopy.

D. Hood Style: Wall-mounted canopy.

E. Filters/Baffles: Removable, stainless-steel. Fabricate stainless steel for filter frame and removable collection cup and pitched trough. Exposed surfaces shall be pitched to drain to collection cup. Filters/baffles shall be tested according to UL 1046, "Grease Filters for Exhaust Ducts," by an NRTL acceptable to authorities having jurisdiction.

F. Lighting Fixtures: CFL fixtures. Wiring shall be installed in conduit on hood exterior. Number and location of fixtures shall provide a minimum of 70 fc at 30 inches above finished floor.

1. Light switches shall be mounted in hood control panel.
2. Lighting Fixtures: Fluorescent complying with UL 1598.

G. Hood Controls: Hood-mounting control cabinet, fabricated of stainless steel. See drawings for kitchen hood control sequence of operations.

1. Exhaust Fan: On-off switches shall start and stop the exhaust fan. Interlock exhaust fan with makeup air supply fan to operate simultaneously except when fire suppression system is activated. Interlock exhaust fan with fire-suppression system to operate fan(s) during fire-suppression-agent release and to remain in operation until manually stopped. Include red pilot light to indicate fan operation.
2. Exhaust Fan Interlock: Factory wire the exhaust fan and make-up air unit starters in a single control cabinet.
3. High-Temperature Control: Alarm shall sound and cooking equipment shall shut down before hood discharge temperature rises to actuation temperature of fire-suppression system.

H. Capacities and Characteristics:

1. Nominal Hood Length: 84 inches.
2. Nominal Hood Width: 52 inches.
3. Canopy Height: 24 inches.
4. Exhaust Airflow: 1,050 cfm.
5. Exhaust-Air Pressure Loss: 0.625 inches wg.
6. Makeup Air Airflow: 1,050 cfm.
7. Makeup Air Pressure Loss: 0.375 inches wg.

2.4 WET-CHEMICAL FIRE-SUPPRESSION SYSTEM

A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product.

B. Description: Engineered distribution piping designed for automatic detection and release or manual release of fire-suppression agent by hood operator. Fire-suppression system shall be listed and labeled for complying with NFPA 17A, "Wet Chemical Extinguishing Systems," by a qualified testing agency acceptable to authorities having jurisdiction.

1. Steel Pipe, NPS 2 and Smaller: ASTM A 53/A 53M, Type S, Grade A, Schedule 40, plain ends.
2. Malleable-Iron Threaded Fittings: ASME B16.3, Classes 150 and 300.
3. Piping, fusible links and release mechanism, tank containing the suppression agent, and controls shall be factory installed. Controls shall be in stainless-steel control cabinet mounted on hood. Furnish manual pull station for wall mounting. Exposed piping shall be covered with chrome-plated aluminum tubing. Exposed fittings shall be chrome plated.
4. Liquid Extinguishing Agent: Noncorrosive, low-pH liquid.
5. Furnish electric-operated gas shutoff valve; refer to Section 231123 "Facility Natural-Gas Piping."
6. Furnish electric-operated gas shutoff valve with clearly marked open and closed indicator for field installation.
7. Fire-suppression system controls shall be integrated with controls for fans, lights, and fuel supply and located in a single cabinet.

8. Wiring shall have color-coded, numbered terminal blocks and grounding bar. Spare terminals for fire alarm, optional wiring to start fan with fire alarm, red pilot light to indicate fan operation, and control switches shall all be factory wired in control cabinet with relays or starters. Include spare terminals for fire alarm, and wiring to start fan with fire alarm.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Complete field assembly of hoods where required.

1. Make closed butt and contact joints that do not require filler.
2. Grind field welds on stainless-steel equipment smooth, and polish to match adjacent finish. Comply with welding requirements in Part 2 "General Hood Fabrication Requirements" Article.

B. Install hoods and associated services with clearances and access for maintaining, cleaning, and servicing hoods, filters/baffles, grease extractor, and fire-suppression systems according to manufacturer's written instructions and requirements of authorities having jurisdiction.

C. Make cutouts in hoods where required to run service lines and to make final connections, and seal openings according to UL 1978.

D. Securely anchor and attach items and accessories to walls, floors, or bases with stainless-steel fasteners, unless otherwise indicated.

E. Install hoods to operate free from vibration.

F. Install seismic restraints according to SMACNA's "Kitchen Ventilation Systems & Food Service Equipment Guidelines," Appendix A, "Seismic Restraint Details."

G. Install trim strips and similar items requiring fasteners in a bed of sealant. Fasten with stainless-steel fasteners at 48 inches o.c. maximum.

H. Install sealant in joints between equipment and abutting surfaces with continuous joint backing, unless otherwise indicated. Provide airtight, watertight, vermin-proof, sanitary joints.

I. Install lamps, with maximum recommended wattage, in equipment with integral lighting.

J. Set initial temperatures, and calibrate sensors.

K. Set field-adjustable switches.

L. Connect ducts according to requirements in Section 233300 "Air Duct Accessories." Install flexible connectors on makeup air supply duct. Weld exhaust-duct connections with continuous liquidtight joint.

M. Install fire-suppression piping for remote-mounted suppression systems according to NFPA 17A, "Wet Chemical Extinguishing Systems."

3.2 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. Report results in writing.

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. Test each equipment item for proper operation. Repair or replace equipment that is defective, including units that operate below required capacity or that operate with excessive noise or vibration.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Perform hood performance tests required by authorities having jurisdiction.
4. Perform fire-suppression system performance tests required by authorities having jurisdiction.

D. Prepare test and inspection reports.

END OF SECTION 233813

SECTION 235533 - FUEL-FIRED UNIT HEATERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes gas-fired unit heaters.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of fuel-fired unit heater indicated. Include rated capacities, operating characteristics, and accessories.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Wiring Diagrams: Power and control wiring.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace heat exchanger of fuel-fired unit heater that fails in materials or workmanship within specified warranty period.

1. Warranty Period: Four years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GAS-FIRED UNIT HEATERS

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. Reznor/Thomas & Betts Corporation.Lennox Industries, Inc.
2. Modine Manufacturing CompanyLennox Industries, Inc..
3. Sterling HVAC Products; Div. of Mestek Technology Inc.

C. Description: Factory assembled, piped, and wired, and complying with ANSI Z83.8/CSA 2.6.

D. Fuel Type: Design burner for natural gas having characteristics same as those of gas available at Project site.

E. Type of Venting: Indoor, separated combustion, power vented.

F. Housing: Steel, with integral draft hood and inserts for suspension mounting rods.

G. Heat Exchanger: Titanium stabilized aluminized steel.

H. Burner Material: Aluminized steel with stainless-steel inserts.

I. Unit Fan: Propeller blades riveted to heavy-gage steel spider bolted to cast-iron hub, dynamically balanced, and resiliently mounted.

J. Controls: Regulated redundant gas valve containing pilot solenoid valve, electric gas valve, pilot filter, pressure regulator, pilot shutoff, and manual shutoff all in one body.

1. Gas Control Valve: Single stage.
2. Ignition: Electronically controlled electric spark with flame sensor.
3. Fan Thermal Switch: Operates fan on heat-exchanger temperature.
4. Control transformer.
5. High Limit: Thermal switch or fuse to stop burner.
6. Thermostat: Single-stage, wall-mounting type with 50 to 90 deg F operating range and fan on switch.

K. Discharge Louvers: Independently adjustable horizontal blades.

L. Accessories:

1. Vertical discharge louvers.
2. Discharge Nozzle: Discharge at 25 to 65 degrees from horizontal.
3. Four-point suspension kit.
4. Summer fan switch.
5. Unit-mounted thermostat bracket.

6. Power Venter: Centrifugal aluminized-steel fan, with stainless-steel shaft; 120-V ac motor.
7. Concentric, Terminal Vent Assembly: Combined combustion-air inlet and power-vent outlet with wall or roof caps. Include adapter assembly for connection to inlet and outlet pipes, and flashing for wall or roof penetration.

M. Capacities and Characteristics:

1. Gas Input: 30,000 Btu/h.
2. Gas Output: 24,600 Btu/h.
3. Minimum Combustion Efficiency: 82 percent.
4. Minimum Airflow: 456 cfm.
5. External Static Pressure: 0.25 inches wg.
6. Electrical Characteristics:

a. Volts: 120.
b. Phase: Single.
c. Hertz: 60.
d. Full-Load Amperes: 3.1.
e.
f. Maximum Overcurrent Protection: 15.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install and connect gas-fired unit heaters and associated fuel and vent features and systems according to NFPA 54, applicable local codes and regulations, and manufacturer's written installation instructions.

B. Suspended Units: Suspend from substrate using threaded rods, spring hangers, and building attachments. Secure rods to unit hanger attachments. Adjust hangers so unit is level and plumb.

C. Install piping adjacent to fuel-fired unit heater to allow service and maintenance.

D. Gas Piping: Comply with Section 231123 "Facility Natural-Gas Piping." Connect gas piping to gas train inlet; provide union with enough clearance for burner removal and service.

E. Electrical Connections: Comply with applicable requirements in electrical Sections.

1. Install electrical devices furnished with heaters but not specified to be factory mounted.

F. Adjust initial temperature set points.

G. Adjust burner and other unit components for optimum heating performance and efficiency.

3.2 FIELD QUALITY CONTROL

A. Tests and Inspections: Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

END OF SECTION 235533

SECTION 238219 - FAN COIL UNITS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes fan-coil units and accessories.

1.2 ACTION SUBMITTALS

A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Wiring Diagrams: Power, signal, and control wiring.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

C. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In the Fan-Coil-Unit Schedule where titles below are column or row headings that introduce lists, the following requirements apply to product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
3. Basis-of-Design Product: The design for each fan-coil unit is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

2.2 FAN-COIL UNITS

A. Description: Factory-packaged and -tested units rated according to ARI 440, ASHRAE 33, and UL 1995.

B. Coil Section Insulation: Not required within unit..

C. Main Drain Pans: Plastic. Fabricate pans and drain connections to comply with ASHRAE 62.1.

D. Chassis: Galvanized steel where exposed to moisture.

E. Cabinet: Steel with baked-enamel finish in manufacturer's standard paint color..
1. Horizontal Unit Bottom Panels: Fastened to unit with cam fasteners and hinge and attached with safety chain; with plastic discharge grilles.

F. Filters: Minimum arrestance according to ASHRAE 52.1, and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2.
1. Pleated Cotton-Polyester Media: 90 percent arrestance and 8 MERV.

G. Hydronic Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch (2.5 mm), rated for a minimum working pressure of 300 psig and a maximum entering-water temperature of 200 deg F. Include manual air vent and drain valve.

H. Fan and Motor Board: Removable.

1. Fan: Forward curved, double width, centrifugal; directly connected to motor. Thermoplastic or painted-steel wheels, and aluminum, painted-steel, or galvanized-steel fan scrolls.
2. Motor: Permanently lubricated, multispeed; resiliently mounted on motor board.
3. Wiring Termination: Connect motor to chassis wiring with plug connection.

I. Factory, Hydronic Piping Package: ASTM B 88, Type M copper tube with wrought-copper fittings and brazed joints. Label piping to indicate service, inlet, and outlet.
1. Two-way, two-position control valve for heating coil.

2. Two-Piece Ball Valves: Bronze body with full-port, chrome-plated bronze ball; PTFE or TFE seats; and 400-psig minimum CWP rating and blowout-proof stem.
3. Calibrated-Orifice Balancing Valves: Bronze body, ball type; 300-psig working pressure, 250-deg F maximum operating temperature; with calibrated orifice or venturi, connections for portable differential pressure meter with integral seals, threaded ends, and equipped with a memory stop to retain set position.

4. Automatic Flow-Control Valve: Brass or ferrous-metal body; 300-psig working pressure at 250 deg F, with removable, corrosion-resistant, tamperproof, self-cleaning piston spring; factory set to maintain constant indicated flow with plus or minus 10 percent over differential pressure range of 2 to 80 psig.
5. Y-Pattern Hydronic Strainers: Cast-iron body (ASTM A 126, Class B); 125-psig working pressure; with threaded connections, bolted cover, perforated stainless-steel basket, and bottom drain connection. Include minimum NPS 1/2 hose-end, full-port, ball-type blowdown valve in drain connection.
6. Wrought-Copper Unions: ASME B16.22.

J. Control devices and operational sequences are specified in Section 230900 "Instrumentation and Control for HVAC" and Section 230993 "Sequence and Operations for HVAC Controls."

K. Basic Unit Controls:

1. Control voltage transformer.
2. Wall-mounting thermostat with the following features:

    a. Temperature Sensor

    b. Heat-cool-off switch.
    c. Fan on-auto switch.
    d. Fan-speed switch.
    e. Adjustable deadband.
    f. Exposed set point.
    g. Exposed indication.
    h. Degree Findication.

L. Terminal Controller:

1. Scheduled Operation: Occupied and unoccupied periods on seven-day clock with a minimum of four programmable periods per day.
2. Unoccupied Period Override Operation: Two hours.
3. Unit Supply-Air Fan Operation:

    a. Occupied Periods: Fan runs continuously.
    b. Unoccupied Periods: Fan cycles to maintain room setback temperature.

4. Heating-Coil Operation:

    a. Occupied Periods: Open control valve to provide heating if room temperature falls below thermostat set point.
    b. Unoccupied Periods: Start fan and open control valve if room temperature falls below setback temperature.

M. Electrical Connection: Factory wire motors and controls for a single electrical connection.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install fan-coil units to comply with NFPA 90A.

B. Suspend fan-coil units from structure with elastomeric hangers.

C. Verify locations of thermostats and other exposed control sensors with Drawings and room details before installation. Install devices 48 inches above finished floor.

D. Install new filters in each fan-coil unit within two weeks after Substantial Completion.

E. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties. Specific connection requirements are as follows:

1. Install piping adjacent to machine to allow service and maintenance.
2. Connect piping to fan-coil-unit factory hydronic piping package. Install piping package if shipped loose.

F. Connect supply and return ducts to fan-coil units with flexible duct connectors specified in Section 233300 "Air Duct Accessories." Comply with safety requirements in UL 1995 for duct connections.

3.2 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports:

1. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
2. Operate electric heating elements through each stage to verify proper operation and electrical connections.
3. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

B. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 238219

SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Provide labor, materials, equipment, transportation and perform operations necessary or incidental to the proper execution and completion of the electrical work, whether specifically mentioned or not, and as directly indicated or reasonably implied by the Drawings and Specifications.

1.2 WORK NOT INCLUDED

A. Refer to the specific Sections for a detailed listing of work that is not included in this Contract.

B. In any case, cooperate with the other trades who may or may not be party to this Contract for the purpose of coordinating the electrical requirements and installation of equipment, materials, and furnishings provided by those other trades, including the Owner.

1.3 CODES AND STANDARDS

A. Provide equipment and materials which conform to, and perform the installation thereof in accordance with the following codes and industry standards. The applicable version of each shall be that in effect as of the date of the Contract:
   1. California Electrical Code (CEC)
   2. American National Standards Institute (ANSI).
   3. California State Fire Marshal (CSFM).
   4. Underwriters' Laboratories (UL).
   5. National Electrical Manufacturers' Association (NEMA).
   6. Institute of Electrical and Electronics Engineers (IEEE).
   7. National Electrical Safety Code (NESC).
   8. Electrical Safety Orders.
   9. Other applicable local codes and ordinances.

B. Where the authority-having-jurisdiction makes an interpretation or decision, as is their prerogative in accordance with the Code, such direction shall be considered a part of these Contract Documents as if contained herein. With respect to completing the intent of the Contract Documents, comply with any and all requirements of the authority-having-jurisdiction and utility company field inspectors, at no additional cost.

C. The above referenced codes and standards are considered to be absolute minimum requirements. The Drawings and Specifications shall take precedence over the above referenced codes and standards where materials or workmanship of higher quality or larger size is indicated. Nothing in these Drawings or Specifications shall be construed to allow work not conforming to the applicable codes and standards.

1.4 REVIEW OF CONTRACT DOCUMENTS

A. Examine all relevant Contract Documents including Drawings, Specifications, and Shop Drawings in order to become acquainted with the Work of other installers whose activities will adjoin or be affected by the Electrical Work.

1.5 PERMITS, LICENSES, AND FEES

A. Procure and pay for all permits, licenses and fees that are required to carry out and complete the Electrical Work.

B. Pay for building department or utility company imposed inspection fees.

C. Pay utility company charges for normal or after hours shutdowns, service calls, repairs, and cable locating that are directly related to the installation of the Electrical Work.

1.6 SITE VERIFICATION OF INFORMATION

A. Visit the project site prior to submitting a bid and verify the condition, location and dimensions of buildings, equipment, and facilities. Become acquainted with conditions under which the Work is to be performed and which may affect the cost thereof.

B. Verify at the project site, the accuracy of information shown on the Drawings regarding existing equipment, materials, and facilities. This includes but is not limited to: size, type, rating, quality, age, and serviceability. No allowance will be made on behalf of the Contractor for extra expenses resulting from the failure to discover conditions affecting the Work.

1.7 WORKING SPACE

A. Maintain adequate work space around, and access to, electrical and mechanical equipment in strict accordance with the applicable Codes. Verify during the course of construction that sufficient space will be available for the installation equipment, fixtures, etc.

1.8 MATERIALS AND SUBSTITUTIONS

A. Materials shall be new, high quality, free from defects, of standard make, and of the brand or grade as shown on the Drawings or specified herein. Specific trade names are used in the Drawings and Specifications in order to establish the standard grade and characteristics of said items. This does not imply the right upon the part of the Contractor to use other materials or methods without the approval of the Architect.

B. Electrical materials and equipment shall bear the label of, or be listed by, the Underwriters' Laboratories (UL) wherever standards have been established and label service is regularly furnished by that agency. Comply with the installation and application requirements of UL as documented in their published directories.

C. Unless specifically noted, equipment and systems shall be the product of a manufacturer who has been in the manufacture of, and has nationally distributed catalogs covering the ratings and specifications of, said equipment or systems, for a period of not less than five (5) years.

D. Maintain uniformity throughout the Project by making use of only one make or brand of material for each material used.

E. Substitutions of materials or methods will only be allowed if such items are approved in writing by the Architect as equal in quality and utility to the specified items. Submit a list of proposed substitutions within thirty (30) days of the award of the Contract. Include on the list the original manufacturer's name and model number, the proposed manufacturer's name and model number, catalog cut sheets, ratings, sizes, performance curves, shop drawings, and other data as may be required to demonstrate equality to the specified item.

F. The approval of a substitution does not authorize any deviation from the utility, size, function, or durability of the specified item unless specifically pointed out and requested in the proposed substitution list, and said deviation is approved in writing by the Architect. Responsibility of the Contractor for dimensional considerations or space conflicts is not relieved by the approval of a substitution.

G. If requested by the Architect, submit samples of materials and equipment for approval prior to installation.

1.9 ELECTRICAL SUBMITTALS

A. See the General Conditions for conditions of submittal approval and general requirements for submission of shop drawings.

B. Submit a minimum of five copies (or more as required by the General Conditions) of electrical shop drawings and manufacturer's cut sheets for equipment and materials as noted in each Division 26 specification section. Bind the submittals as complete volumes according to classification of equipment such as power, lighting, fire alarm, etc. When possible, make all electrical submittals at the same time.

C. Submit shop drawings and supporting data as instruments of the Contractor. Stamp each item in the submittal documents with the Contractor's stamp, thereby stating that the equipment meets all requirements and conditions of the Drawings and Specifications. In particular, certify that the items shown on the shop drawings conform to the dimensional, environmental, and space restrictions as pertains to all work under this Contract and the work of other parties in conjunction with this Project.

D. Provide a blank space on the title page of each submittal classification for the Architect's or Engineers approval stamp and comment field. The minimum size of such space shall be eight inches wide by five inches high.

E. Arrange panelboard submittals to show bussing, circuit numbering, and branch circuit protective devices similar the schedules on the Drawings. Show elevations of switchboards, motor control centers, and distribution centers indicating the layout of devices, meters, handles,

etc. Provide device ratings, circuit numbers, and nameplate descriptions in table form. Include terminal strip mounting arrangements on elevations for terminal cabinets.

1.10 DRAWINGS AND SPECIFICATIONS

A. The data and information contained on the Drawings is as accurate as was reasonably possible at the time they were produced, but absolute accuracy is not guaranteed. Exact locations, distances, elevations, etc., will be dictated by the actual building and the conditions at the site.

B. The layout of electrical equipment, wiring, and accessories is shown in a diagrammatic fashion (not pictorially) in order to achieve clarity and legibility. Although the size and location of electrical equipment is drawn to scale wherever possible, refer to all data in the Contract Documents and field verify this information as the project progresses. Examine architectural, structural, mechanical, and other drawings to determine the exact location of conduits, outlets, fixtures, and equipment and to note any conditions which may affect the electrical work.

C. The Drawings and Specifications may be superseded by later detail drawings and specifications prepared by the Architect. Conform to such detail drawings, specifications, addenda, change orders, other reasonable changes as if they are contained herein. See the General Conditions for change order cost considerations.

D. Because the Electrical Drawings may be distorted for clarity of representation, it may be necessary to field verify the exact location of electrical outlets, lights, switches, etc. in order to conform to the architectural elements. The Architect reserves the right to make minor changes to the locations of equipment, devices, and wiring shown on the Drawings, at no additional cost, providing the changes are ordered before the rough-in of conduit, boxes, or related items is completed, and no extra material are required.

E. For dimensional and locational purposes, the Architectural Drawings take precedence over the Electrical Drawings. Determine the appropriate location of lighting fixtures, outlets, wall-mounted devices, etc. by studying the reflected ceiling plans, building sections, and interior elevations. Report conflicting conditions to the Architect before rough-in for adjustments to the locations.

F. Conduit quantities, sizes, termination points, and wiring are depicted on the Electrical Drawings. However, not all conduit bends or routing details are necessarily shown. Route conduit so as to conform to the structural conditions, avoid obstructing other trades, maintain space restrictions and keep circulation areas and access openings clear.

G. Thoroughly examine the Contract Documents prior to submitting a bid in order to determine electrical requirements which are not necessarily indicated on the Electrical Drawings. Include sufficient allowance in the bid sum to cover the costs of these other requirements.

H. Should the Contractor perceive that the Drawings and Specifications do not sufficiently define the intent of electrical work, contact the Architect for clarification or additional information. The absence of such contact will be considered as evidence of understanding, on the part of the Contractor, of the intended Electrical Work and the required installation thereof.

1.11 WORKMANSHIP

A. Constantly supervise the work personally or through an authorized and competent representative. Keep the same foreman or supervisor on the project from commencement through completion.

B. Perform the Electrical work using the highest caliber craftsman available. Workmanship shall be first class and of the best quality available to insure a long and trouble free service life. Allow only experienced and competent workmen on the job.

1.12 COOPERATION AND COORDINATION

A. Consult with the other installers and trades in coordinating the Work so as to avoid conflicts, omissions and delays. Cooperate with other contractors, third parties, and the Owner in order to expedite the project and provide for the proper execution of the building as a whole. Work performed without regard to other trades or the overall project scheme, may necessarily be required to be moved at the Contractor's expense.

1.13 MANUFACTURER'S DIRECTIONS

A. Adhere to the manufacturer's directions regarding the proper installation and configuration of electrical equipment where those directions cover points not included in these Drawings and Specifications.

1.14 PROTECTION AND STORAGE

A. Deliver electrical materials to the site new, and in unbroken packages. Provide for the temporary storage of such materials, equipment, and construction tools in accordance with the General Conditions. Protect electrical equipment and materials during transit, storage and handling to prevent damage, soiling and deterioration.

B. During shipping storage and handling protect electrical materials from damage of any type including dust, water, over-spray, and temperature. Avoid damage during construction to the work and materials of other trades as well as the electrical work and material. Repair or replace, at the Contractor's expense, defective or damaged items such that the entire Work is completed in a condition satisfactory to the Architect.

1.15 EXCAVATION, CUTTING, PATCHING, AND REPAIR

A. Perform excavation and backfill required for the installation of electrical sub-structures. Restore grounds, walkways, roadways, curbs, walls, and other existing underground facilities to their original condition.

B. Conform to the applicable requirements of Specification Section "Earthwork for Utilities" in the selection, placement, and compaction of backfill material and finished surfaces.

C. Cut, core-drill, and demolish existing walls, floors, ceilings and other building surfaces as required for the installation of Electrical Work. Obtain the approval of the Architect prior to performing any operation which may affect any structural elements of the building.

D. Patch and repair wood, plaster, tile, or concrete surfaces which have been damaged by the installation of the Electrical Work so that the finished surface matches the surrounding conditions.

1.16 FLASHING, WATERPROOFING AND SEALING

A. In general, install in an approved watertight manner, Electrical Work which pierces exterior walls or waterproofing membranes. Flash and counter-flash roof and wall penetrations in a manner described in other applicable sections of this Specification and as approved by the Architect.

B. Fit conduits passing through finished walls with steel escutcheon plates of brass, chrome, or painted finish as directed by the Architect. Grout penetrations of floor slabs, concrete or masonry walls with an approved grout or silicone elastomeric caulk.

1.17 CLEANING, ADJUSTING, AND TOUCH-UP

A. Remove on a daily basis electrical debris, scraps, packaging material and other rubbish. Dispose of such items off-site in an approved manner and debris. Maintain the site free from physical hazards at all times in accordance with OSHA regulations. See the General Conditions for additional requirements.

B. After installation, completely clean electrical equipment, fixtures, and materials of excess paint, over-spray, plaster, cement, insulating products, and other foreign matter. Leave the Electrical Work in a clean, finished, dry, level, like new condition.

C. Touch-up paint scratches and scuffs on electrical equipment and lighting fixtures with paint recommended by the manufacturer and matching the original item finish.

D. Make setting, adjustments, and programming in accordance with the manufactures' operating and installation instructions. Settings and program variables will be issued by the Architect prior to commissioning of the electrical system.

1.18 AS-BUILT DRAWINGS

A. Throughout the project, maintain accurate and current record documents. Show on the record drawings deviations from the Electrical Drawings, locations of underground conduits and pull-boxes, and concealed equipment which is not readily apparent. Dimension the record drawings using permanent, readily identified benchmarks such as column or wall lines.

B. At the completion of the project, present one clearly legible set of the record drawings to the Architect.

1.19 INSPECTIONS AND TESTING

A. Arrange for the inspection of the Work at various stages of completion by the Authority Having Jurisdiction, utility company representatives, and the Architect. Comply with all directions and remedial measures issued thereby. Any objections to these orders on the part of the Contractor must be presented to the Architect in writing within forty eight (48) hours of the inspection report.

B. Coordinate the installation of the Work so that observation of all rough-in, concealed, or underground Work can take place by the Architect. Provide a minimum of seventy two (72) hours notice to the Architect prior to covering up the work. Uncover Work that has not been properly observed and make repairs to restore the Work and adjoining surfaces to their proper condition at no additional cost.

C. Perform tests of the electrical system during the course of the project and at project completion to ensure safe and proper function in accordance with the Contract Documents, manufacturers' recommendations, and applicable codes. Provide complete documentation of all test results to the Architect prior to project completion. Testing shall include, but not necessarily be limited to, the following:
   1. Test for short circuits, open circuits, neutral leakage, and improper grounds on feeders and branch circuits. Perform this test with mains in disconnect from feeders, branch circuits closed, fixtures and devices permanently connected, lamps removed from sockets and wall switches closed.
   2. Provide insulation resistance tests of all phase and neutral circuit conductors using a 500 Volt Megger for circuits of 240 Volt rating and below, and a 1000 Volt Megger for circuits of 277 volts and above. Minimum acceptable insulation resistance is one (1) megohm.
   3. Perform a ground resistance test of each main grounding electrode system, ground rod, and supplemental grounding electrode. Utilize a calibrated, direct reading, earth ground test set and make the tests using the "Three-terminal, Fall-of-Potential" method. The maximum allowable earth ground resistance is 25 ohms.
   4. Test for proper phase-to-phase and phase-to-neutral operating voltage on the main service and on each separately derived system. Perform this test at full load and at no load. With all circuits at full operating conditions, test the phase and neutral load currents using a clamp-on ammeter.
   5. Tests as required by other sections of these Specifications.
   6. Tests as prescribed by individual equipment manufacturers whether or not described in these Specifications.

D. At project completion, demonstrate to the Architect that the entire installation is complete, in proper operation condition and that the Contract has been properly and fully executed. Activate all circuits, lights, devices, and controls under full load and normal operating conditions. Identify faulty items and immediately replace or repair defective equipment, workmanship, and materials to like new condition and retest in the presence of the Architect.

E. At the completion of the Project, demonstrate to the Architect that the entire electrical system is free from short circuits and improper grounds, or upon request of the Architect anytime, make necessary tests under the observation of the Architect which will ensure that electrical equipment, materials and installation methods are as specified.

1.20 GUARANTEE

A. In accordance with Division 1 requirements.

1.21 WARRANTIES, CERTIFICATES, AND OPERATING MANUALS

A. Properly fill out and deliver to the Architect, all warranties, guarantees, certificates, etc. for equipment and materials that are furnished and installed under this Section of the Work. The effective date on each item shall be the date of acceptance of the work by the Owner.

B. Deliver to the Architect, a minimum of two (2) copies of the manufacturers' operating and maintenance manuals for major items of equipment.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes building wire and cable; nonmetallic-sheathed cable; armored cable; metal clad cable; and wiring connectors and connections.

B. Related Sections:
   1. Section 26 05 00 - Common Work Results for Electrical

1.2 REFERENCES

A. International Electrical Testing Association:
   1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

B. National Fire Protection Association:
   1. NFPA 70 - National Electrical Code.

C. Underwriters Laboratories, Inc.:
   1. UL 83 - Standard for Thermoplastic-Insulated Wires and Cables.
   2. UL 1569 - Standard for Metal-Clad Cables.

1.3 SYSTEM DESCRIPTION

A. Product Requirements: Provide products as follows:
   1. Stranded conductor for feeders and branch circuits 10 AWG and smaller.
   2. Stranded conductors for control circuits.
   3. Conductor not smaller than 12 AWG for power and lighting circuits.
   4. Conductor not smaller than 12 AWG for control circuits.
   5. Increase wire size in branch circuits to limit voltage drop to a maximum of 5 percent.

B. Wiring Methods: Provide the following wiring methods:
   1. Wet or Damp Locations: Use only building wire, Type XHHW insulation, in raceway
   2. Dry Interior Locations: Use only building wire, Type THHN/THWN insulation, in raceway metal clad cable.

1.4 DESIGN REQUIREMENTS

A. Conductor sizes are based on copper.

B. When aluminum conductor is substituted for copper conductor, size to match circuit requirements, terminations, conductor ampacity and voltage drop.

1.5 SUBMITTALS

A. Product Data: Submit for building wire.

B. Test Reports: Indicate procedures and values obtained.

1.6 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of components and circuits.

1.7 QUALITY ASSURANCE

A. Provide wiring materials located in plenums with peak optical density not greater than 0.5, average optical density not greater than 0.15, and flame spread not greater than 1.5 m when tested in accordance with NFPA 262.

B. Perform Work in accordance with GSA Building Standard.

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

1.9 FIELD MEASUREMENTS

A. Verify field measurements are as indicated on Drawings.

1.10 COORDINATION

A. Where wire and cable destination is indicated and routing is not shown, determine routing and lengths required.

B. Wire and cable routing indicated is approximate unless dimensioned.

PART 2 - PRODUCTS

2.1 BUILDING WIRE

A. Product Description: UL 83, single conductor insulated wire.

B. Conductor: Copper.

C. Insulation Voltage Rating: 600 volts.

D. Insulation Temperature Rating: 75 or 90 degrees C.

E. Insulation Material: Thermoplastic, THHN/THWN

2.2 METAL CLAD CABLE

A. Product Description: UL 1569, cable assembly with ground wire and overall metallic sheath.

B. Conductor: Copper.

C. Insulation Voltage Rating: 600 volts.

D. Insulation Temperature Rating: 75 degrees C.

E. Insulation Material: Thermoplastic.

F. Armor Material: Steel.

G. Armor Design: Interlocked metal tape

H. Jacket: Where required.

2.3 WIRING CONNECTORS

A. Split Bolt Connectors:
1. FCI Burndy Corp.
2. Thomas & Betts Co.
3. Cooper Crouse-Hinds.
4. Substitutions: Approved Equal

B. Solderless Pressure Connectors:
1. FCI Burndy Corp.
2. Ideal Industries Co.
3. Thomas & Betts Co.
4. 3M Corp.
5. Substitutions: Approved Equal

C. Spring Wire Connectors:
1. Ideal Industries Co.
2. 3M Corp.
3. Substitutions: Approved Equal

D. Compression Connectors:

1. FCI Burndy Corp.
2. Thomas & Betts Co.
3. 3M Corp.
4. Substitutions: Approved Equal

2.4 TERMINATIONS

A. Terminal Lugs for Wires 6 AWG and Smaller: Solderless, compression type copper.

B. Lugs for Wires 4 AWG and Larger: Color keyed, compression type copper, with insulating sealing collars.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify interior of building has been protected from weather.

B. Verify mechanical work likely to damage wire and cable has been completed.

C. Verify raceway installation is complete and supported.

3.2 PREPARATION

A. Completely and thoroughly swab raceway before installing wire.

3.3 EXISTING WORK

A. Remove exposed abandoned wire and cable, including abandoned wire and cable above accessible ceiling finishes. Patch surfaces where removed cables pass through building finishes.

B. Disconnect abandoned circuits and remove circuit wire and cable. Remove abandoned boxes when wire and cable servicing boxes is abandoned and removed. Install blank cover for abandoned boxes not removed.

C. Provide access to existing wiring connections remaining active and requiring access. Modify installation or install access panel.

D. Extend existing circuits using materials and methods compatible with existing electrical installations, as specified.

E. Clean and repair existing wire and cable remaining.

3.4 INSTALLATION

A. Route wire and cable to meet Project conditions.

B. Neatly train and lace wiring inside boxes, equipment, and panelboards.

C. Identify wire and cable under provisions of Section 26 05 53. Identify each conductor with its circuit number or other designation indicated.

D. Special Techniques – Building Wire in Raceway:
   1. Pull conductors into raceway at same time.
   2. Install building wire 4 AWG and larger with pulling equipment.

E. Special Techniques – Metal Clad Cable:
   1. Protect exposed cable from damage.
   2. Support cables above accessible ceiling, using spring metal clips to support cables from structure or ceiling suspension system. Do not rest cable on ceiling panels.
   3. Use suitable cable fittings and connectors. Provide non-metallic insulator guards on cut ends of cable.

F. Special Techniques – Wiring Connections:
   1. Clean conductor surfaces before installing lugs and connectors.
   2. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
   3. Tape uninsulated conductors and connectors with electrical tape to 150 percent of insulation rating of conductor.
   4. Install split bolt connectors for copper conductor splices and taps, 6 AWG and larger.
   5. Install solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
   6. Install insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.
   7. Terminate aluminum conductors with tin-plated, aluminum-bodied compression connectors only. Fill with anti-oxidant compound before installing conductor.
   8. Install suitable connectors filled with antioxidant compound for connecting existing aluminum conductors to copper conductors.

G. Install stranded conductors for branch circuits 10 AWG and smaller. Install crimp on fork terminals for device terminations. Do not place bare stranded conductors directly under screws.

H. Install terminal lugs on ends of 600 volt wires unless lugs are furnished on connected device, such as circuit breakers.

I. Size lugs in accordance with manufacturer’s recommendations terminating wire sizes. Install 2-hole type lugs to connect wires 4 AWG and larger to copper bus bars.

J. For terminal lugs fastened together such as on motors, transformers, and other apparatus, or when space between studs is small enough that lugs can turn and touch each other, insulate for dielectric strength of 2-½ times normal potential of circuit.

3.5 WIRE COLOR

A. General:
   1. For wire sizes 10 AWG and smaller, install wire colors in accordance with the following:
      a. Black and red for single phase circuits at 120/240 volts.
      b. Black, red, and blue for circuits at 120/208 volts single or three phase.
      c. Brown, orange, and yellow for circuits at 277/480 volts single or three phase.
   2. For wire sizes 8 AWG and larger, identify wire with colored tape at terminals, splices and boxes. Colors are as follows:
      a. Black and red for single phase circuits at 120/240 volts.
      b. Black, red, and blue for circuits at 120/208 volts single or three phase.
      c. Brown, orange, and yellow for circuits at 277/480 volts single or three phase.

B. Neutral Conductors: White. When two or more neutrals are located in one conduit or raceway, individually identify each with proper circuit number(s).

C. Branch Circuit Conductors: Install three or four wire home runs with each phase uniquely color coded.

D. Feeder Circuit Conductors: Uniquely color code each phase.

E. Ground Conductors:
   1. For 6 AWG and smaller: Green.
   2. For 4 AWG and larger: Identify with green tape at both ends and visible points including junction boxes.

3.6 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Perform inspections and tests listed in NETA ATS, Section 7.3.1.

END OF SECTION

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes furnishing and installation of grounding electrodes and conductors; equipment grounding conductors; bonding methods and materials.

B. This section also includes inspection and testing of the Grounding and Bonding System and Ground-Fault Protection Systems.

C. Not all methods and materials specified herein may be required on this project.

1.2 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. The standards referenced herein, except as modified in the Contract Documents, shall have full force and effect as though included in these Specifications. These standards are not furnished to the Contractor since manufacturers and trades involved are assumed to be familiar with these requirements. The Contractor shall obtain copies of reference standards direct from publication sources as needed for proper performance and completion of the work.

1. ASTM B 187 Specifications for Copper Bus, Rod, and Shapes.
2. ASTM A 653 Standard Specifications for Sheet Steel, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by Hot Dip Process
3. IEEE 142 Recommended Practice for Grounding of Industrial and Commercial Power Systems.
4. IEEE 1100 Recommended Practice for Powering and Grounding Electronic Equipment.
5. NECA (National Electrical Contractors Association) – Standard of Installation.
6. NETA ATS Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
7. NFPA 70 National Electrical Code (NEC). Latest edition adopted by the State of California (CEC).
8. UL 467 Electrical Grounding and Bonding Equipment.

1.3 DESIGN REQUIREMENTS

A. Furnish products listed and classified by Underwriters Laboratories, Inc. (UL), Electrical Testing Laboratories, Inc. (ETL), or other recognized, acceptable testing and listing agencies as suitable for purpose specified and shown.

B. Grounding shall be in accordance with the National Electrical Code (NEC). Where size, type, rating and quantities indicated or specified are in excess of NEC requirements, the more stringent requirements and the greater size, rating, and quantity indications govern.

1.4 CONTRACTOR SUBMITTALS

A. Product Data:
   1. Submit product data for grounding electrodes and connections for fastening components

B. Test Report:
   1. Grounding & Bonding: Provide certified test report for Engineer's Review.
   2. Ground-Fault Protection System: Provide certified test report for Engineers Review.

1.5 CLOSEOUT SUBMITTALS

A. Record actual locations of components and grounding electrodes.

B. Submit final one (1) electronic copy on CD-ROM and certified, five (5) bound copies of the Power System Study report.

C. Submit final certified five (5) copies of the test reports of all grounding tests and ground-fault protection systems.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five (5) years' experience.

B. Installer: A firm with at least five (5) years of installation experience on projects with electrical grounding work similar to that required for this project.

1.7 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

B. Field testing shall be performed by a third party testing firm with certification from a recognized testing agency, with a minimum of five (5) years of testing experience.

PART 2 - PRODUCTS

2.1 GROUNDING SYSTEM

A. Except as indicated elsewhere, provide materials for electrical grounding system, including, but not limited to, cables, wires, connectors, terminals (solderless lugs) and exothermic welds, grounding rods and electrodes, bonding jumper and braided straps, and other items and accessories required for a complete installation. Where more than one type of material or equipment meets indicated requirements, selection shall be at Installer's option. Where materials or components are not otherwise indicated, provide products as recommended by the accessories manufacturers and in compliance with the NEC and established industry standards.

B. All grounding materials required shall be furnished new and undamaged in accordance with the requirements of these specifications:

2.2 WIRE

A. Electrical Equipment Grounding Conductor: Insulated, soft-drawn copper, Class B stranding or solid, with green colored polyvinyl chloride insulation per Section 16123. Size per NEC Article 250-122, unless otherwise noted.

2.3 MECHANICAL CONNECTORS

A. Bolt-on bronze connectors, suitable for grounding and bonding applications in configurations required for the particular installation.

B. Manufacturer
1. Burndy Corp.
2. Anderson
3. Thomas & Betts
4. 3-M Co.

2.4 BONDING PLATES, CONNECTIONS, TERMINALS AND CLAMPS

A. Provide electrical bonding plates, connectors, terminals and clamps, and accessories as recommended by the manufacturer for the specific applications. Components shall be high-strength, high-conductivity copper alloy.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that abandoned wiring and equipment serve only abandoned facilities.

3.2 EXISTING WORK

A. Modify existing grounding system to maintain continuity to accommodate renovations.

B. Extend existing grounding system using materials and methods as specified.

C. Install temporary wiring and connections to maintain existing grounding systems in service during construction.

D. Perform work on energized equipment or circuits with experienced and trained personnel following all safety rules and procedures.

E. Remove, relocate, and extend existing installations to accommodate new construction.

F. Repair adjacent construction and finishes that are damaged during demolition and extension work.

G. Remove exposed and/or abandoned grounding and bonding components, fasteners, supports and electrical identification labels. Cut embedded support elements below surface of walls and floors. Patch surfaces damaged by removal of existing components to match surrounding finishes.

3.3 GROUNDING AND BONDING INSTALLATION:

A. Verify that final backfill and compaction has been completed before driving rod electrodes.

B. Install grounding well with cover at rod locations as indicated on Drawings. Install well top flush with finished grade.

C. Installation:
1. Remove paint, rust, mill-oils, and surface contaminants at connection points.
2. Install grounding electrode conductor and connect to reinforcing steel in slab or foundation.
3. Bond together metal siding not attached to grounded structure; bond to ground.
4. Bond together reinforcing steel and metal accessories.
5. Connect to site grounding system.
6. Install continuous grounding using underground cold water system and building steel as grounding electrode. Where water piping is not available, provide an artificial station ground by means of driven rods or buried electrodes.
7. Permanently ground entire light and power system in accordance with NEC, including service equipment, distribution panels, lighting panel boards, switch and starter enclosures, motor frames, grounding type receptacles, and other exposed non-current carrying metal parts of electrical equipment.
8. Install branch circuits feeding isolated ground receptacles with separate insulated grounding conductor, connected only at isolated ground receptacle, ground terminals, and at ground bus of serving panel in accordance with IEEE 1100.
9. Accomplish grounding of electrical system by installing insulated grounding conductor with each feeder and branch circuit conductor in conduit. Install separate insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing. Size grounding conductor in accordance with the NEC.
10. Install grounding conductor from ground bus of serving panel to ground bus of served panel, grounding screw of receptacles, lighting fixture housing, light switch outlet boxes, and metal enclosures of service equipment.
11. Bond all metallic conduits to grounding bus at service panel by means of grounding bushings using minimum No. 12 AWG conductor.
12. Ground electrical system using continuous metal raceway system enclosing circuit conductors in accordance with NEC. Bond together each metallic raceway, pipe, duct and other metal object entering enclosures and exiting slabs.
13. Permanently bond all equipment, grounding conductors, lightning protection system and grounding system prior to energizing equipment.

3.4 GROUND CONDUCTORS

A. Grounding conductors shall be located and connected as indicated on drawings or as required by Code.

B. Ground conductors under buildings or structures shall be buried with at least 6 inches of earth cover. Buried grounding conductors extending beyond the foundations of buildings or structures shall have at least 18 inches of earth cover.

C. Exposed conductors shall be installed inconspicuously in vertical or horizontal positions on supporting structures. When located on irregular supporting surfaces or equipment, the conductors shall run parallel to or normal to dominant surfaces.

D. Conductors routed over concrete, steel, or equipment surfaces shall be kept in close contact with those surfaces by using fasteners located at intervals not to exceed 3 feet.

E. Conductors passing through floor slabs shall be installed in conduit sleeves that extend above the floor slab, a minimum of 1-½ inches to provide protection. Sleeves shall be sealed to maintain fireproof integrity.

F. Provide a separate equipment-grounding conductor for low voltage distribution systems, single or three phase feeder circuit and each branch circuit with single or three phase protective devices. Install a grounding conductor in conduit with phase and neutral conductors. Single-phase branch circuits for 120 and 277 volt lighting, receptacles, and motors shall have a phase, neutral, and ground conductors installed in the common conduit. Provide suitable bonding jumpers and approved grounding type bushings for flexible conduits used for equipment connection utilized in conjunction with the above branch circuits. Single-phase circuits for equipment and all branch circuits installed in non-metallic or flexible conduits shall be provided with a separate grounding conductor.

3.5 CONNECTIONS

A. All connections shall be made by the exothermic welding process, except where otherwise indicated. The manufacturer's instructions on the use of exothermic welding materials shall be followed in all details. Powder and molds shall be kept dry and warm until use. Worn or damaged molds shall not be used.

B. All surfaces to be joined by the welds shall be thoroughly cleaned. Paint, scale, and other deleterious substances shall be removed from surfaces of ungalvanized structural steel members by grinding. Galvanized steel surfaces shall be cleaned with emery paper.

C. All exothermic welded connections shall successfully resist moderate hammer blows. Any connection which fails such test or which, upon inspection, indicates a porous or deformed weld, shall be remade.

D. All exothermic welds shall encompass 100 percent of the ends of the materials being welded. Welds, which do not meet this requirement, shall be remade.

E. Worn, damaged, incorrectly sized, or improperly shaped molds which, in the opinion of the Engineer, do not make satisfactory welds, shall be removed from the jobsite after being physically rendered inoperable.

F. All contact surfaces of bolted and screwed connections shall be thoroughly cleaned and coated with oxide inhibitor before being securely tightened.

3.6 CONDUIT GROUNDING

A. All grounding bushings within all enclosures, including equipment enclosures, shall be wired together and connected internally to the enclosure grounding lug or grounding bus with a bare copper conductor. Grounding bushings shall be grounded with conductors sized in accordance with NEC, but not smaller than No. 8 AWG.

3.7 EQUIPMENT GROUNDING

A. Comply with NEC Article 250, except where larger sizes or more conductors are indicated.
   1. All electrical equipment shall be connected to the grounding system with an insulated, green, stranded or solid copper equipment-grounding conductor.
   2. Terminate each end on suitable lug, bus, or bushing. The term "electrical equipment", as used in this article, shall include, but not be limited to, all enclosures containing electrical connections or bare conductors, except that individual devices, such as solenoids, pressure switches, and limit switches, shall be exempt from this requirement, unless the device requires grounding for proper operation.
   3. Large equipment, such as metal-clad or metal-enclosed switchgear, will be furnished with a grounding bus that shall be connected to the grounding system.
   4. Most other equipment will be furnished with grounding pads and/or grounding lugs which shall be connected to the grounding system. All ground connection surfaces shall be cleaned immediately prior to connection.
   5. Contractor shall furnish all grounding material required, if not furnished with the equipment.

B. Install equipment grounding system such that all metallic structures, enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, portable equipment and other conductive items in close proximity with electrical circuits will operate continuously at ground potential and provide a low impedance path for possible ground fault currents.

C. Where grounding system extension stingers are indicated on the drawings to be provided for connection to electrical equipment, the Contractor shall connect the bare grounding conductor to the equipment ground bus, pad, or lug. Except where otherwise indicated on the drawings, all equipment ground conductors that are not an integral part of a cable assembly, shall be sized in accordance with the requirements of NEC. All ground conductors installed in conduit shall be insulated.

D. Suitable grounding facilities, acceptable to the Engineer, shall be furnished on electrical equipment not so equipped. The grounding facilities shall consist of compression type terminal connectors bolted to the equipment frame or enclosure and providing a minimum of joint resistance.

E. The conduit system is not considered to be a grounding conductor, except for lighting fixtures. No grounding conductor shall be smaller in size than No. 12 AWG, unless it is a part of an acceptable cable assembly.

3.8 GROUND SYSTEM RESISTANCE

A. Ground resistance of the system shall be no greater than five (5) ohms.

3.9 ACCEPTANCE TESTING

A. Grounding and Bonding: Perform inspections and tests as outlined in NETA ATS, Section 7.13 – Grounding Systems.

END OF SECTION

SECTION 260533 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes conduit and tubing, surface raceways, wireways, outlet boxes, pull and junction boxes, and handholes.

B. Related Sections:
   1. Section 26 05 00 – Common Work Results for Electrical
   2. Section 26 05 53 – Identification for Electrical Systems.

1.2 REFERENCES

A. American National Standards Institute:

B. ANSI C80.3 - Specification for Electrical Metallic Tubing, Zinc Coated.

C. National Electrical Manufacturers Association:

D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

E. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.

F. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.

1.3 SYSTEM DESCRIPTION

A. Raceway and boxes located as indicated on Drawings, and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Raceway and boxes are shown in approximate locations unless dimensioned. Provide raceway to complete wiring system.

B. Wet and Damp Locations: Provide rigid steel conduit, intermediate metal conduit. Provide cast metal outlet, junction, and pull boxes. Provide flush mounting outlet box in finished areas.

C. Concealed Dry Locations: Provide rigid steel conduit, intermediate metal conduit and electrical metallic tubing. Provide sheet-metal boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pull boxes.

D. Exposed Dry Locations: Provide rigid steel conduit, intermediate metal conduit and electrical metallic tubing. Provide sheet-metal boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pull boxes.

E. Select materials, sizes, and types of anchors, fasteners, and supports to carry loads of equipment and raceway, including weight of wire and cable in raceway. Anchor and fasten electrical products to building elements and finishes as follows:
   1. Concrete Structural Elements: Expansion anchors.
   2. Steel Structural Elements: Beam clamps[, spring steel clips and welded fasteners.
   3. Concrete Surfaces: and expansion anchors.
   4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Toggle bolts and hollow wall fasteners.
   5. Solid Masonry Walls: Expansion anchors.
   6. Sheet Metal: Sheet metal screws.
   7. Wood Elements: Wood screws.

1.4 DESIGN REQUIREMENTS

A. Minimum Raceway Size: ¾ inch trade size, unless otherwise specified.

1.5 SUBMITTALS

A. Product Data: Submit for the following:
   1. Flexible metal conduit.
   2. Liquidtight flexible metal conduit.
   3. Metallic conduit
   4. Raceway fittings.
   5. Conduit bodies.
   6. Pull and junction boxes.

B. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.6 CLOSEOUT SUBMITTALS

A. Project Record Documents:
   1. Record actual routing of conduits larger than 2 inch.
   2. Record actual locations and mounting heights of outlet, pull, and junction boxes.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

1.8 COORDINATION

A. Coordinate installation of outlet boxes for audio/visual equipment with audio/visual equipment supplier.

B. Coordinate mounting heights, orientation and locations of outlets mounted above counters, benches, and backsplashes.

PART 2 - PRODUCTS

2.1 FLEXIBLE METAL CONDUIT

A. Product Description: Interlocked steel construction.

B. Fittings: NEMA FB 1, all steel fittings.

2.2 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

A. Product Description: Interlocked steel construction with PVC jacket.

B. Fittings: NEMA FB 1, material to match conduit.

2.3 ELECTRICAL METALLIC TUBING (EMT)

A. Product Description: ANSI C80.3; galvanized tubing.

B. Fittings and Conduit Bodies: NEMA FB 1; steel set screw type. Malleable iron fittings and conduit bodies shall not be used.

2.4 SURFACE METAL RACEWAY

A. Product Description: Sheet metal channel with fitted cover, suitable for use as surface metal raceway.

B. Wiremold product as specified on drawings. No other manufacturer or model will be acceptable to retain compatibility with other installed equipment

C. Finish: Gray enamel.

D. Fittings, Boxes, and Extension Rings: Furnish manufacturer's standard accessories; match finish on raceway.

2.5 OUTLET BOXES

A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.

B. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; furnish 13 mm male fixture studs where required.

C. Wall Plates for Finished Areas: As specified in Section 26 09 23.

D. Wall Plates for Unfinished Areas: Furnish gasketed cover.

2.6 PULL AND JUNCTION BOXES

A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.

2.7 CABINETS AND ENCLOSURES

A. Hinged Cover Enclosures: NEMA 250, steel enclosure with continuous hinge cover and flush latch. Finish inside and out with manufacturer's standard enamel.

B. Cabinets: NEMA 250, Type 12, unless otherwise noted. Galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel. Where door gasketing is required, provide neoprene gasket attached with oil-resistant adhesive and held in place with steel retaining straps. Hinged door in front cover with flush latch and concealed hinge. Key to match panelboards. Include metal barriers to separate wiring of different systems and voltage and include accessory feet where required for freestanding equipment.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive raceways, boxes, enclosures and cabinets for compliance with installation tolerances and other conditions affecting the performance of the raceway system. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Verify outlet locations and routing and termination locations of raceway prior to rough-in.

3.2 EXISTING WORK

A. Remove exposed abandoned raceway, including abandoned raceway above accessible ceiling finishes. Cut raceway flush with walls and floors, and patch surfaces.

B. Remove abandoned raceway to its source, including abandoned raceway above ceiling and in all other concealed locations.

C. Disconnect abandoned outlets and remove devices. Remove abandoned outlets when raceway is abandoned and removed. Install blank cover for abandoned outlets not removed.

D. Maintain access to existing boxes and other installations remaining active and requiring access. Modify installation or provide access panel.

E. Extend existing raceway and box installations using materials and methods compatible with existing electrical installations, as specified.

F. Clean and repair existing raceway and boxes to remain.

G. Repair adjacent construction and finishes damaged during demolition and extension work.

3.3 INSTALLATION

A. Install raceway, boxes, enclosures and cabinets according to manufacturer's instructions.

B. Ground and bond raceway and boxes in accordance with Section 26 05 26.

C. Fasten raceway and box supports to primary or secondary structure and finishes only.

D. Identify raceway and boxes in accordance with Section 26 05 53.

E. All raceway shall be marked at both ends.

F. There shall be no unmarked conduit any place in the system.

G. Marking made on conduits shall correspond to submittals, written documentation and "as built" drawings.

H. Arrange raceway and boxes to maintain headroom and present neat appearance.

I. Wherever wall, ceilings, floors or other building finishes are cut for installation or accidentally marred during installation, repair, restore and refinish to original appearance.

3.4 INSTALLATION - GENERAL

A. Fabricate supports from structural steel or formed steel members.

B. Install sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

3.5 INSTALLATION - RACEWAY

A. Raceway routing is shown in approximate locations unless dimensioned. Route to complete wiring system. Conduit shall be concealed within finished walls. Ceilings and floors, except in equipment rooms, unfinished storage spaces and where otherwise indicated.

B. Arrange raceway supports to prevent misalignment during wiring installation.

C. Support raceway using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.

D. Group related raceway; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional raceways.

E. Do not support raceway with wire or perforated pipe straps. Remove wire used for temporary supports

F. Do not attach raceway to other piping systems.

G. Construct wireway supports from steel channel.

H. Route exposed raceway parallel and perpendicular to walls and building lines. Where possible, install raceway above water and steam piping systems.

I. Route raceway installed above accessible ceilings parallel and perpendicular to walls and building lines.

J. Maintain clearance between raceway and piping for maintenance purposes.

K. Maintain 12-inches of clearance between raceway and surfaces with temperatures exceeding 104 degrees F (40 degrees C), including flues and steam or hot water pipes.

L. Cut conduit square using saw or pipe cutter; de-burr cut ends.

M. Bring conduit to shoulder of fittings; fasten securely.

N. Install conduit hubs to fasten conduit to cast boxes in damp and wet locations.

O. Install no more than equivalent of three 90 degree bends between boxes. Install conduit bodies to make sharp changes in direction, as around beams. Install factory elbows for bends in conduit larger than 2-inch trade size.

P. Make bends and offsets so that the internal diameter of the conduit is not reduced. Bends and offsets shall be made without flattening, kinking, rippling or destroying the smooth internal bore or surface of the conduit, and to not less than NEC minimum radius. Conduit that shows signs of rippling of kinking shall not be installed.

Q. Avoid moisture traps; install junction box with drain fitting at low points in conduit system.

R. Install fittings to accommodate expansion and deflection where raceway crosses seismic, control and expansion joints.

S. Use fittings compatible with the raceway and suitable for the use and location.

T. Install pull string in each empty raceway except sleeves and nipples. Use #14 AWG zinc-coated steel or monofilament plastic line having not less than 90-kg tensile strength. Leave minimum 24-inches of slack at each end of the pull string.

U. Install suitable caps to protect installed conduit against entrance of dirt and moisture. Conduit in which water of foreign matter has been permitted to accumulate shall be thoroughly cleaned. If such accumulation cannot be removed by methods approved by Architect, replace affected conduit.

V. Surface Raceway: Install flat-head screws, clips, and straps to fasten raceway channel to surfaces; mount plumb and level. Install insulating bushings and inserts at connections to outlets and corner fittings.

W. Close ends and unused openings in wireway.

X. Use a maximum of 6-feet of flexible conduit for equipment subject to vibration, noise transmission or movement. Use liquidtight flexible conduit in wet or damp locations. Install separate ground conductor across flexible connections.

3.6 INSTALLATION - BOXES

A. Sizes shall be adequate to meet NEC volume requirements, but in no case smaller than 4-inches X 4-inches X 1-½ inches unless specifically indicated. Provide suitable plaster rings to match finish materials to set flush with finished surface. In masonry wall where a tile or plaster ring cannot be used, install single-gang 2-½ inch deep box, minimum.

B. Install wall mounted boxes at elevations to accommodate mounting heights as indicated on Drawings.

C. Adjust box location up to12-inches prior to rough-in to accommodate intended purpose.

D. Orient boxes to accommodate wiring devices oriented as specified in Section 26 09 23.

E. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

F. In Accessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.

G. Locate flush mounting box in masonry wall to require cutting of one masonry unit only. Coordinate masonry cutting to achieve neat opening.

H. Do not install flush mounting box back-to-back in walls; install with minimum 12-inches separation. Install with minimum 24-inches separation in acoustic rated walls.

I. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.

J. Install stamped steel bridges to fasten flush mounting outlet box between studs.

K. Install flush mounting box without damaging wall insulation or reducing its effectiveness.

L. Install adjustable steel channel fasteners for hung ceiling outlet box.

M. Do not fasten boxes to other piping systems.

N. Support boxes independently of conduit.

O. Install gang box where more than one device is mounted together. Do not use sectional box.

P. Install gang box with plaster ring for single device outlets.

Q. Set floor boxes level and adjust to floor surface.

R. Boxes mounted in desks or furniture cabinets or in glazed tile, concrete block, marble, brick, stone or wood walls, use rectangular shaped boxes with square corners and straight sides. Install such boxes without plaster rings. Saw cut all recesses for outlet boxes in exposed masonry walls.

3.7 INSTALLATION – CABINETS

A. Remove any sharp edges where they may come into contact with wiring or personnel.

B. Set hinged enclosures and cabinets plumb. Support each corner.

C. Mount with the long axis vertical or as indicated. Dimensions are to the center of enclosure mounted on walls. Locate so that enclosures do not span different types of building finishes either vertically or horizontally.

D. Support speaker enclosures from structure or ceiling suspension system. Loosely but completely fill speaker boxes with fiberglass.

3.8 INTERFACE WITH OTHER PRODUCTS

A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods.

B. Locate outlet boxes to allow luminaires positioned as indicated on reflected ceiling plan.

C. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

D. ADJUSTING

E. Adjust flush-mounting outlets to make front flush with finished wall material.

F. Install knockout closures in unused openings in boxes.

3.9 CLEANING

A. Clean interior of boxes to remove dust, debris, and other material.

B. Clean exposed surfaces and restore finish.

END OF SECTION

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. The extent of the electrical systems and equipment requiring identification is shown on the drawings, and the extent of identification required is specified herein and in individual sections of work requiring identification. The types of electrical identification specified in this section include the following:
   1. Exposed conduit color banding.
   2. Buried cable warnings.
   3. Cable/conductor identification.
   4. Operational instructions and warnings.
   5. Danger signs.
   6. Equipment/system identification signs.

B. REFERENCES - CODES AND STANDARDS

C. The standards referenced herein, except as modified in the Contract Documents, shall have full force and effect as though included in these Specifications. These standards are not furnished to the Contractor since manufacturers and trades involved are assumed to be familiar with these requirements. The Contractor shall obtain copies of reference standards direct from publication sources as needed for proper performance and completion of the work.
   1. ANSI Z535.1 Safety Color Code
   2. APWA ULCC Uniform Color Code for Buried Utilities.
   3. NFPA 70 National Electrical Code (NEC). Latest approved edition.

1.2 SYSTEM DESCRIPTION

A. Label the following electrical equipment with nameplates which clearly identify each item, the function or use of the item, and the circuit identification of the feed to the item:
   1. All transformers shall be identified by 1-inch high block letters cut in stencil and applied with yellow paint on a flat-black background. The transformer number, primary and secondary voltages, and the kVA shall be shown.
   2. All Metal-Clad Switchgear, Metal-Enclosed Switchgear, Switchboards, Distribution Panelboards, Power and Lighting Panels, Motor Control Centers, Local Control Panels, Terminal Cabinets and all electrical equipment enclosure shall be identified using laminated plastic nameplates. The equipment number, voltage rating, current rating, number of phases, connection type, short circuit interrupting rating, and circuit number shall be shown
   3. Identify all receptacles and lighting switches, by the circuit number shown on the drawings using ¼-inch high white characters on ½-inch wide black stick-on tape placed on the wall directly above the device if the device is wall mounted. Place the tape on the device enclosure if the device is not wall mounted.
   4. All motors, starters, disconnect switches, Time Switches, Special Function Pushbuttons and Switches, and miscellaneous control devices shall be identified by function and

circuit number, with ¼-inch high white characters on a ½-inch wide black stick-on tape where installed indoors and engraved plastic nameplates where installed outdoors.

5. All underground raceway or cable shall be marked with buried warning tape along its entire length.
6. All exposed raceway longer than 10 feet in length shall be identified.
7. Panelboard Directories: Furnish all panelboards with a complete 8-1/2-inch by 11-inch typewritten directory mounted in the inner door under a clear plastic cover set in a metal frame.

B. Branch circuits and devices:
1. Label all individual receptacle outlets at the outlet faceplate to indicate the panelboard of origin and branch circuit number. Label modular furniture feeds at the power pole drop in a visible and consistent location. Labels shall be self adhesive, thermal machine printed type such as Brothers, Panduit, or T&B and shall be clear plastic with black lettering.
2. All branch circuits in outlet boxes shall be identified with circuit number using wrap-around labels (T&B, BRADY or 3M).
3. As an alternative to separate nameplates, device plates may be engraved directly with lettering filled with black enamel.

1.3 SUBMITTALS

A. Catalog data for nameplates, labels, and markers.

B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under regulatory requirements. Include instructions for storage, handling, protection, examination, preparation and installation of Product.

1.4 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70 – National Electrical Code.

B. Furnish products listed and classified by Underwriters' Laboratories, Inc. (UL), Electrical Testing Laboratories, Inc. (ETL), or other recognized, approved testing and listing agencies as suitable for the purpose specified and shown.

PART 2 - PRODUCTS

2.1 NAMEPLATES AND LABELS

A. Nameplates
1. Engraved three-layer laminated plastic, white letters on black background for normal power and white letters on red background for emergency power. Communications and control cabinets shall be labeled with white letters on green background.
2. Locations
   a. Each electrical distribution and control equipment enclosure.
   b. Communication cabinets.

c. Motor control centers, including each combination module.

3. Letter Size
   a. Use 1/8-inch letters for identifying individual equipment and loads.
   b. Use ¼-inch letters for identifying grouped equipment, loads, panelboards, and transfer switch.
   c. Use ½-inch letters for identifying the main switchboard, motor control centers, and large distribution switchboards.

B. Labels
1. Printed adhesive tape, with 3/16-inch letters on clear background. Black text for normal power and red text for emergency power. Use only for identification of individual wall switches and receptacles, control device stations, and multi-outlet devices.
2. Thickness
   a. 1/16-inch for units up to 20 square inches or 8-inch length.
   b. 1/8-inch for larger units.

2.2 WIRE MARKERS

A. Manufacturers
1. Brady
2. Thomas & Betts
3. 3-M Co.

B. Description: Cloth, tape, split sleeve, or tubing type wire markers, self-adhesive.

C. Locations: Each conductor at panelboard gutters, pull boxes, outlet and junction boxes, control panels, motor controllers and starters, and each load connection.

D. Legend
1. Power and Lighting Circuits: Branch circuit or feeder number indicated on contract drawings.
2. Control Circuits: Control wire number indicated on shop drawings.
3. Neutral Conductors: Clearly indicate the branch circuit or feeder number the neutral serves. In multi-wire circuits where the neutral is shared, mark the neutral with the circuit number of the "A" phase.

2.3 CONDUIT MARKERS

A. Provide manufacturer's standard preprinted, flexible or semi-rigid, permanent, plastic-sheet conduit markers, minimum of 3 mils thick and 1-1/2-inch wide extending 360 degrees around conduits; designed for self-adhesive attachment to conduit. Except as otherwise indicated, provide lettering that indicates the voltage of the conductor(s) in the conduit. Provide 8-inch minimum length for 2-inch and smaller conduit, 12-inch minimum length for larger conduit.

B. Identify conduits containing conductors above 600-volts with the following alternating markers
1. DANGER - HIGH VOLTAGE
2. The voltage, as applicable (i.e. – 12-kV, 4.16-kV, 480-Volts, 240-Volts, etc.)

C. Location: Furnish markers for each conduit longer than 10 feet.

D. Spacing: 20 feet on center.

E. Color: Conduit shall be painted in accordance with Section 26 05 33 Raceways and Boxes.

2.4 FASTENERS

A. Secure all labels and nameplates with self-tapping stainless steel screws. Use contact type permanent adhesive where screws cannot or should not penetrate the substrate.

2.5 BAKED ENAMEL DANGER SIGNS

A. Provide manufacturer's standard "DANGER" signs of baked enamel finish on 20 gage steel; of standard red, black and white graphics; 14-inch by 10-inch size except where 10-inch by 7-inch is the largest size which can be applied where needed, and except where larger size is needed for adequate vision; with recognized standard explanation wording (e.g. HIGH VOLTAGE, KEEP AWAY, BURIED CABLE, DO NOT TOUCH SWITCH).
   1. At each entry doors of Electrical Rooms: “DANGER HIGH VOLTAGE – KEEP OUT, AUTHORIZED PERSONNEL ONLY”

2.6 LETTERING AND GRAPHICS

A. Coordinate names, abbreviations and other designations used in the electrical identification work, with the corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording as indicated or, if not otherwise indicated, as recommended by manufacturers or as required for proper identification and operation/maintenance of the electrical systems and equipment.

PART 3 - EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive nameplates and labels.

B. Coordination: Where identification is to be applied to surfaces that require finish, install identification after completion of painting.

C. Regulations: Comply with governing regulations and the requests of governing authorities for the identification of electrical work.

3.2 APPLICATION

A. Install nameplate and label parallel to equipment lines.

B. Secure nameplate to equipment front using screws, rivets, or adhesive.

C. Secure nameplate to outside moveable surface of door on panelboard.

D. Conduit Identification:
   1. Where electrical conduit is exposed in spaces with exposed mechanical piping, which is identified by a color-coded method, apply color-coded identification on the electrical conduit in a manner similar to the piping identification. Except as otherwise indicated, use orange as the coded color for conduit.
   2. Paint red band or provide red tape on each fire alarm conduit longer than 10 feet, minimum 20 feet on center.

E. Cable/Conductor Identification:
   1. Apply cable/conductor identification on each cable and conductor in each box/enclosure/cabinet where the wires of more than one circuit or communication/signal system are present, except where another form of identification (such as color-coded conductors) is provided.
   2. Match identification with marking system used in panelboards, shop drawings, contract documents, and similar previously established identification for project electrical work.

F. Operational Identification and Warnings
   1. Wherever reasonably required to ensure safe and efficient operation and maintenance of the electrical systems, and electrically connected mechanical systems and general systems and equipment, including the prevention of misuse of electrical facilities by unauthorized personnel, install self-adhesive plastic signs or similar equivalent identification, instruction or warnings on switches, outlets and other controls, devices and covers of electrical enclosures. Where detailed instructions or explanations are needed, provide plasticized tags with clearly written messages adequate for the intended purposes.

G. Danger Signs
   1. In addition to the installation of danger signs required by governing regulations and authorities, install appropriate danger signs at the locations indicated and at locations subsequently identified by the Installer of electrical work as constituting similar dangers for persons in or about the project.
   2. High Voltage
      a. Install danger signs wherever it is possible, under any circumstances, for persons to come into contact with electrical power of voltages higher than 110-120 volts.
      b. Critical Switches/Controls
      c. Install danger signs on switches and similar controls, regardless of whether concealed or locked up, where untimely or inadvertent operation (by anyone) could result in significant danger to persons, or damage to or loss of property.

H. Equipment/System Identification Signs
   1. Install an engraved plastic-laminate sign on each major unit of electrical equipment in the building; including the central or master unit of each electrical system and the communication/signal systems, unless the unit is specified with its own self-explanatory identification or signal system.
   2. Except as otherwise indicated or specified, provide single line of test, ½-inch high lettering on 1-1/2-inch high sign (2-inch high where two lines are required), white lettering in black field.
   3. Provide text matching terminology and numbering of the contract documents and shop drawings.
   4. Provide signs for each unit of the following categories of electrical work
      a. Major electrical switchboard
      b. Electrical substation

c. Motor control center
d. Fire alarm control panel and annunciators.

I. Install signs at locations indicated or, where not otherwise indicated, at location for best convenience of viewing without interference with operation and maintenance of equipment. Secure to substrata with fasteners, except use adhesive where fasteners should not or cannot penetrate the substrata.

END OF SECTION

SECTION 260923 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Intelligent lighting controls and control devices, occupancy sensors, daylight sensors, and relay power packs.

B. Related Sections:
   1. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.
   2. Section 26 05 33 - Raceway and Boxes for Electrical Systems.
   3. Section 26 05 53 - Identification for Electrical Systems.
   4. Section 26 27 26 - Wiring Devices.

1.2 SYSTEM DESCRIPTION

A. Intelligent lighting controls using self-powered automatic and manual lighting control devices.

B. The intelligent lighting control system design is based on the Wattstopper lighting controls. Specific model numbers are presented to provide a basis for functionality required from the lighting control system only and are not intended to limit the selection of lighting control products.

C. Devices and controls manufactured by other lighting control manufacturers will be accepted providing that equivalent functionality of the specified system are retained and duplicated.

D. Because of the differing architecture of various intelligent lighting control systems, any substitution of controls or equipment shall be submitted with a complete lighting control system design.

1.3 SUBMITTALS

A. Shop Drawings: Drawings of lighting control system components and accessories. Include typical wiring diagrams for each component.

B. Product Data: Submit manufacturer’s standard product data for each system component.

C. Manufacturer's Installation Instructions: Submit for each system component.

1.4 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record the following information:
   1. Actual locations of components and record circuiting and switching arrangements.

2. Wiring diagrams reflecting field installed conditions with identified and numbered, system components and devices.

B. Operation and Maintenance Data:
1. Submit replacement parts numbers.
2. Submit manufacturer's published installation instructions and operating instructions.
3. Recommended renewal parts list.

1.5 QUALITY ASSURANCE

A. Maintain one copy of each document on site.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

1.7 PRE-INSTALLATION MEETINGS

A. Convene minimum one week prior to commencing work of this section.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Accept components on site in manufacturer's packaging. Inspect for damage.

B. Protect components by storing in manufacturer's packaging indoors, protected from weather.

PART 2 - PRODUCTS

2.1 INTELLIGENT POWER PACK

A. Manufacturer: Wattstopper LC-100, V2.

B. Description: Intelligent ceiling-mounted power pack with two isolated relays, capable of controlling lighting system and fans. Power pack shall provide separate and independent inputs for an occupancy sensor and photocell.

2.2 OCCUPANCY SENSOR

A. Manufacturer: Wattstopper DT-300 Series

B. Description: Dual technology, ceiling mounted occupancy sensor. Ultrasonic combined with passive infrared sensing. Powered directly from intelligent power pack.

2.3 DAYLIGHT SENSOR

A. Manufacturer: Wattstopper LS-102

B. Description: Ceiling mountable daylight sensor with multi-band receiver. Adjustable on, off, and time delay settings. Powered directly from intelligent power pack.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Mount occupancy sensors and daylight as indicated on Drawings.

B. Install wiring in accordance with Section 26 05 19.

C. Use only properly color coded, stranded wire. Install wire sizes as indicated on Drawings. Install wire in conduit in accordance with Section 26 05 33.

D. Mount power pack as indicated on Drawings. Wire relays in pack to control power to each load. Install relays to be accessible.

E. Identify power wiring with circuit breaker number controlling load. When multiple circuit breaker panels are feeding into relay panel, label wires to indicate originating panel designation.

F. Label each low voltage wire with relay number at each switch or sensor.

G. Connect wiring device grounding terminal to outlet box with bonding jumper and branch circuit equipment grounding conductor.

3.2 MANUFACTURER'S FIELD SERVICES

A. Furnish services for minimum of one day for check, test, and start-up. Perform the following services:
1. Check installation of components.
2. Test operation of controlled devices.
3. Repair or replace defective components.

3.3 ADJUSTING

A. Test each system component after installation to verify proper operation.

B. Adjust occupancy and daylight sensors

C. Test relays and switches after installation to confirm proper operation.

3.4 DEMONSTRATION

A. Demonstrate operation of the following system components:
   1. Operation of each type of occupancy sensor.
   2. Operation of each type of daylight sensor.

END OF SECTION

SECTION 262416 - PANELBOARDS

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. Lighting and appliance branch-circuit panelboards.

1.3 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Panelboards shall withstand the effects of earthquake motions and be certified to meet the requirements of California Building Code Zone 4.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of panelboard, switching and overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

   1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
   2. Detail enclosure types and details for types other than NEMA 250, Type 1.
   3. Detail bus configuration, current, and voltage ratings.
   4. Short-circuit current rating of panelboards and overcurrent protective devices.
   5. Include evidence of NRTL listing for series rating of installed devices.
   6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
   7. Include wiring diagrams for power, signal, and control wiring.
   8. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards. Submit on translucent log-log graft paper; include selectable ranges for each type of overcurrent protective device.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Seismic Qualification Certificates: Submit certification that panelboards, overcurrent protective devices, accessories, and components meet the requirements of California Building Code Zone 4. Include the following:

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Field Quality-Control Reports:

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

D. Panelboard Schedules: For installation in panelboards

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

1.7 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA or an NRTL.

1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

B. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.

C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

D. 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.

E. Comply with NEMA PB 1.

F. Comply with NFPA 70.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Remove loose packing and flammable materials from inside panelboards.

B. Handle and prepare panelboards for installation according to NEMA PB 1.

1.9 COORDINATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

A. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces.

B. Enclosures: Flush-mounted cabinets.

1. Rated for environmental conditions at installed location.

a. Indoor Dry and Clean Locations: NEMA 250, Type 1.

2. Front: Secured to box with concealed trim clamps. For flush-mounted fronts, overlap box.
3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
4. Finishes:

a. Panels and Trim: Steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
b. Back Boxes: Galvanized steel.

5. Directory Card: Inside panelboard door, mounted in transparent card holder.

C. Incoming Mains Location: Top.

D. Phase, Neutral, and Ground Buses:

1. Material: Tin-plated aluminum.
2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.

E. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Tin-plated aluminum.
2. Main and Neutral Lugs: Mechanical type.

F. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.2 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

B. Mains: Circuit breaker.

C. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

D. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

E. Column-Type Panelboards: Narrow gutter extension, with cover, to overhead junction box equipped with ground and neutral terminal buses.

2.3 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.

B. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

C. Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.
2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.

B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.

C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install panelboards and accessories according to NEMA PB 1.1.

B. Mount top of trim 72 inches above finished floor unless otherwise indicated.

C. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

D. Install overcurrent protective devices and controllers not already factory installed.

E. Install filler plates in unused spaces.

F. Comply with NECA 1.

3.3 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Division 26 Section "Identification for Electrical Systems."

B. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

D. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
3. Perform the following infrared scan tests and inspections and prepare reports:

    a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each panelboard. Remove front panels so joints and connections are accessible to portable scanner.

b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each panelboard 11 months after date of Substantial Completion.

c. Instruments and Equipment:

1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

E. Panelboards will be considered defective if they do not pass tests and inspections.

F. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

A. Adjust moving parts and operable component to function smoothly, and lubricate as recommended by manufacturer.

END OF SECTION 262416

SECTION 26 27 26

WIRING DEVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Wiring devices are defined as single discrete units of electrical distribution systems that are intended to carry but not utilize electric energy. The types of general purpose wiring devices required for the project include, but are not limited to the following line voltage devices:
   1. Connectors
   2. Plugs
   3. Receptacles
   4. Switches
   5. Wall plates

1.2 RELATED SECTIONS

A. Section 26 05 53 – Electrical Equipment Identification

1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. IEC 529 Degrees of Protection provided by Enclosures.

B. NEMA WD 1 General Purpose Wiring Devices

C. NEMA WD 6 Wiring Device Configurations.

1.4 CONTRACTOR SUBMITTALS

A. Product Information:
   1. Catalog cut of each device showing Manufacturer name, catalog number, voltage and current rating and dimensions.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five (5) years experience.

B. Installer: A firm with at least five (5) years of successful installation experience on projects with electrical installation work similar to that required for the project.

1.6 REGULATORY REQUIREMENTS

A. Furnish products listed and classified by Underwriters Laboratories, Inc. (UL), Electrical Testing Laboratories, Inc. (ETL), or other recognized, acceptable testing and listing agencies as suitable for the purpose specified and shown.

PART 2 PRODUCTS

2.1 GENERAL

A. Provide factory fabricated wiring devices in the type, color, electrical rating for service indicated, and/or as shown on the drawings.

2.2 MANUFACTURERS

A. Provide products produced by one of the following for each type of wiring device, or acceptable alternate:
1. Appleton
2. Arrow-Hart, Inc.
3. Bryant Electric Co.
4. Crouse-Hinds Co.
5. General Electric Co.
6. Hubbell Wiring Device Division
7. Pass & Seymour
8. Pyle National
9. Russell & Stoll
10. Slater

2.3 WALL SWITCHES

A. Provide specification grade, quiet type, flush, 1-pole, 2-pole, three and four-way toggle switches, 20 ampere, 120/277-volts AC, with mounting yoke insulated from mechanism equipped with plaster ears and side wired screw terminals, ivory plastic body with toggle handle, NEMA WD-1.
1. Device Number: #1221, #1222, #1223, #1224
2. Manufacturers: Hubbell, Pass & Seymour, Bryant

2.4 RECEPTACLES

A. Provide specification grade, grounding type, heavy-duty receptacles with ivory plastic body, green hexagonal equipment ground screw terminal and grounding poles internally connected to mounting yoke; metal plaster ears; side wiring NEMA WD-6 as follows:
1. Duplex Receptacle: Two pole, 3 wire, 20-ampere, 125-volt duplex receptacle, NEMA configuration 5-20R unless otherwise indicated.
2. GFCI Receptacle: Two pole, 3 wire, 20-ampere, 125-volt duplex receptacle with integral ground fault circuit interrupter to meet regulatory requirements.
3. Special Purpose: Two pole, 3 wire, 20-ampere, 125-volt single receptacle, twist-lock, NEMA configuration L5-20R as indicated.
4. Two pole, 3 wire, 20-ampere, 250-volt single receptacle, twist-lock, NEMA configuration L6-20R as indicated.
5. Two pole, 3 wire, 20-ampere, 277-volt single receptacle, twist-lock, NEMA configuration L7-20R as indicated.
6. Two pole, 3 wire, 30-ampere, 125-volt single receptacle, twist-lock, NEMA configuration L5-30R as indicated.
7. Two pole, 3 wire, 30-ampere, 250-volt single receptacle, twist-lock, NEMA configuration L6-30R as indicated.

8. Two pole, 3 wire, 30-ampere, 277-volt single receptacle, twist-lock, NEMA configuration L7-30R as indicated.
9. Three phase, 4 wire, 20-ampere, 125/250-volt single receptacle, twist-lock, NEMA configuration L14-20R as indicated.
10. Three phase, 4 wire, 20-ampere, 250-volt single receptacle, twist-lock, NEMA configuration L15-20R as indicated.
11. Three phase, 4 wire, 20-ampere, 480-volt single receptacle, twist-lock, NEMA configuration L16-20R as indicated.
12. Three pole, 4 wire, 30-ampere, 125/250-volt single receptacle, twist-lock, NEMA configuration L14-30R as indicated.
13. Three pole, 4 wire, 30-ampere, 250-volt single receptacle, twist-lock, NEMA configuration L15-30R as indicated.
14. Special Purpose Receptacle: Type as required meeting the requirements of this Section and the equipment shown on the drawings and elsewhere specified.

2.5 WALL PLATES

A. Decorative Cover Plate: Nylon, to match device color, or stainless steel cover plate. Coordinate plate material with Architect.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify outlet boxes are installed at proper height.

B. Verify wall openings are neatly cut and will be completely covered by wall plates.

C. Verify branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

D. Inspect each item of materials or equipment immediately prior to installation, and reject damaged and defective items.

3.2 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface, if necessary.

B. Clean debris from all boxes.

3.3 INSTALLATION

A. Install wiring devices where indicated, in accordance with the manufacturer's written instructions, the applicable requirements of the NEC and the NECA "Standard of Installation", and in accordance with recognized industry practices to ensure that products serve the intended function.

B. Comply with the manufacturer's applicable instructions and recommendations for installation, to whatever extent these are more explicit or more stringent than applicable requirements indicated in the contract documents.

1. Install devices plumb and level. Install switches with OFF position down
2. Install vertically oriented grounded receptacles with grounding pole on top
3. Connect wiring device grounding terminal to equipment grounding conductor as specified in Section 16050 – Basic Materials and Methods.
4. Connect isolated ground (IG) receptacle equipment (yoke) grounding terminal only at metallic box with bonding jumper
5. Install decorative plates on switch, receptacle, and blank outlets in finished areas
6. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets in utility areas. (Does not include multi-outlet assemblies, other similar locations.).
7. Identify wiring devices as specified in Section 26 05 53 – Electric Equipment Identification.

3.4 INTERFACE WITH OTHER PRODUCTS

A. Coordinate locations of outlet boxes to obtain mounting heights compliant with ADA.

B. Install wall switch at 42 inches to top of the maximum reach above finished floor for forward reach applications, 48 inches to top of reach for side reach applications. The lower reach shall be at or above 18 inches for forward reach and for side reach, unless otherwise noted.

C. Install convenience receptacle 18 inches to center above finished floor, unless otherwise noted.

D. Install convenience receptacle 6 inches to center above backsplash of counter, unless otherwise noted.

E. Install dimmer 42 inches to center above finished floor, unless otherwise noted.

F. Install telephone and/or data jacks 18 inches to center above finished floor, unless otherwise noted.

G. Install telephone jack for wall telephone 42 inches to top of reach above finished floor for forward reach applications, and 48 inches above finished floor to top of reach for side reach applications to comply with the ADA. Receiver hook shall not be above 54 inches to its highest point above finished floor.

3.5 FIELD QUALITY CONTROL

A. Inspect each wiring device for defects.

B. Operate each wall switch with circuit energized and verify proper operation.

C. Verify that each receptacle device is energized.

D. Test each receptacle device for proper polarity.

E. Test each GFCI receptacle device for proper operation.

F. Verify that each telephone and data jack is properly connected and circuit is operational.

3.6 ADJUSTING

A. Adjust devices and wall plates to be flush, plumb and level.

END OF SECTION

SECTION 262816 - ENCLOSED CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Molded-case circuit breakers (MCCBs).
   2. Enclosures.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

   1. Enclosure types and details for types other than NEMA 250, Type 1.
   2. Current and voltage ratings.
   3. Short-circuit current ratings (interrupting and withstand, as appropriate).

B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.

   1. Wiring Diagrams: For power, signal, and control wiring.

C. Qualification Data: For qualified testing agency.

D. Seismic Qualification Certificates: For enclosed switches and circuit breakers, accessories, and components, from manufacturer.

   1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
   2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
   3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

E. Field quality-control reports.

   1. Test procedures used.
   2. Test results that comply with requirements.

3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
2. Time-current coordination curves for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA or an NRTL.

1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

B. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single source from single manufacturer.

C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

D. 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.

E. Comply with NFPA 70.

1.6 PROJECT CONDITIONS

A. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions indicated:

1. Notify Construction Manager no fewer than seven days in advance of proposed interruption of electric service.
2. Do not proceed with interruption of electric service without Construction Manager's written permission.
3. Comply with NFPA 70E.

1.7 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.1 MOLDED-CASE CIRCUIT BREAKERS

A. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.

B. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

C. Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.
2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.

2.2 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

C. Comply with NECA 1.

3.3 IDENTIFICATION

A. Comply with requirements in Division 26 Section "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections.

D. Acceptance Testing Preparation:

1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

E. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
3. Perform the following infrared scan tests and inspections and prepare reports:

    a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each enclosed switch and circuit breaker. Remove front panels so joints and connections are accessible to portable scanner.
    b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each enclosed switch and circuit breaker 11 months after date of Substantial Completion.
    c. Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

4. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

F. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

G. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

END OF SECTION 262816

SECTION 265000 - LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes lighting fixtures, lamps, ballasts, hangars, trim and diffusers; supports, suspension systems, and blocking for lighting fixtures.

B. RELATED SECTIONS
1. Section 26 09 23 – Lighting Control Devices

1.2 Reference Codes and Standards

A. The standards referenced herein, except as modified in the Contract Documents, shall have full force and effect as though included in these Specifications. These standards are not furnished to the Contractor since manufacturers and trades involved are assumed to be familiar with these requirements. The Contractor shall obtain copies of reference standards direct from publication sources as needed for proper performance and completion of the work.

1.	ANSI C82.1	Ballasts for Fluorescent Lamps
2.	ANSI C82.11	Line Frequency Fluorescent Lamp Ballasts
3.	ANSI C82.4	Ballasts for High-Intensity Discharge and Low Pressure Sodium Lamps
4.	ANSI C82	Ballasts for High-Intensity Discharge Lamps
5.	CBC 5209	California Building Code
6.	NECA	Standard of Installation
7.	NFPA 70	National Electrical Code
8.	UL 935	Fluorescent Lamp Ballasts
9.	UL 1029	High-Intensity Discharge Lamp Ballasts
10.	UL 1598	Luminaires

1.3 SUBMITTALS

A. Provide submittals for the following:
1. Light fixtures.
2. Lamps.
3. Ballasts.
4. Occupancy sensors, remote switches, and power packs.

PART 2 - PRODUCTS

2.1 LIGHTING FIXTURES

A. Provide lighting fixtures, lamps, ballasts and accessories complete and ready for operation. Furnish the fixtures as indicated on the Drawings and as listed in the fixture schedule. Verify in all cases, the lengths and quantity of fixtures necessary to achieve the indicated results.

B. Provide lighting fixtures in the finishes and colors as noted on the Drawings. Where fixture finishes are noted to be “By Architect”, include the available finishes when making fixture submittals, and obtain the Architects written selection of fixture finishes prior to ordering lighting fixtures.

C. Prominently indicate in the submittals those fixture that are proposed to be provided with remote or separately mounted ballasts. Such fixtures must be specifically approved by the Architect in writing prior to ordering the fixtures.

D. Provide the Underwriters Laboratories labels on all lighting fixtures.

E. Equip fluorescent fixtures with CBM/ETL labeled ballasts provided with internally mounted automatic reset thermal protectors and silver plated sockets.

F. All lighting fixtures shall have published photometric tests conducted by Electrical Testing Laboratories. Make available the test results upon request. Testing shall include candlepower distribution curves, total fixture efficiency, brightness and shielding angles in longitudinal and transverse directions.

G. Observe the requirements of the Building Code regarding plastic lighting diffusers. Fixtures and auxiliary equipment mounted against combustible material shall be approved for such installation.

H. Make-up fixtures with Type AF or equal fixture wire. Provide an identified, approved landing lug for equipment ground wires.

2.2 LENSES, REFLECTORS, AND TRIM

A. Provide specialty lenses and frames as indicated on the lighting fixture schedule. Verify that the fixture frames and trims are designed to function with the selected lens and the particular mounting conditions.

2.3 LAMPS

A. Fluorescent lamps:
   1. All fluorescent lamps shall be low mercury, Federal EPA TCLP compliant, extended life lamps.
   2. T-8 fluorescent lamps shall be extended performance, 3500 Kelvin, 86 CRI color rendering, long-life 24,000 hrs @ 3 hrs/start.

3. Compact fluorescent lamps shall be low mercury, 3500 Kelvin, 82 CRI color rendering, 10,000 hrs @ 3 hrs/start.
4. Provide 3500 Kelvin, tri-phosphor, energy saving, slim-line or high output fluorescent lamps where lamps longer than four feet long are specified.
5. Furnish all fluorescent lamps of the same type, throughout the Project, from the same manufacturer.

2.4 BALLASTS

A. Electronic Ballasts:
1. Fully electronic fluorescent ballast
2. Power factor: 0.85 minimum
3. Ballast factor: 0.87 minimum
4. Total Harmonic Distortion (THD): 20% maximum
5. Warranty: five years
6. Ballasts must be of the rapid start type; instant-start is not acceptable.

PART 3 - EXECUTION

3.1 GENERAL

A. Install fixtures in straight, true lines and without visible gaps between fixtures and building surfaces and between fixtures in continuous rows. For linear wall mounted fixtures, ensure that the wall surface is finished flat, straight, and free of imperfections prior to mounting the fixtures. Replace or repair lighting fixture installations that are out of plumb or that have obvious gaps or misalignment.

B. Provide fixtures with the appropriate trim frames, flanges, canopies, and finish accessories to accommodate the ceiling conditions. Prior to ordering fixtures, and throughout the Project, verify the exact ceiling types, finishes, and thicknesses and coordinate the fixture installation therewith.

C. Refer to the Drawings, particularly the architectural elevations and reflected ceiling plans, in determining the exact mounting location and height of lighting fixtures. For wall mounted or suspended fixtures that do not have the mounting heights clearly indicated, contact the Architect for clarification prior to ordering pendants and installing the fixtures.

D. Following installation of HID and fluorescent lighting fixtures, and prior to completion of the Project, perform a burn in test of the lights. The burn in test shall consist of operating the fixtures continuously for a minimum of forty-eight (48) hours. Replace lamps that are inoperative or that show signs of flicker or color wander. If building power is not available for the burn in test, then provide a portable generator, fuel, and temporary connections for the stipulated period.

E. Provide final touchup painting to repair fixture finishes which are nicked or marred during installation. Obtain the paint from the fixture manufacturer.

3.2 AUDIBILITY

A. Fixtures shall be free from any undesirable hum, vibration, or noise. Provide lighting equipment suitable for the intended ambient sound levels. Where necessary to meet this criteria, provide additional means of sound deadening, whether or not specifically indicated. Fixtures that are found to be unsatisfactory in the opinion of the Architect shall be removed and replaced at the Contractor's expense.

3.3 SUPPORTS AND BLOCKING

A. Provide hangers, suspension cables, and blocking for lighting fixtures that will provide support independent of suspended ceilings, ceiling or wall surfaces, and electrical outlet boxes. Exception: Fixtures less than 12 inches in all dimensions and weighing less than six pounds may be permitted to be supported from the electrical outlet box if the box itself is independently supported by blocking or hangars.

B. Refer to the Drawings for specific blocking details and seismic mounting details for lighting fixtures.

3.4 OBSTRUCTIONS

A. Verify throughout the Project that mounting locations and suspension systems remain free of obstructions. Suspended or pendant mounted fixtures must be free to swing 45 degrees in all directions without hitting obstructions or other fixtures. Provide seismic rated swivel ball hangars for pendant mounted lighting fixtures to achieve the proper swing.

END OF SECTION

CALIFORNIA MILITARY DEPARTMENT - BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION

3800 West Valhalla Drive, Burbank, California 91505-1119

100% Submittal | January 20, 2012

WINZLER & KELLY

2235 Mercury Way, Suite 150
Santa Rosa, CA 95407
Tel: 707.523.1010 | Fax: 707.527.8679
www.w-and-k.com

RIM ARCHITECTS

Owner

California Military Department - Burbank Armory
3800 West Valhalla Drive
Burbank, California 91505-1119

Owner's Representative

California Army National Guard
9800 Goethe Road
Sacramento, California 95826
Contact: Captain Garth Page
Telephone: 916.854.3528
email: garth.page@us.army.mil

Architectural

RIM Architects
1000 Sansome Street, Suite 1000
San Francisco, California 94111
Contact: Kimberly Champion
Telephone: 415-247-0400
email: kchampion@rimarchitects.com

Mechanical, Plumbing & Electrical

Winzler & Kelly
2235 Mercury Way, Suite 150
Santa Rosa, California 95407
Contact: Terry Wong
Telephone: 707-523-1010
email: terrywong@w-and-k.com

Applicable Codes

2010 California Building Code, Title 24 Part 2
2010 California Electrical Code, Title 24 Part 3
2010 California Mechanical Code, Title 24 Part 4
2010 California Plumbing Code, Title 24 Part 5
2010 California Energy Code, Title 24 Part 6
2010 California Existing Building Code, Title 24 Part 10
2010 California Referenced Standards Code, Title 24 Part 12

Project Data

Type of Construction: Type IIIA, non-conforming
Number of Stories: 2
Building Area: 1st floor: 23,355 square feet
2nd floor: 8,495 square feet
Total: 31,850 square feet

	A3	B	S2
Occupancy:			
S.F./occupancy:	11,054	18,560	2,236
Area of project:	2,873 square feet		

Space	S.F.	S.F. per Occ.	Load
A3	11,054	7	1580
B	18,560	100	186
S2	2,236	300	8
Total Occupant Load			1774

Number of exits required: 4
Number of exits provided: 4

Maximum Exit Travel Distance allowed: 200 feet
Exit Travel Distance provided: 150 feet

Fire Sprinklers: None
Fire Alarm: None

Project Description

Upgrade of existing latrines and kitchen, including but not limited to the replacement of plumbing fixtures, toilet and urinal partitions, light fixtures, finishes, kitchen equipment and range hood. Also included is the modification of a portion of a supply room into an ADA compliant shower and latrine.

Drawing Index

General Notes

1. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS AT THE PROJECT SITE BEFORE ORDERING OR FABRICATION OF ANY MATERIALS OR EQUIPMENT.

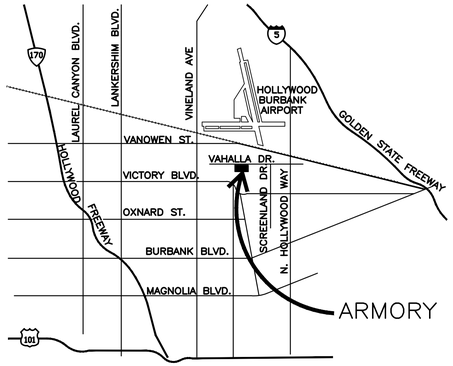
2. PAINTING CONTRACTOR IS HEREBY NOTIFIED THAT PAINT SAMPLES HAVE BEEN TESTED AND THAT LEAD LEVELS WERE IDENTIFIED TO BE GREATER THAN THE THRESHOLD LIMITS SET FORTH BY CAL OSHA GUIDELINES. LEAD CONTAINING MATERIALS WERE IDENTIFIED ON ARMORY INTERIOR AND EXTERIOR WALLS, WINDOW FRAMING, INCLUDING PAINT ON GLAZIERS PUTTY. IT WILL BE THE CONTRACTOR'S RESPONSIBILITY TO COMPLY WITH ALL COUNTY, STATE, AND FEDERAL REQUIRMENTS FOR THE REMOVAL AND DISPOSAL OF LEAD CONTAINING MATERIALS. LEAD PAINT ON THE INTERIOR OF THIS BUILDING HAS NOT BEEN ABATED.

3. PREPARE AND PAINT ALL SURFACES PER COATING MANUFACTURER'S WRITTEN INSTRUCTIONS. PAINT PREPARATION SHALL BE TESTED ON SITE BY NACE REPRESENTATIVE PER ASTM D3359 (SCRATCH MATRIX TEST), ONE TEST FOR FIRST 100 SQUARE FEET PRIMED AND ONE TEST PER EACH ADDITIONAL 500 SQUARE FEET (OR ANY AREA OF QUESTIONABLE PREPARATION). IT SHALL BE THE PAINTING CONTRACTOR'S RESPONSIBILITY FOR ACCEPTANCE OF PAINTING SUBSTRATE. GENERAL CONTRACTOR SHALL COORDINATE ANY HAZARDOUS MATERIALS ABATEMENT AND PAINTING SURFACE PREPARATION. ADDITIONAL TESTING MAY BE DONE IN ACCORDANCE WITH ASTM D4541-95.

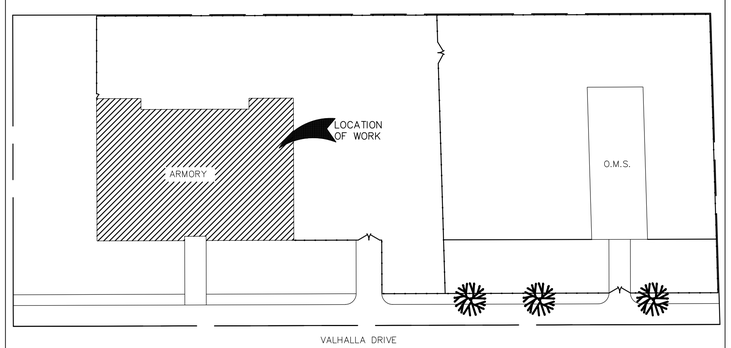
4. PREPARE AND PAINT ALL EXISTING WALL MOUNTED ITEMS WITHIN PROJECT LIMIT, INCLUDING BUT NOT LIMITED TO EXISTING CONDUIT AND UTILITY PIPING (PIPE WRAPPING IF APPLICABLE).

Alternates:

- PROVIDE AN ALTERNATE FOR DEMOLISHING AND REPLACING THE GYPSUM BOARD WALLS IN THE 2 EXISTING MEN'S ROOM SHOWER STALLS WITH NEW TILE BACKER BOARD.



VICINITY MAP



LOCATION OF WORK

REMARKS | BY:
DATE
SYMBOL
REVISIONS

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE: 1.20.12

TITLE SHEET
GENERAL NOTES, PROJECT DATA, DRAWINGS INDEX
PROJECT NUMBER: XXX
PROJECT BURBANK ARMORY KITCHEN AND LATRINE, MODERNIZATION
LOCATION BURANK, CALIFORNIA
MILITARY DEPARTMENT
STATE OF CALIFORNIA

SHEET NUMBER T1
OF 1 OF 43

ABBREVIATION LEGEND

A

AB	ANCHOR BOLT
ABS	ACRYLONITRILE BUTADIENE STYRENE
ABV	ABOVE
A/C	AIR CONDITIONING
AC	ASPHALTIC CONCRETE
ACP	ACOUSTICAL CEILING PANEL
AD	AREA DRAIN
ADDL	ADDITIONAL
ADJ	ADJACENT
AFF	ABOVE FINISH FLOOR
AFS	ABOVE FINISH SLAB
AGGR	AGGREGATE
ALUM	ALUMINUM
ALT	ALTERNATE
ANOD	ANODIZED
APPROX	APPROXIMATE
ARCH	ARCHITECTURAL

B

BBQ	BARBEQUE
BD	BOARD
BFF	BELOW FINISH FLOOR
BKBD	BACK BOARD
BLDG	BUILDING
BLK	BLOCK
BLKG	BLOCKING
BM	BEAM
BOD	BOTTOM OF DECK
BOT F	BOTTOM FACE
BOT	BOTTOM
BR	BEDROOM
BRG	BEARING
BRKT	BRACKET
BSMT	BASEMENT
BTWN	BETWEEN
BUR	BUILT-UP ROOFING

C

CAB	CABINET
CB	CATCH BASIN
CEM	CEMENT
CER	CERAMIC
CFCI	CONTRACTOR FURNISHED CONTRACTOR INSTALLED
CG	CORNER GUARD
CMPST	COMPOSITE
CI	CAST IRON
CIP	CAST IN PLACE
CJ	CONTROL JOINT
CL	CENTER LINE
CLG	CEILING
CLO	CLOSET
CLR	CLEAR
CMU	CONCRETE MASONRY UNIT
CNTR	COUNTER
CO	CLEAN OUT
COL	COLUMN
CONC	CONCRETE
COND	CONDITION
CONN	CONNECTION
CONSTR	CONSTRUCTION
CONT	CONTINUE/CONTINUOUS
CONTR	CONTRACTOR
COORD	COORDINATE
COP	COPPER
CORR	CORRIDOR
CPT	CARPET
CSK	COUNTERSUNK
CT	CERAMIC TILE
CTR	CENTER
CUH	CABINET UNIT HEATER
CULT	CULTURED
CW	COLD WATER PIPING

D

D	DEEP/DEPTH
DBL	DOUBLE
DEG	DEGREE
DEPT	DEPARTMENT
DET	DETAIL
DF	DRINKING FOUNTAIN
DIA	DIAMETER
DIAG	DIAGONAL
DIM	DIMENSION
DISP	DISPENSER
DN	DOWN
DR	DOOR
DS	DOWNSPOUT
DSP	DRY STANDPIPE
DW	DISHWASHER
DWG	DRAWING
DWR	DRAWER

E

E	EAST
EA	EACH
EIFS	EXTERIOR INSULATION FINISH SYSTEM
EJ	EXPANSION JOINT
EL	ELEVATION
ELAST	ELASTOMERIC
ELEC	ELECTRIC
ELEV	ELEVATOR
EMER	EMERGENCY
ENCL	ENCLOSURE
EPB	ELECTRICAL PANEL BOARD
EPDM	ETHYLENE PROPYLENE DIENE MONOMER
ES	EACH SIDE
EQ	EQUAL
EQUIP	EQUIPMENT
EOS	EDGE OF SLAB
EWC	ELECTRIC WATER COOLER
EXH	EXHAUST
EXP	EXPOSED
EXPN	EXPANSION
EXT	EXTERIOR
(E)	EXISTING

F

F	FAHRENHEIT
FA	FIRE ALARM
FAB	FABRICATE
FB	FLAT BAR
FCU	FAN COIL UNIT
FD	FLOOR DRAIN
FDTN	FOUNDATION
FE	FIRE EXTINGUISHER
FEC	FIRE EXTINGUISHER CABINET
FF	FINISH FLOOR ELEVATION
FF & E	FURNITURE, FIXTURES AND EQUIPMENT
FGL	FIBERGLASS
FH	FIRE HYDRANT
FHC	FIRE HOSE CABINET
FIN	FINISH
FIN GR	FINISH GRADE
FIXT	FIXTURE
FLDG	FOLDING
FLG	FLOORING
FLR	FLOOR
FLUOR	FLUORESCENT
FLR SK	FLOOR SINK
FOC	FACE OF CONCRETE
FOF	FACE OF FINISH
FOM	FACE OF MASONRY
FOS	FACE OF STUD
FOW	FACE OF WALL
FP	FIRE PROOF
FR	FRAME
FRP	FIBERGLASS REINFORCED PLASTIC
FRT	FIRE RETARDANT TREATED
FRZ	FREEZER
FT	FEET
FTD	FACIAL TISSUE DISPENSER
FTG	FOOTING
FURG	FURRING
FUT	FUTURE

G

G	NATURAL GAS
GA	GAGE
GALV	GALVANIZED
GB	GRAB BAR
GEN	GENERAL
GFGI	GOVERNMENT FURNISHED/ GOVERNMENT INSTALLED
GFRG	GLASSFIBER REINFORCED GYPSUM
GFRC	GLASSFIBER REINFORCED CONCRETE
GL	GLASS/GLAZING
GLU LAM	GLUE LAMINATED WOOD
GPM	GALLONS PER MINUTE
GRAN	GRANITE
GSB	GYPSUM SHEATHING BOARD
GTV	GATE VALVE
GWT	GLAZED WALL TILE
GYP	GYPSUM
GWB	GYPSUM WALL BOARD

H

H	HIGH
HB	HOSE BIBB
HC	HOLLOW CORE
HCP	HANDICAPPED
HD	HEAD
HDBD	HARDBOARD
HDW	HARDWARE
HDWD	HARDWOOD
HM	HOLLOW METAL
HORIZ	HORIZONTAL
HS	HAND SINK
HT	HEIGHT
HVAC	HEATING, VENTILATION AND AIR COND.
HW	HOT WATER
HWR	HOT WATER RETURN
HWS	HOT WATER SUPPLY

I

ID	INSIDE DIAMETER
INCL	INCLUDED
IMP	INSULATED METAL PANEL
IN	INCH
INFO	INFORMATION
INSUL	INSULATION/INSULATED
INT	INTERIOR
INV	INVERT

J

J-BOX	JUNCTION BOX
JAN	JANITOR
JST	JOIST
JT	JOINT

K

KD	KNOCK DOWN
KIT	KITCHEN
KO	KNOCK-OUT
KW	KILOWATT
KWH	KILOWATT HOUR

L

	LENGTH
LAB	LABORATORY
LAM	LAMINATE
LAV	LAVATORY
LB	POUND
LBF/SF	POUNDS PER SQUARE FOOT
LDG	LANDING
LF	LINEAR FOOT
LH	LEFT HAND
LKR	LOCKER
LLV	LONG LEG VERTICAL
LOC	LOCATION
LT	LIGHT
LR	LIVING ROOM
LVR	LOUVER

M

M	METER
M2	SQUARE METERS
MATL	MATERIAL
MAX	MAXIMUM
MB	MACHINE BOLT
MBR	MASTER BEDROOM
MC	MEDICINE CABINET
MECH	MECHANICAL
MEMB	MEMBRANE
MEZZ	MEZZANINE
MFR	MANUFACTURER
MH	MANHOLE
MI	MIRROR
MID	MIDDLE
MIN	MINIMUM
MISC	MISCELLANEOUS
MLDG	MOULDING
MM	MILLIMETER
MO	MASONRY OPENING
MOD	MODULE
MP	METAL PANEL
MR	MOISTURE RESISTANT
MTD	MOUNTED
MTL	METAL
MTG	MOUNTING
MULL	MULLION
MUN	MUNTIN
MW	MICROWAVE

N

(N)	NEW
N	NORTH
NFS	NON-FROST SUSCEPTIBLE
NIC	NOT IN CONTRACT
NO.	NUMBER
NOM	NOMINAL
NTS	NOT TO SCALE

O

OA	OVERALL
OBS	OBSCURE
OC	ON CENTER
OD	OUTSIDE DIAMETER
OFCI	OWNER FURNISHED/ CONTRACTOR INSTALLED
OFOI	OWNER FURNISHED/ OWNER INSTALLED
OFD	OVERFLOW DRAIN
OH	OVER HANG
OPH	OPPOSITE HAND
OPNG	OPENING
OPP	OPPOSITE
OPR	OPERABLE
OVHD	OVER HEAD

P

PA	PUBLIC ADDRESS
PC	PIECE
PCC	PRECAST CONCRETE
PEND	PENDANT
PERIM	PERIMETER
PH	PENTHOUSE
PLAS	PLASTER
PLBG	PLUMBING
PL	PROPERTY LINE
PLAM	PLASTIC LAMINATE
PLYWD	PLYWOOD
PNL	PANEL
PR	PAIR
PROP	PROPERTY
PREFAB	PREFABRICATE
PT	PAINT
PTD	PAPER TOWEL DISPENSER
PTDR	PAPER TOWEL DISPENSER AND WASTE RECEPTACLE
PTN	PARTITION
PTR	PAPER TOWEL RECEPTACLE
PVC	POLYVINYL CHLORIDE
PVMT	PAVEMENT

Q

QT	QUARRY TILE

R

R	RISER
R	RADIUS
RA	RETURN AIR
RB	RUBBER BASE
RB HK	ROBE HOOK
RCP	REFLECTED CEILING PLAN
RD	ROOF DRAIN
REC	RECESSED
REF	REFRIGERATOR
REFL	REFLECTED
REG	REGISTER
REINF	REINFORCE
RECS	RECOMMENDATIONS
REQD	REQUIRED
RESIL	RESILIENT
REST	REST ROOM
REV	REVISION
RTF	RUBBER TILE FLOOR
RFG	ROOFING
RLG	RAILING
RH	RIGHT HAND
RND	ROUND
RWL	RAIN WATER LEADER
RM	ROOM
RO	ROUGH OPENING
RWL	RAIN WATER LEADER

S

S	SOUTH
SA	SUPPLY AIR
SAB	SOUND ATTENUATION BLANKET
SB	SPLASH BLOCK
SC	SOLID CORE
SCHED	SCHEDULE
SCD	SEAT COVER DISPENSER
SCP	SCUPPER
SCR	SHOWER CURTAIN ROD
SCRN	SCREEN
SD	SMOKE DETECTOR
SECT	SECTION
SED	SEE ELECTRICAL DRAWINGS
SF	SQUARE FEET
SHT	SHEET
SHR	SHOWER
SHTHG	SHEATHING
SHV	SHELVING
SIM	SIMILAR
SL	SLOPE
SLDG	SLIDING
SLNT	SEALANT
SM	SHEET METAL
SND	SANITARY NAPKIN DISPENSER
SNDU	SANITARY NAPKIN DISPOSAL UNIT
SPC	SPACING
SPEC	SPECIFICATION
SPKLR	SPRINKLER
SPKR	SPEAKER
SQ	SQUARE
SSD	SEE STRUCTURAL DRAWINGS
SST	STAINLESS STEEL
SMD	SEE MECHANICAL DRAWINGS
SMLS	SEAMLESS
SS	SOLID SURFACE
STA	STATION
STD	STANDARD
STL	STEEL
STOR	STORAGE
STR	STRINGERS
STRUCT	STRUCTURAL
SURR	SURROUND
SUSP	SUSPENDED
SVCE	SERVICE
SW	SWITCH
SYMM	SYMMETRICAL
SYS	SYSTEM

T

T	TREAD
TB	TOWEL BAR
TBD	TO BE DETERMINED
TD	TRENCH DRAIN
TEL	TELEPHONE
TEMP	TEMPERATURE
TER	TERRAZZO
T&G	TONGUE & GROOVE
THRES	THRESHOLD
THRU	THROUGH
THK	THICKNESS
TK BD	TACK BOARD
TMPD	TEMPERED
TOC	TOP OF CURB
TOM	TOP OF MASONRY
TOP	TOP OF PARAPET
TOS	TOB OF SLAB
TOW	TOP OF WALL
TPD	TOILET PAPER DISPENSER
TPH	TOILET PAPER HOLDER
TS	TUBE STEEL
TSH	TOWEL SHELF
TSTAT	THERMOSTAT
TV	TELEVISION
TYP	TYPICAL
TLT	TOILET

U

UBC	UNIFORM BUILDING CODE
UC	UNDERCUT
UNGD	UNDERGROUND
UH	UNIT HEADER
UL	UNDERWRITERS LABORATORY
UNFIN	UNFINISHED
UNO	UNLESS NOTED OTHERWISE
UR	URINAL

V

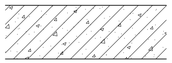
VAR	VARIES
VB	VALVE BOX
VCT	VINYL COMPOSITION TILE
VERT	VERTICAL
VIF	VERIFY IN FIELD
VEST	VESTIBULE
VOL	VOLUME
VP	VENEER PLASTER
VR	VAPOR RETARDER
VTR	VENT THROUGH ROOF
VWC	VINYL WALL COVERING

W

W	WIDE
W/	WITH
WC	WALL COVERING
WCLR	WATER COOLER
WD	WOOD
WDSP	WASTE DISPOSER
WDW	WINDOW
WF	WIDE FLANGE
WGL	WIRED GLASS
WH	WATER HEATER
W/O	WITHOUT
WP	WEATHERPROOF/ WATERPROOFING
WR	WATER REPELLENT
WSCT	WAINSCOT
WSP	WET STAND PIPE
WT	WEIGHT
WWF	WELDED WIRE FABRIC

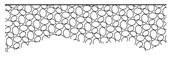
MATERIALS LEGEND

CONCRETE



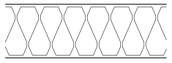
CMU

SAND, MORTAR, PLASTER, TILE BACKER BOARD



BASE COURSE, CUSHION FILL, SUB BASE, GRAVEL, CRUSHED ROCK

EARTH, COMPACT FILL



BATT INSULATION

FINISHED WOOD

RIGID INSULATION

METAL

PLYWOOD/MDF

GLASS

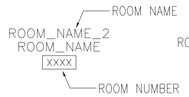
GYPSUM WALL BOARD

CERAMIC TILE, VCT OR RESILIENT FLOORING

ACOUSTICAL TILE

CARPET

SYMBOLS LEGEND



ROOM DESIGNATION

WALL TYPE

DOOR DESIGNATION

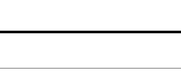
EQUIPMENT DESIGNATION

OPENING DESIGNATION

REVISION DESIGNATION

PLAN KEYNOTE

DEMOLITION KEYNOTE



BREAK LINE

MATCHLINE

PLAN NORTH/NORTH

DATUM DESIGNATION

TITLE DESIGNATION

RIM ARCHITECTS
CALIFORNIA ALASKA HAWAII GUAM
1000 BANSOME STREET SUITE 200
SAN FRANCISCO, CA 94133
Phone: 415.247.0400
Fax: 415.247.0401
www.rimarchitects.com

BY:	REMARKS	DATE	PATH_NAME
			REVDATE

REVISIONS SYMBOL

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE: 1.20.12

SHEET TITLE: ABBREVIATIONS, MATERIALS AND SYMBOLS LEGEND
PROJECT: BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
LOCATION: BURBANK, CALIFORNIA
PROJECT NUMBER: XXX

MILITARY DEPARTMENT
STATE OF CALIFORNIA

SHEET NUMBER
A0

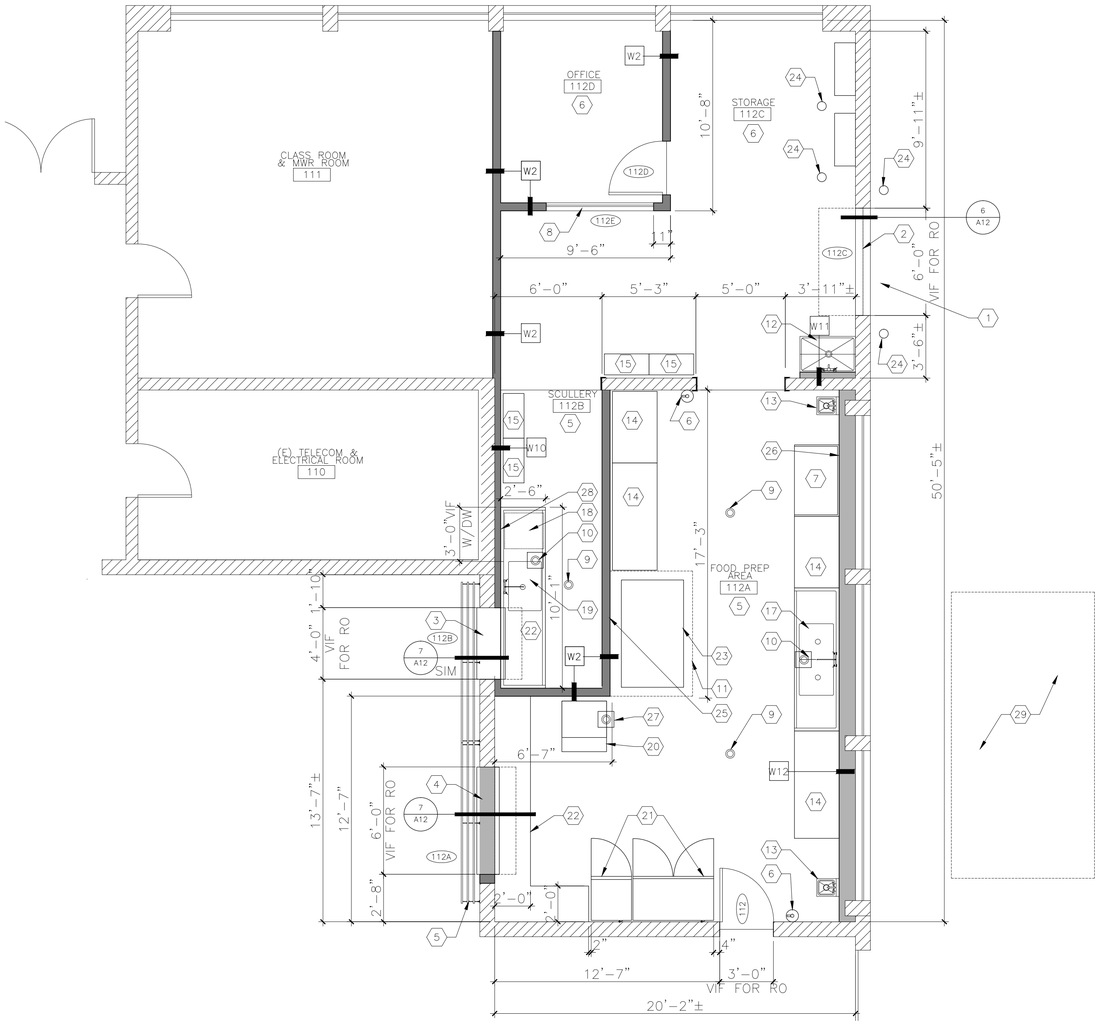
OF 2 OF 43

FLOOR PLAN KEYNOTES

1. PROVIDE CONCRETE RAMP FROM EXTERIOR CONCRETE UP TO INTERIOR FINISHED FLOOR. SLOPE 5% MAXIMUM.
2. (N) OVERHEAD ROLLING DOOR. FACTORY FINISH WITH FIELD PAINTED YELLOW CAUTION STRIPE. COORDINATE OPENING DIMENSIONS WITH DOOR MANUFACTURER INFORMATION.
3. (N) STAINLESS STEEL ROLL–UP COUNTER DOOR WITH SHELF. COORDINATE OPENING DIMENSIONS WITH DOOR MANUFACTURER INFORMATION.
4. (N) STAINLESS STEEL ROLL–UP COUNTER DOOR AND SHELF. INFILL WALL OPENING BELOW WITH CAST–IN–PLACE CONCRETE FINISHED FLUSH WITH (E). COORDINATE OPENING DIMENSIONS WITH DOOR MANUFACTURER INFORMATION.
5. STAINLESS STEEL TRAY SLIDE. SEE DETAIL 7/A12.
6. (N) K–TYPE FIRE EXTINGUISHER
7. (N) BAKER'S TABLE, ADVANCE TABCO #ADVBG304. CFCI.
8. (N) HOLLOW METAL INTERIOR WINDOW, FIXED GLAZING. PROVIDE ACOUSTICAL CAULKING.
9. (N) FLOOR DRAIN TO GREASE INTERCEPTOR
10. (N) FLOOR SINK TO GREASE INTERCEPTOR
11. (N) RANGE HOOD AND ANSUL SYSTEM. CFCI.
12. (N) MOP SINK
13. (N) 12" HAND SINK
14. (N) WORK TABLE: ADVANCE TABCO #ADVKAG 304, 305, 306, ADVBG304 – OFCI
15. (N) STORAGE RACK – OFCI
16. NOT USED.
17. (N) 2 COMPARTMENT SINK: ADVANCE TABCO MODEL NUMBER ADVFC2242424RLX (96" X 30"). CFCI.
18. (N) DISHWASHER. SEE PLUMBING DRAWINGS.
19. (N) CUSTOM FABRICATED SINK WITH DISPOSAL, INTEGRAL TO DISHTABLE. SINK: 22"X33"X12"D. VERIFY SPACE REQUIRED FOR DISHWASHER TO FIT UNDER COUNTER AND TO RIGHT OF SINK. OPEN UNDERNEATH WITH LEGS. 2" DEEP PAN TYPE COUNTER & BACKSPLASH FOR FAUCET ATTACHMENT
20. ICE MACHINE – OFCI. SEE PLUMBING DRAWINGS.
21. FREEZER AND REFRIGERATOR – OFCI
22. (N) STAINLESS STEEL WORK TABLE, CUSTOM FABRICATED TO FIT.
23. (N) RANGE: 72" X 42" CHALLENGER XL BY WOLF RANGE, MODEL NUMBER WOLC72SC6B36G. CFCI.
24. (N) STEEL AND CONCRETE BOLLARD. SEE DETAIL 8/A12.
25. (N) STAINLESS STEEL WALL LINER BEHIND RANGE AND HOOD
26. (N) FRP ON GYPSUM BOARD, INCLUDE TOP LEDGE. WHITE WITH BRUSHED ALUMINUM TRIM.
27. (N) FLOOR SINK TO SANITARY SEWER.
28. FUR OUT WALL FOR PLUMBING; (N) FRP FLOOR TO CEILING AT DISHTABLE. SEE ELEVATIONS.
29. (N) GREASE INTERCEPTOR.
30.

SHEET NOTES

1. PROVIDE AN ALLOWANCE FOR METAL BACKING PLATES FOR 40 LINEAR FEET OF WALL–HUNG SHELVES BY OWNER. SEE DETAIL 8/A10.
2. SEE MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION.
3. PAINT ALL EXPOSED GYPSUM BOARD AND CONCRETE WALLS WITH SEMI–GLOSS EPOXY PAINT U.N.O. PAINT NEW WALL IN ROOM 111 WITH LATEX.
4. COORDINATE ALL OF OWNER FURNISHED EQUIPMENT AS WELL AS NEW EQUIPMENT WITH CONSTRUCTION. FIELD VERIFY ALL DIMENSIONS.
5. DIMENSIONS ARE FINISH TO FINISH.
6. REFER TO FLOORING PLANS FOR FLOOR FINISHES.

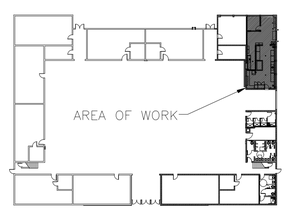


1 / A1 FLOOR PLAN – NEW KITCHEN
1/4" = 1'–0"
0" 2' 4' 8'

N

LEGEND

- (E) PARTITION TO BE DEMOLISHED
- EXISTING PARTITION
- EXISTING PARTITION WITH NEW FURRING APPLIED.
- NEW PARTITION TO (E) GYP. BD. CEILING
- NEW PARTIAL HEIGHT PARTITION
- NEW 8" CONCRETE BLOCK PARTITION
- W — INDICATES PARTITION TYPE. SEE SHEETS A7 – A10 FOR PARTITION TYPE DETAILS.



KEY PLAN

RIM ARCHITECTS
CALIFORNIA ALASKA HAWAII GUAM
1000 SANSOME STREET SUITE 200
SAN FRANCISCO, CA 94111
Phone: 415.247.0400
Fax: 415.247.0401
www.rimarchitects.com

BY:	REMARKS	DATE	PATH_NAME

REVISIONS SYMBOL DATE

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE: 1.20.12

SHEET TITLE: FIRST FLOOR KITCHEN PLAN – NEW FLOOR PLAN
PROJECT: BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
PROJECT NUMBER: XXX
LOCATION: BURBANK, CALIFORNIA

MILITARY DEPARTMENT
STATE OF CALIFORNIA

SHEET NUMBER
A1a

OF 3 OF 43

DEMOLITION KEYNOTES

1. CUT NEW OPENING IN CONCRETE WALL. SEE NEW FLOOR PLAN FOR OPENING DIMENSIONS. SEE ELEVATION FOR HEIGHT OF OPENING.
2. REMOVE DOORS, FRAME AND ASSOCIATED HARDWARE
3. REMOVE VCT FLOORING IN AREA TO BE RENOVATED AND PREP FOR NEW FLOORING
4. REMOVE GLUED–ON ACOUSTICAL TILES FROM CEILING. PREP FOR NEW CEILING.

REFLECTED CEILING PLAN KEYNOTES

1. (E) GYPSUM BOARD CEILING TO REMAIN. PATCH ANY HOLES, CLEAN AND PAINT.
2. (N) FURRING AND WATER RESISTANT GYPSUM BOARD. PAINT.
3. (N) RANGE HOOD
4. SEE MECHANICAL DRAWINGS FOR DUCT FROM RANGE HOOD.

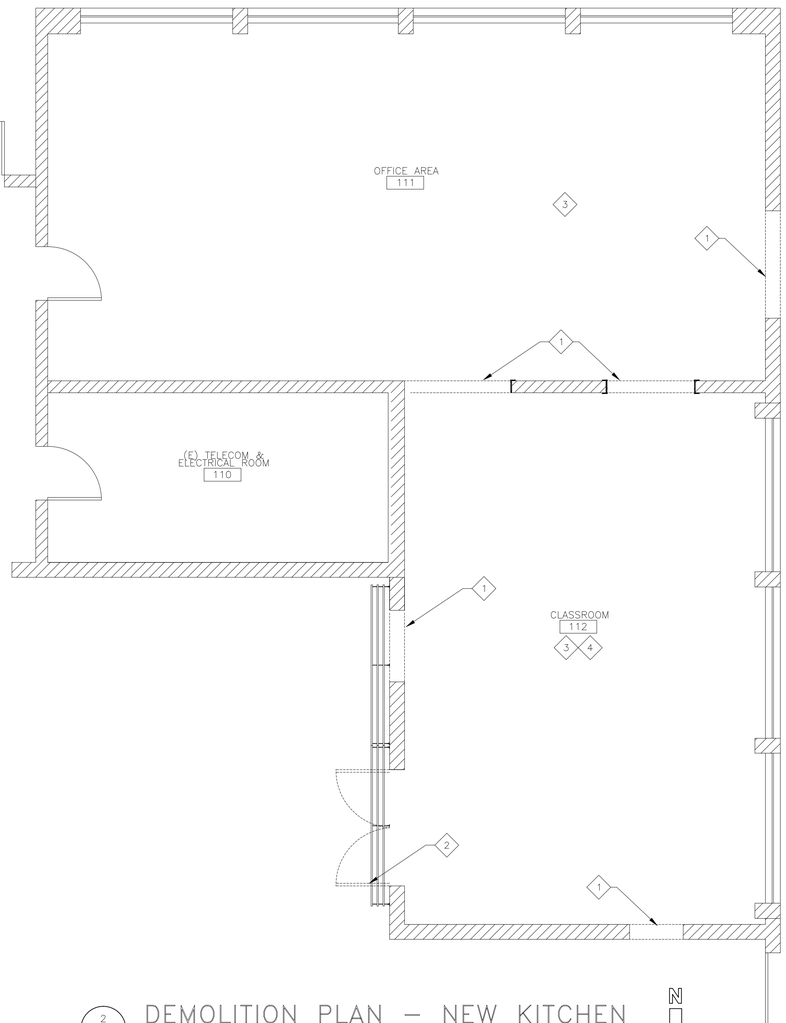
SHEET NOTES

1. SEE MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION.

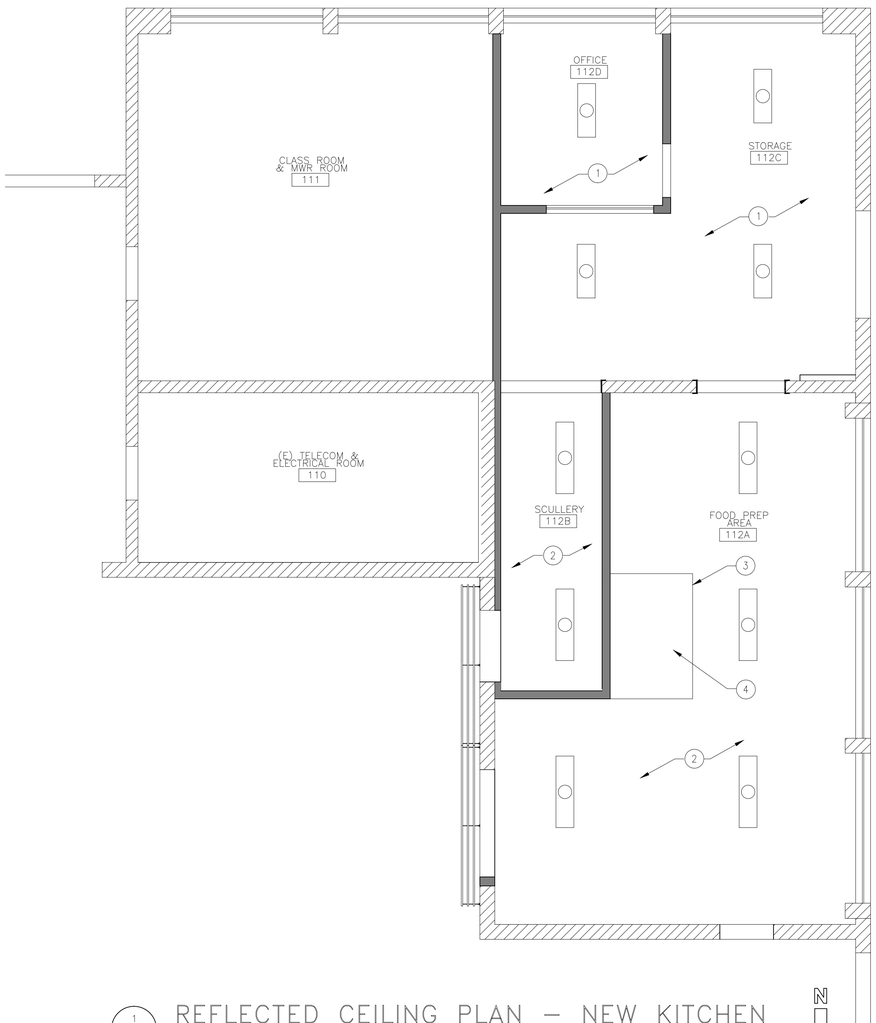
LEGEND

- (E) PARTITION TO BE DEMOLISHED
- EXISTING PARTITION
- EXISTING PARTITION WITH NEW FURRING APPLIED.
- NEW PARTITION TO (E) GYP. BD. CEILING
- NEW PARTIAL HEIGHT PARTITION
- NEW 8" CONCRETE BLOCK PARTITION

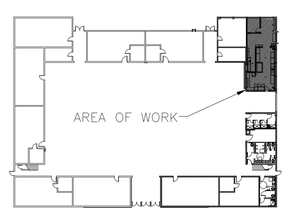
SEE SHEETS A7 – A10 FOR PARTITION TYPE DETAILS.



2 / A1a DEMOLITION PLAN – NEW KITCHEN
1/4" = 1'–0"
0" 2' 4' 8'
N



1 / A1a REFLECTED CEILING PLAN – NEW KITCHEN
1/4" = 1'–0"
0" 2' 4' 8'
N



KEY PLAN

RIM ARCHITECTS
CALIFORNIA ALASKA HAWAII GUAM
1000 SANSOME STREET SUITE 250
SAN FRANCISCO, CA 94111
Phone: 415.247.0400
Fax: 415.247.0401
www.rimarchitects.com

REVISIONS	SYMBOL	DATE	REMARKS	BY:

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE: 1.20.12

SHEET TITLE: FIRST FLOOR KITCHEN PLANS – DEMO AND RCP
PROJECT: BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
PROJECT NUMBER: XXX
LOCATION: BURBANK, CALIFORNIA
STATE OF CALIFORNIA
MILITARY DEPARTMENT

SHEET NUMBER
A1b

OF 4 OF 43

DEMOLITION KEYNOTES

1. REMOVE DOORS, FRAME AND ASSOCIATED HARDWARE
2. REMOVE VCT FLOORING AND PREP FOR NEW FLOORING
3. REMOVE KITCHEN EQUIPMENT
4. REMOVE PLUMBING FIXTURES
5. REMOVE TILE FROM FLOOR AND WALLS THROUGHOUT.
6. REMOVE SHOWER FIXTURES AND ACCESSORIES
7. REMOVE TOILET PARTITIONS
8. REMOVE ACCESSORIES
9. REMOVE PORTION OF WALL FOR NEW DOOR
10. REMOVE WALL.
11. REMOVE WINDOW.

RCP KEYNOTES

1. (E) GYPSUM BOARD CEILING TO REMAIN. CLEAN AND PREP & PROVIDE NEW EPOXY PAINT.

FLOOR PLAN KEYNOTES

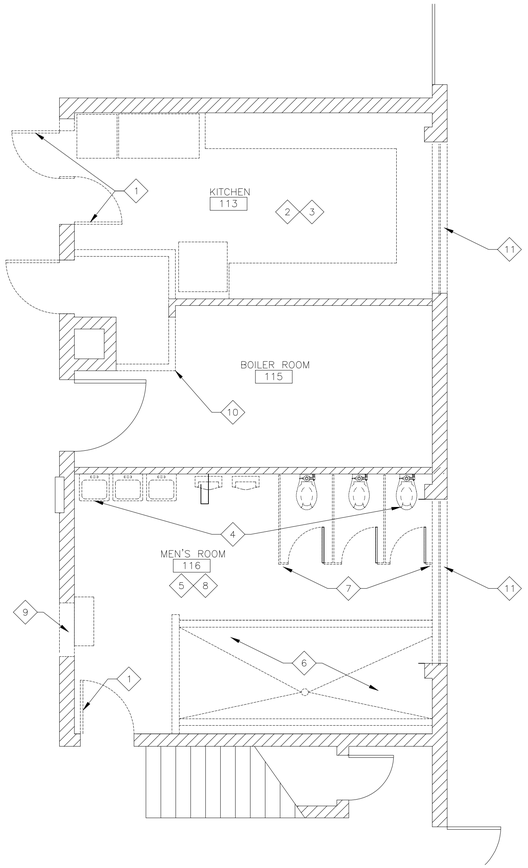
1. FUR OUT WALL FOR PLUMBING
2. INFILL WALL WITH CAST-IN-PLACE CONCRETE FINISHED FLUSH WITH (E)
3. LINE ALL WALLS WITH 12" X 12" CERAMIC TILE TO 6'-0" A.F.F. U.N.O. ON ELEVATIONS.
4. (N) SOLID PHENOLIC SHOWER PARTITION AND DOORS.
5. (N) SHOWER CURTAIN, CURTAIN ROD AND SOAP DISH IN EACH SHOWER.
6. (N) FLOOR DRAIN.
7. (N) SOLID SURFACE COUNTERTOP WITH INTEGRAL SINKS AND BACK AND SIDESPLASH.
8. (N) FOLDING SHOWER BENCH
9. (N) HOLLOW METAL DOOR AND FRAME
10. (N) GRAB BARS FOR ACCESSIBLE STALLS
11. (N) TOILETS AND URINALS
12. (N) ACCESSORIES (TOWEL DISPENSER, TOILET TISSUE HOLDERS, WASTE RECEPTACLE, MIRRORS.
13. (N) PARTIAL HEIGHT WALL BENEATH COUNTERTOP, TILED.
14. (N) SOLID PHENOLIC TOILET AND URINAL PARTITIONS
15. (N) PAINT ALL UNTILED WALLS WITH EPOXY PAINT.
16. (N) WINDOW WITH OBSCURE GLAZING.

SHEET NOTES

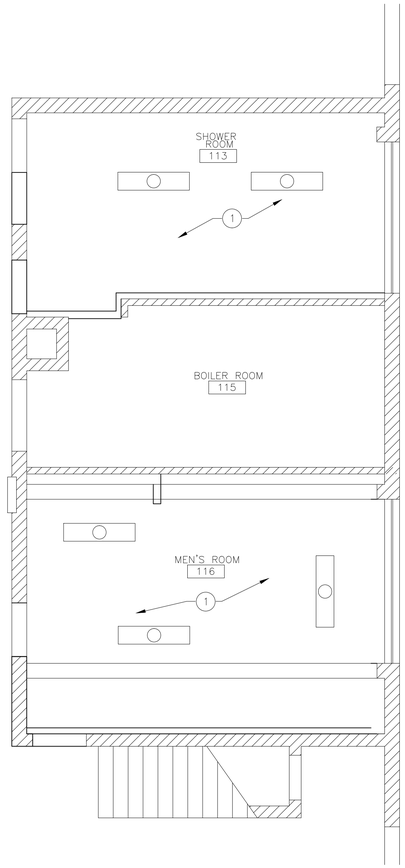
1. SEE MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION.
2. SEE FLOORING PLANS FOR FLOOR FINISHES.
3. DIMENSIONS ARE FINISH TO FINISH.

LEGEND

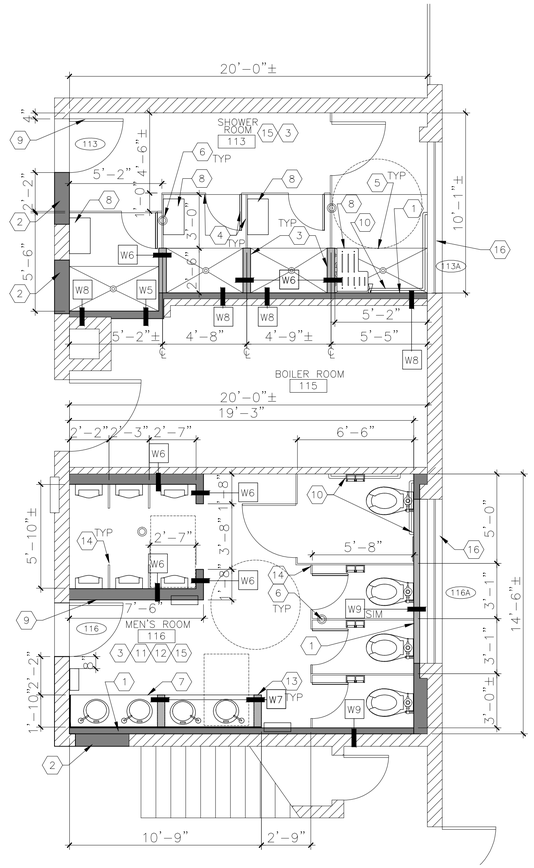
- (E) PARTITION TO BE DEMOLISHED
- EXISTING PARTITION
- EXISTING PARTITION WITH NEW FURRING APPLIED.
- NEW PARTITION TO (E) GYP. BD. CEILING
- NEW PARTIAL HEIGHT PARTITION
- NEW 8" CONCRETE BLOCK PARTITION
- W — INDICATES PARTITION TYPE. SEE SHEETS A7 – A10 FOR PARTITION TYPE DETAILS.



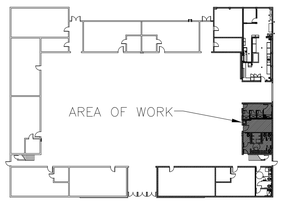
3/A2 DEMO PLAN – SHOWER & MEN'S ROOM
1/4" = 1'-0"



2/A2 RCP – SHOWER & MEN'S ROOM
1/4" = 1'-0"



1/A2 FLOOR PLAN – SHOWER & MEN'S ROOM
1/4" = 1'-0"



KEY PLAN

RIM ARCHITECTS
CALIFORNIA ALASKA HAWAII GUAM
1000 SANSOME STREET SUITE 200
SAN FRANCISCO, CA 94111
Phone: 415.247.0400
Fax: 415.247.0401
www.rimarchitects.com

REVISIONS	SYMBOL	DATE	REMARKS	BY:

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE: 1.20.12

SHEET TITLE: FIRST FLOOR RESTROOM PLANS – DEMO, RCP AND FLOOR
PROJECT: BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
PROJECT NUMBER: XXX
LOCATION: BURBANK, CALIFORNIA
MILITARY DEPARTMENT
STATE OF CALIFORNIA

SHEET NUMBER
A2a

DEMOLITION KEYNOTES

1. REMOVE SECTION OF WALL FOR NEW DOOR OPENING
2. PREP FOR NEW FLOORING

RCP KEYNOTES

1. (N) GYPSUM BOARD CEILING AT 8'–0" A.F.F. OR TO BOTTOM OF EXISTING PIPES. PAINT. SEE DETAIL 6/A10.
2. (E) BEAM ABOVE NEW CEILING.
3. (N) ACCESS PANELS AS REQUIRED FOR ACCESS TO PIPES ABOVE

FLOOR PLAN KEYNOTES

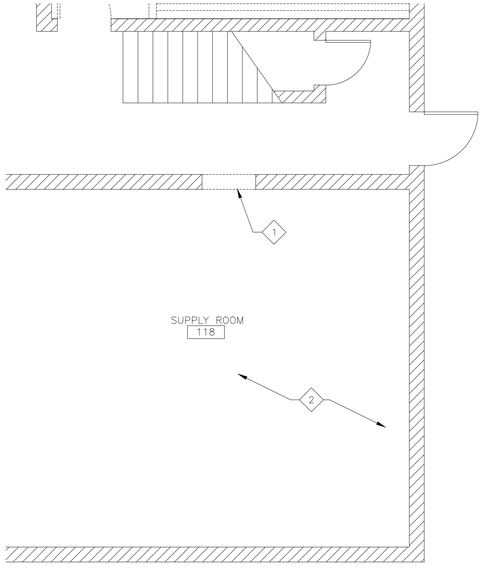
1. FUR OUT WALL FOR PLUMBING
2. LINE ALL WALLS WITH (N) 12" X 12" CERAMIC TILE TO 6'–0" A.F.F. U.N.O. OTHERWISE ON ELEVATIONS..
3. (N) SOLID PHENOLIC SHOWER DOOR.
4. (N) SHOWER CURTAIN, CURTAIN ROD AND SOAP DISH
5. (N) SOLID SURFACE COUNTERTOP WITH INTEGRAL SINKS, BACK AND SIDESPLASHES. NO SIDESPLASH AT PARTITION.
6. (N) PARTIAL HEIGHT WALL BENEATH COUNTERTOP, TILED.
7. (N) FOLDING SHOWER BENCH
8. (N) HOLLOW METAL DOOR AND FRAME
9. (N) GRAB BARS
10. (N) TOILETS
11. (N) ACCESSORIES (TOWEL DISPENSER, TOILET TISSUE HOLDERS, WASTE RECEPTACLE, MIRRORS).
12. (N) FLOOR DRAIN.
13. (N) SOLID PHENOLIC TOILET PARTITIONS
14. (N) PAINT ON ALL UNTILED WALLS.

SHEET NOTES

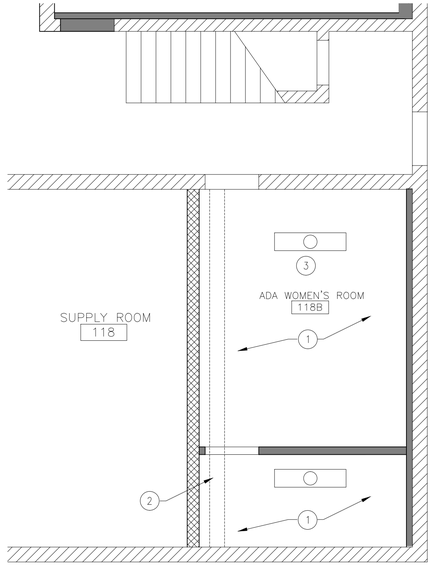
1. SEE MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION.
2. SEE FLOORING PLANS FOR FLOOR FINISHES.
3. DIMENSIONS ARE FINISH TO FINISH.

LEGEND

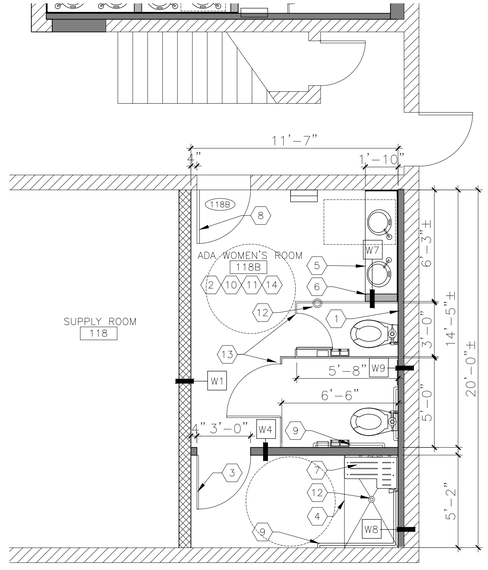
- (E) PARTITION TO BE DEMOLISHED
- EXISTING PARTITION
- EXISTING PARTITION WITH NEW FURRING APPLIED.
- NEW PARTITION TO (N) GYP. BD. CEILING
- NEW PARTIAL HEIGHT PARTITION
- NEW 8" CONCRETE BLOCK PARTITION
- W — INDICATES PARTITION TYPE. SEE SHEETS A7 – A10 FOR PARTITION TYPE DETAILS.



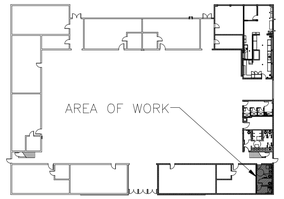
3/A2 DEMO PLAN – ADA WOMEN'S ROOM
1/4" = 1'–0"
0" 2' 4' 8'



2/A2 RCP – ADA WOMEN'S ROOM
1/4" = 1'–0"
0" 2' 4' 8'



1/A2 FLOOR PLAN – ADA WOMEN'S ROOM
1/4" = 1'–0"
0" 2' 4' 8'



KEY PLAN

RIM ARCHITECTS
CALIFORNIA ALASKA HAWAII GUAM
1000 BANSOME STREET SUITE 200
SAN FRANCISCO, CA 94133
Phone: 415.247.0400
Fax: 415.247.0401
www.rimarchitects.com

BY:
REMARKS
DATE
SYMBOL
REVISIONS
PATH_NAME
REVDATE
1.20.12

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE:

SHEET TITLE: FIRST FLOOR ADA RESTROOM PLAN – DEMO, RCP AND F
PROJECT: BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
PROJECT NUMBER: XXX
LOCATION: BURBANK, CALIFORNIA

MILITARY DEPARTMENT
STATE OF CALIFORNIA

SHEET NUMBER
A2b

DEMOLITION KEYNOTES

1. REMOVE DOORS, FRAME AND ASSOCIATED HARDWARE
2. PREP CONCRETE FLOOR FOR NEW TILE FLOORING
3. REMOVE PLUMBING FIXTURES
4. REMOVE TILE FROM WALLS.
5. REMOVE TILE FROM FLOOR.
6. REMOVE SHOWER FIXTURES AND ACCESSORIES
7. REMOVE TOILET PARTITIONS
8. REMOVE ACCESSORIES
9. REMOVE GYP. BD. CEILING.

RCP KEYNOTES

1. (N) WATER RESISTANT GYPSUM BOARD CEILING. PAINT.
2. (E) GYPSUM BOARD CEILING TO REMAIN. CLEAN AND PREP FOR NEW PAINT.

FLOOR PLAN KEYNOTES

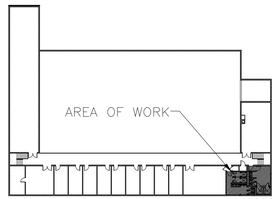
1. FUR OUT WALL FOR PLUMBING
2. LINE ALL WALLS WITH (N) 12" X 12" CERAMIC TILE TO 6'-0" A.F.F. U.N.O. ON ELEVATIONS.
3. (N) SHOWER CURTAIN AND ROD
4. (N) PARTIAL HEIGHT WALL BENEATH COUNTERTOP, TILED
5. (N) SOLID SURFACE COUNTERTOP WITH INTEGRAL SINKS, BACK AND SIDESPLASHES. SIDESPLASHES AT ADJACENT WALLS ONLY.
6. (N) FOLDING SHOWER BENCH
7. (N) HOLLOW METAL DOOR AND FRAME
8. (N) SOAP DISH
9. (N) TOILETS IN SAME LOCATIONS
10. (N) TOILETS AND URINALS IN SAME LOCATIONS.
11. (N) ACCESSORIES (TOWEL DISPENSER, TOILET TISSUE HOLDERS, WASTE RECEPTACLE, MIRRORS).
12. LINE INTERIOR SHOWER WALLS WITH (N) 12" X 12" CERAMIC TILE TO CEILING.
13. (N) SOLID PHENOLIC TOILET AND URINAL PARTITIONS
14. (N) SOLID PHENOLIC SHOWER ROOM DOOR
15. (N) SOLID PHENOLIC SHOWER PARTITION, SHOWER CURTAIN AND ROD.
16. (N) FLOOR DRAIN

SHEET NOTES

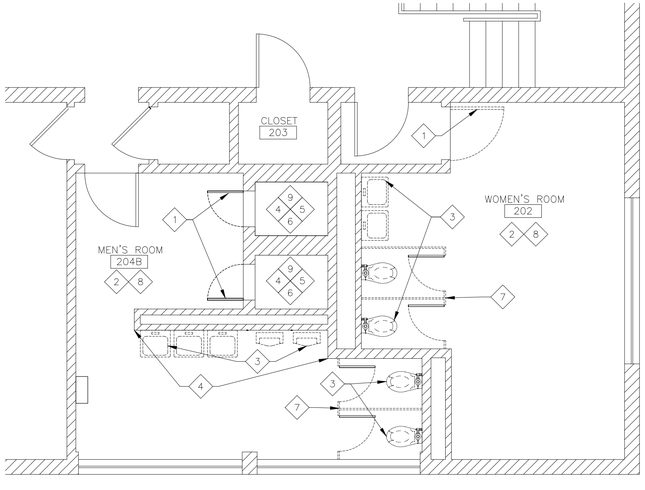
1. SEE MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION.
2. PROVIDE AN ALTERNATE FOR DEMOLISHING AND REPLACING THE GYPSUM BOARD WALLS IN THE 2 EXISTING MEN'S ROOM SHOWER STALLS WITH NEW TILE BACKER BOARD.
3. SEE FLOORING PLANS FOR FLOOR FINISHES.
4. DIMENSIONS ARE FINISH TO FINISH

LEGEND

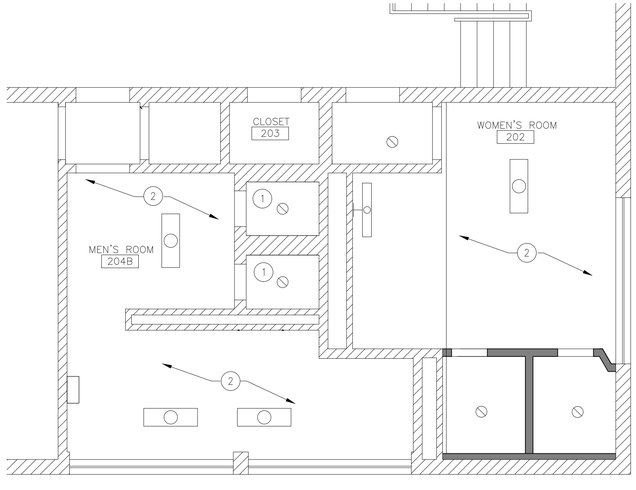
- (E) PARTITION TO BE DEMOLISHED
- EXISTING PARTITION
- EXISTING PARTITION WITH NEW FURRING APPLIED.
- NEW PARTITION TO (E) GYP. BD. CEILING
- NEW PARTIAL HEIGHT PARTITION
- NEW 8" CONCRETE BLOCK PARTITION
- W — INDICATES PARTITION TYPE. SEE SHEETS A7 – A10 FOR PARTITION TYPE DETAILS.



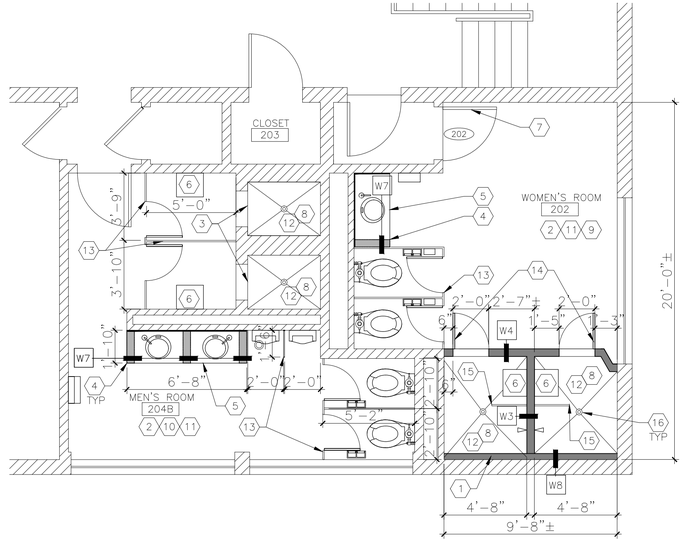
KEY PLAN



3 / A3 DEMO PLAN – WOMEN'S & MEN'S ROOM
1/4" = 1'-0"
0" 2' 4' 8'



2 / A3 RCP – WOMEN'S & MEN'S ROOM
1/4" = 1'-0"
0" 2' 4' 8'



1 / A3 FLOOR PLAN – WOMEN'S & MEN'S ROOM
1/4" = 1'-0"
0" 2' 4' 8'

RIM ARCHITECTS
CALIFORNIA ALASKA HAWAII GUAM
1000 SANSOME STREET SUITE 200
SAN FRANCISCO, CA 94111
Phone: 415.247.0400
Fax: 415.247.0401
www.rimarchitects.com

REVISIONS	SYMBOL	DATE	REMARKS	BY:

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE: 1.20.12

SHEET TITLE: SECOND FLOOR RESTROOM PLANS – DEMO, RCP AND FLOOR
PROJECT: BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
PROJECT NUMBER: XXX
LOCATION: BURBANK, CALIFORNIA

MILITARY DEPARTMENT
STATE OF CALIFORNIA

SHEET NUMBER
A3

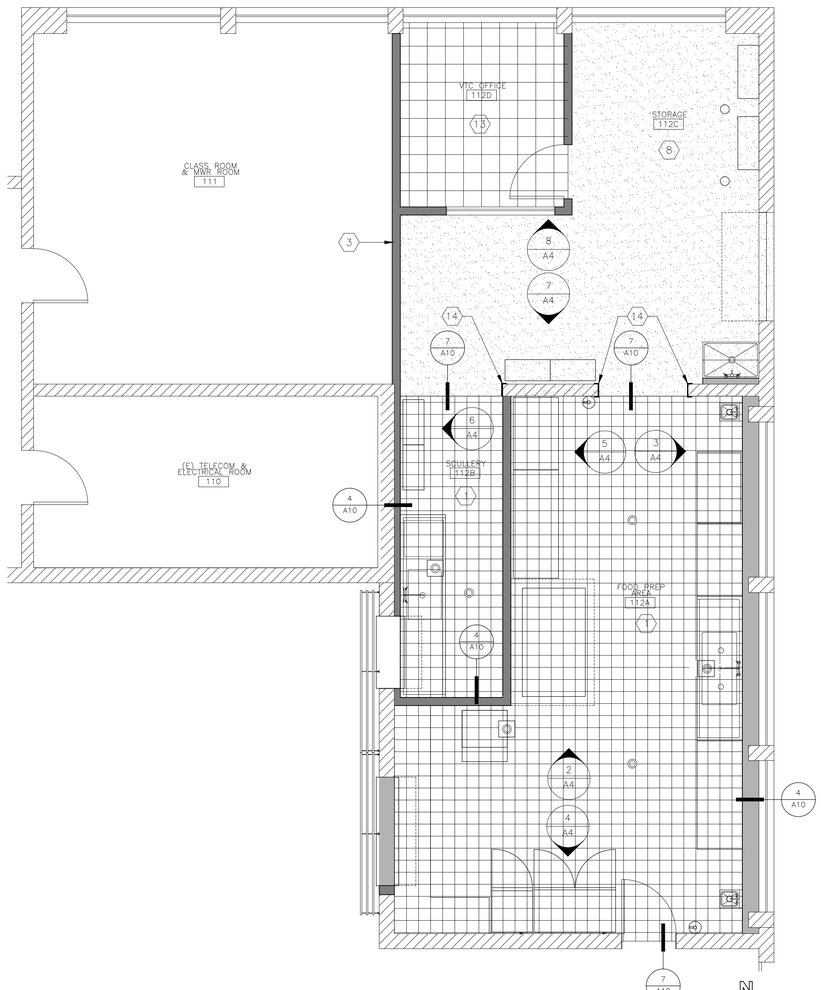
OF 7 OF 43

KEYNOTES

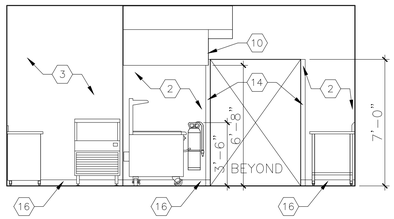
1. 12" X 12" CERAMIC TILE FLOOR
2. (E) CONCRETE WALL – PAINT
3. (N) GYPSUM BOARD PARTITION – PAINT
4. (N) FRP
5. HOLLOW METAL DOOR AND FRAME – PAINT
6. ROLL–UP DOOR – FACTORY PRIME AND FIELD PAINT. INCLUDE YELLOW CAUTION STRIPE.
7. STAINLESS STEEL ROLL–UP COUNTER DOOR
8. (N) EPOXY FLOORING.
9. STAINLESS STEEL WALL LINER BEHIND RANGE AND HOOD, ALIGN WITH HOOD
10. STAINLESS STEEL RANGE HOOD
11. (E) EXTERIOR WINDOWS.
12. (N) INTERIOR HOLLOW METAL WINDOW – PAINT.
13. (N) VCT.
14. (N) STAINLESS STEEL CORNER GUARD
15. (N) 6" RUBBER WALL BASE
16. (N) 6" CERAMIC TILE WALL BASE
17. NO WALL BASE

SHEET NOTES

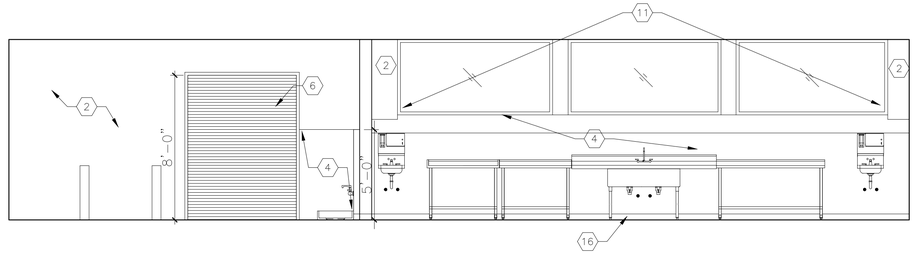
1. PROVIDE AN ALLOWANCE FOR METAL BACKING PLATES FOR 40 LINEAR FEET OF WALL–HUNG SHELVES BY OWNER.
2. SEE MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION.
3. PAINT ALL WALLS WITH SEMI–GLOSS EPOXY PAINT, UNLESS NOTED OTHERWISE.



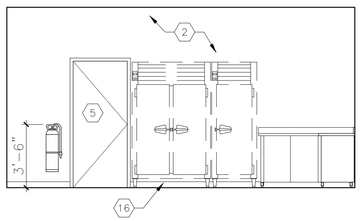
1/A4 FLOORING PLAN – NEW KITCHEN
1/4" = 1'–0"



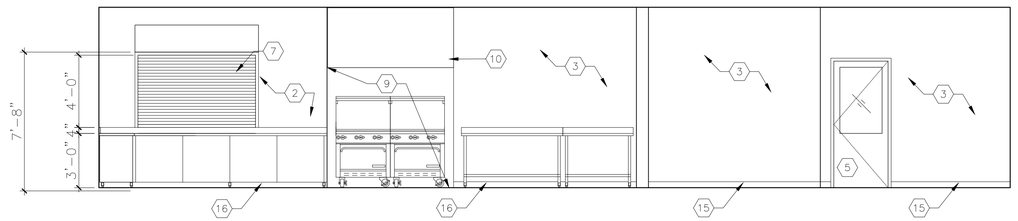
2/A4 INTERIOR ELEVATION – NEW KITCHEN
1/4" = 1'–0"



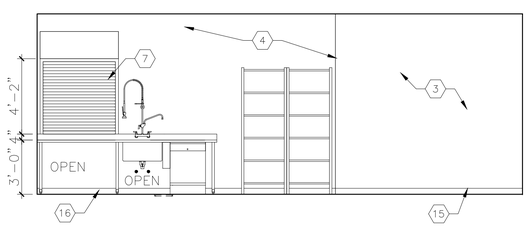
3/A4 INTERIOR ELEVATION – NEW KITCHEN
1/4" = 1'–0"



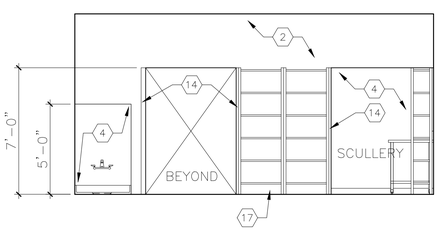
4/A4 INTERIOR ELEVATION – NEW KITCHEN
1/4" = 1'–0"



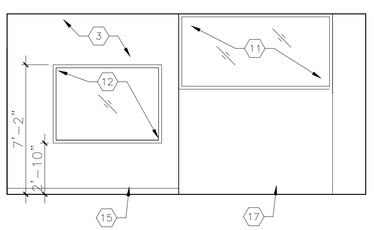
5/A4 INTERIOR ELEVATION – NEW KITCHEN
1/4" = 1'–0"



6/A4 INTERIOR ELEVATION – SCULLERY
1/4" = 1'–0"



7/A4 INTERIOR ELEVATION – SCULLERY
1/4" = 1'–0"



8/A4 INTERIOR ELEVATION – STORAGE
1/4" = 1'–0"

RIM ARCHITECTS
CALIFORNIA
1000 SANSOME STREET
SUITE 200
SAN FRANCISCO, CA 94111
Phone: 415.247.0400
Fax: 415.247.0401
www.rimarchitects.com

BY:	REMARKS	DATE	PATH_NAME
		REVDATE	

REVISIONS SYMBOL DATE

1.20.12

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE:

SHEET TITLE FIRST FLOOR KITCHEN – INTERIOR ELEVATIONS

PROJECT BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
PROJECT NUMBER XXX

LOCATION BURBANK, CALIFORNIA

STATE OF CALIFORNIA
MILITARY DEPARTMENT

SHEET NUMBER
A4

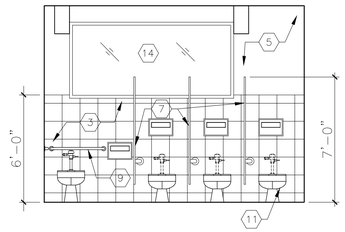
OF 8 OF 43

KEYNOTES

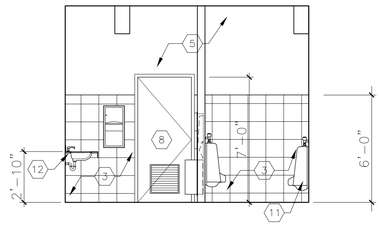
1. (N) 12" X 12" CERAMIC TILE FLOOR
2. (N) 2" X 2" CERAMIC TILE FLOOR IN SHOWER STALLS & CHANGING AREA
3. (N) 12" X 12" CERAMIC WALL TILE
4. (N) GYPSUM BOARD PARTITION – PAINT.
5. (N) OR (E) CONCRETE WALL – PAINT
6. LINE INTERIOR SHOWER WALLS WITH (N) 12" X 12" TILE
7. (N) SOLID PHENOLIC PARTITION
8. (N) HOLLOW METAL DOOR AND FRAME – PAINT
9. (N) STAINLESS STEEL GRAB BARS
10. (N) FOLD–DOWN BENCH
11. (N) FIXTURES, TYPICAL
12. (N) INTEGRAL SINKS IN SOLID SURFACE COUNTERTOP
13. (N) 36"X18" MIRRORS, 1 TO BE TILTABLE.
14. (N) EXTERIOR WINDOW WITH OBSCURE GLAZING
15. (N) SHOWER CURTAIN AND ROD

SHEET NOTES

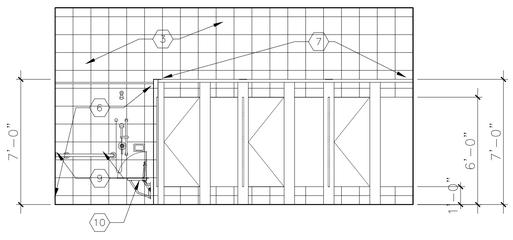
1. SEE MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION.
2. PAINT ALL WALLS WITH SEMI–GLOSS EPOXY PAINT, UNLESS NOTED OTHERWISE.



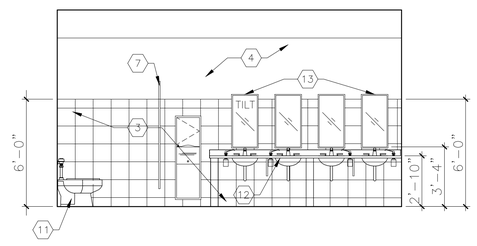
5 / A5a INTERIOR ELEVATION – MEN'S ROOM
1/4" = 1'–0"
0" 2' 4' 8'



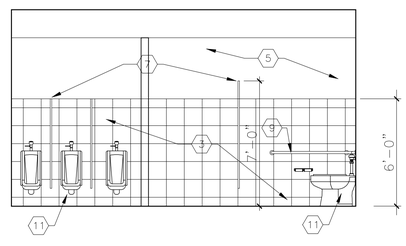
3 / A5a INTERIOR ELEVATION – MEN'S ROOM
1/4" = 1'–0"
0" 2' 4' 8'



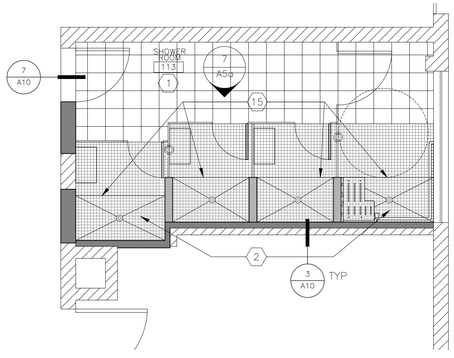
7 / A5a INTERIOR ELEVATION – SHOWER
1/4" = 1'–0"
0" 2' 4' 8'



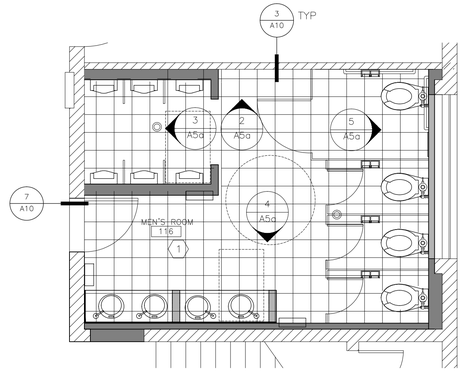
4 / A5a INTERIOR ELEVATION – MEN'S ROOM
1/4" = 1'–0"
0" 2' 4' 8'



2 / A5a INTERIOR ELEVATION – MEN'S ROOM
1/4" = 1'–0"
0" 2' 4' 8'



6 / A5a FLOORING PLAN – SHOWER
1/4" = 1'–0"
0" 2' 4' 8'



1 / A5a FLOORING PLAN – MEN'S ROOM
1/4" = 1'–0"
0" 2' 4' 8'

N

RIM ARCHITECTS
CALIFORNIA ALASKA HAWAII GUAM
1000 SANSOME STREET SUITE 250
SAN FRANCISCO, CA 94111
Phone: 415.247.4400
Fax: 415.247.0401
www.rimarchitects.com

BY:	REMARKS	DATE	PATH_NAME
			REVDATE

REVISIONS SYMBOL

1.20.12

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE:

SHEET TITLE FIRST FLOOR SHOWER & MEN'S ROOM – INTERIOR ELEVATIONS

PROJECT BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
PROJECT NUMBER: XXX
LOCATION BURBANK, CALIFORNIA

MILITARY DEPARTMENT
STATE OF CALIFORNIA

SHEET NUMBER
A5a

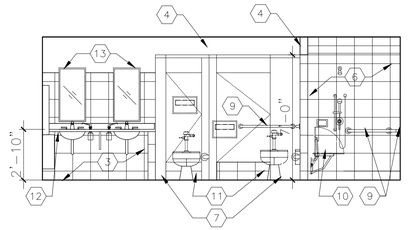
OF 9 OF 43

KEYNOTES

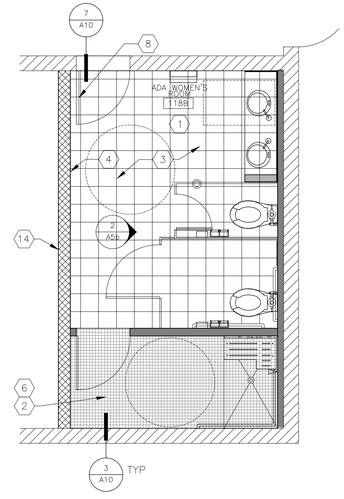
1. (N) 8" X 8" CERAMIC TILE FLOOR
2. (N) 2" X 2" CERAMIC TILE FLOOR IN SHOWER STALLS & CHANGING AREA
3. (N) 12" X 12" CERAMIC WALL TILE ALL WALLS TO 6'–0" A.F.F. EXCEPT SHOWER.
4. (N) GYPSUM BOARD PARTITION – PAINT ABOVE TILE.
5. (N) CONCRETE WALL – PAINT ABOVE TILE
6. LINE INTERIOR SHOWER WALLS WITH (N) 12" X 12" TILE TO CEILING.
7. (N) SOLID PHENOLIC PARTITION
8. (N) HOLLOW METAL DOOR AND FRAME – PAINT
9. (N) STAINLESS STEEL GRAB BARS
10. (N) FOLD–DOWN BENCH
11. (N) FIXTURES, TYPICAL
12. (N) INTEGRAL SINKS IN SOLID SURFACE COUNTERTOP
13. (N) 36" X 18" TILTABLE MIRRORS
14. (N) CONCRETE WALL – PAINT.

SHEET NOTES

1. SEE MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION.
2. PAINT ALL WALLS WITH SEMI–GLOSS EPOXY PAINT, UNLESS NOTED OTHERWISE.



2 / A5b INTERIOR ELEVATION – ADA WOMEN'S ROOM
1/4" = 1'–0"
0" 2' 4' 8'



1 / A5b FLOORING PLAN – ADA WOMEN'S ROOM
1/4" = 1'–0"
0" 2' 4' 8'

N

RIM ARCHITECTS
CALIFORNIA
ALASKA HAWAII GUAM
1000 SANSOME STREET
SUITE 310
SAN FRANCISCO, CA 94111
Phone 415.247.2400
Fax 415.247.2401
www.rimarchitects.com

BY:	REMARKS	DATE	PATH_NAME
			REVDATE

REVISIONS SYMBOL

1.20.12

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE:

SHEET TITLE FIRST FLOOR ADA WOMEN'S ROOM – INTERIOR ELEVATIONS

PROJECT BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
PROJECT NUMBER: XXX
LOCATION BURBANK, CALIFORNIA

STATE OF CALIFORNIA
MILITARY DEPARTMENT

SHEET NUMBER
A5b

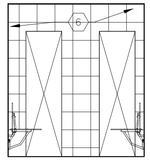
OF 10 OF 43

KEYNOTES

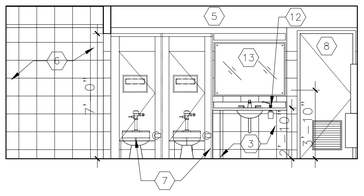
1. (N) 12" X 12"" CERAMIC TILE FLOOR
2. (N) 2" X 2" CERAMIC TILE FLOOR IN SHOWER STALLS & CHANGING AREA
3. (N) 12" X 12" CERAMIC WALL TILE TO 6'–0" A.F.F. ON ALL WALLS EXCEPT SHOWER.
4. (N) GYPSUM BOARD PARTITION – PAINT ABOVE TILE.
5. (E) CONCRETE WALL – PAINT ABOVE TILE
6. LINE INTERIOR AND EXTERIOR SHOWER WALLS WITH (N) 12" X 12" TILE
7. (N) SOLID PHENOLIC PARTITION
8. (N) HOLLOW METAL DOOR AND FRAME – PAINT
9. NOT USED
10. NOT USED
11. (N) FIXTURES, TYPICAL
12. (N) INTEGRAL SINKS IN SOLID SURFACE COUNTERTOP
13. (N) 48" X 36" MIRROR, INSET IN TILE
14. (N) 18" X 36" MIRRORS, INSET IN TILE
15. (N) PAPER TOWER DISPENSER/WASTE RECEPTACLE
16. (N) SHOWER ROD AND CURTAIN.

SHEET NOTES

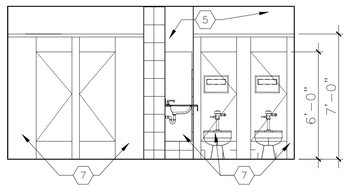
1. SEE MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION.
2. PAINT ALL WALLS WITH SEMI–GLOSS EPOXY PAINT, UNLESS NOTED OTHERWISE.



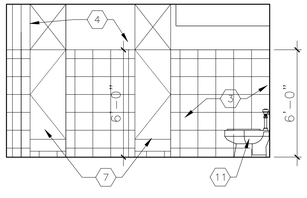
6 / A6 INTERIOR ELEVATION – MEN'S ROOM
1/4" = 1'–0"



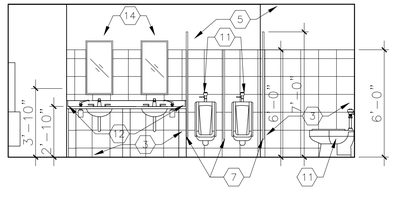
5 / A6 INTERIOR ELEVATION – WOMEN'S ROOM
1/4" = 1'–0"



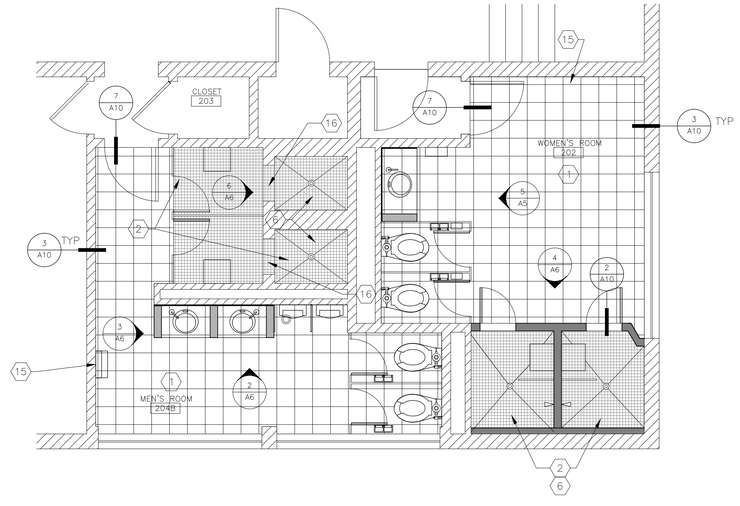
3 / A6 INTERIOR ELEVATION – MEN'S ROOM
1/4" = 1'–0"



4 / A6 INTERIOR ELEVATION – WOMEN'S ROOM
1/4" = 1'–0"



2 / A6 INTERIOR ELEVATION – MEN'S ROOM
1/4" = 1'–0"



1 / A6 FLOORING PLAN – WOMEN'S AND MEN'S ROOM
1/4" = 1'–0"

N

RIM ARCHITECTS
CALIFORNIA ALASKA HAWAII GUAM
1000 SANSOME STREET SUITE 200 SAN FRANCISCO, CA 94111
Phone 415.247.2400 Fax 415.247.2401
www.rimarchitects.com

BY:	REMARKS	DATE	PATH_NAME
			REVDATE

REVISIONS SYMBOL

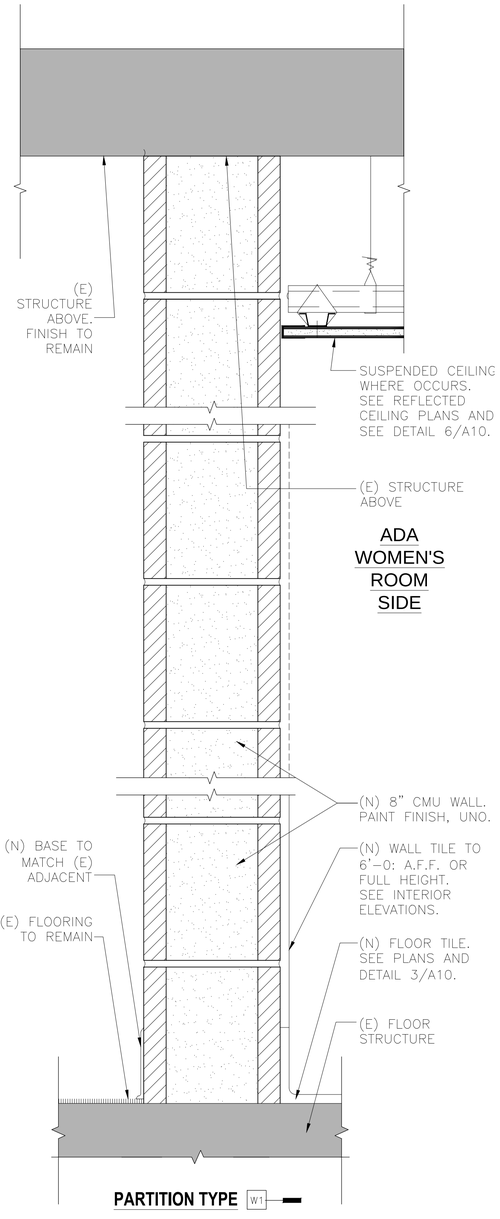
1.20.12

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE:

SHEET TITLE ELEVATIONS

PROJECT SECOND FLOOR MEN'S & WOMEN'S ROOM – INTERIOR
LOCATION BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
PROJECT NUMBER: XXX
BURBANK, CALIFORNIA
STATE OF CALIFORNIA
MILITARY DEPARTMENT

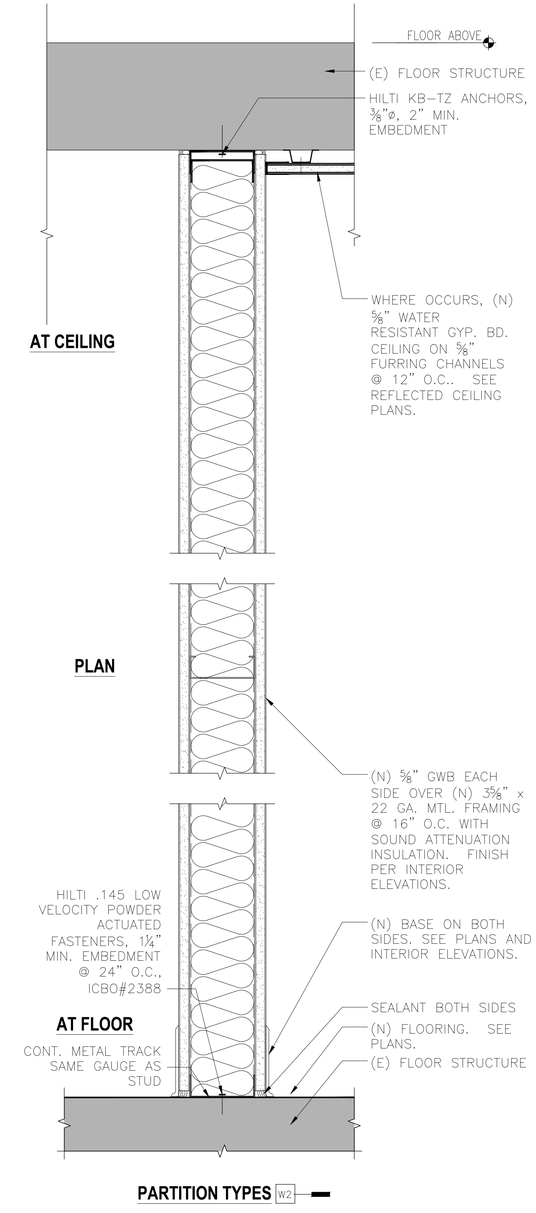
SHEET NUMBER
A6
OF 11 OF 43



ADA WOMEN'S ROOM SIDE

PARTITION TYPE W1

1 A7 PARTITION TYPE DETAIL
3" = 1'-0"



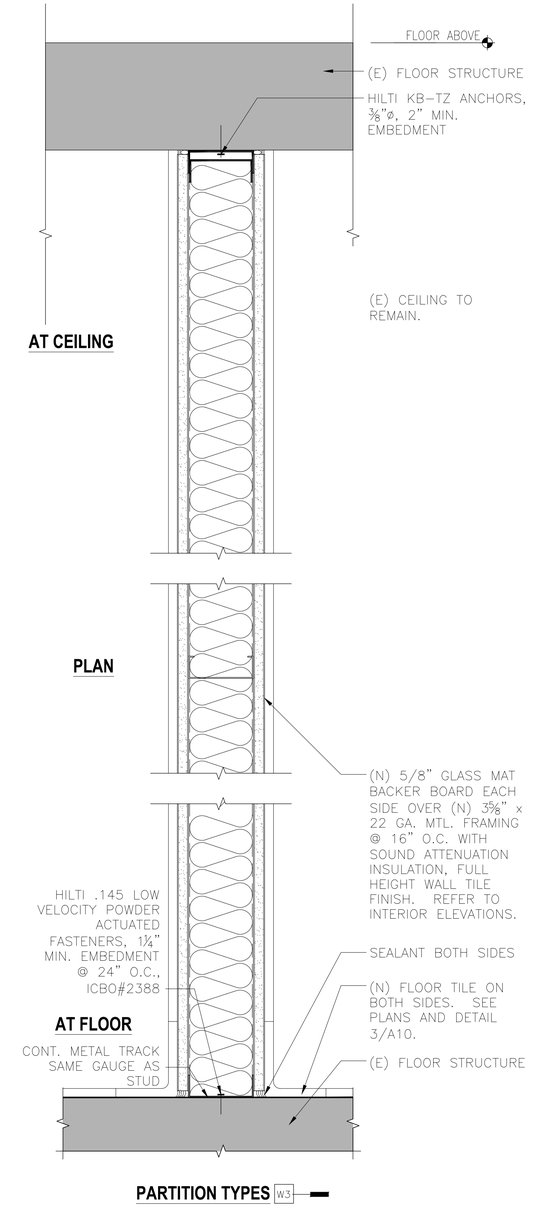
AT CEILING

PLAN

AT FLOOR

PARTITION TYPES W2

2 A7 PARTITION TYPE DETAIL
3" = 1'-0"



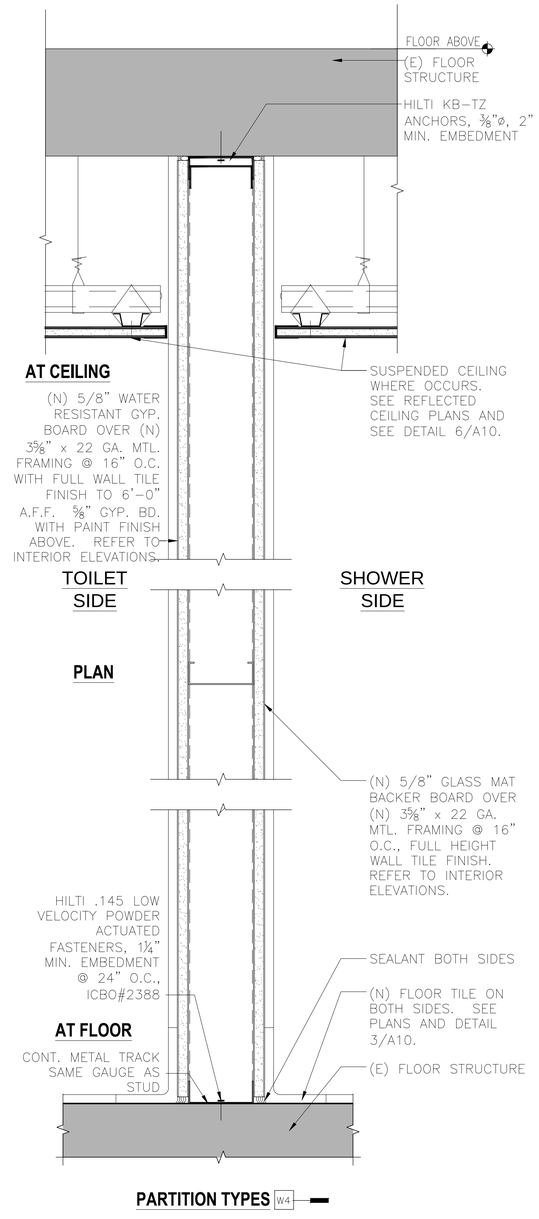
AT CEILING

PLAN

AT FLOOR

PARTITION TYPES W3

3 A7 PARTITION TYPE DETAIL
3" = 1'-0"



AT CEILING

TOILET SIDE

SHOWER SIDE

PLAN

AT FLOOR

PARTITION TYPES W4

4 A7 PARTITION TYPE DETAIL
3" = 1'-0"

RIM ARCHITECTS
CALIFORNIA ALASKA MARINE GUAM
1000 SANSOME STREET SUITE 200
SAN FRANCISCO, CA 94111
Phone: 415.247.2400
Fax: 415.247.2401
www.rimarchitects.com

BY:	REMARKS	DATE	PATH_NAME
		REVDATE	

REVISIONS SYMBOL

1.20.12

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE:

SHEET TITLE PARTITION TYPES

PROJECT BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION

PROJECT NUMBER: XXX

LOCATION BURBANK, CALIFORNIA

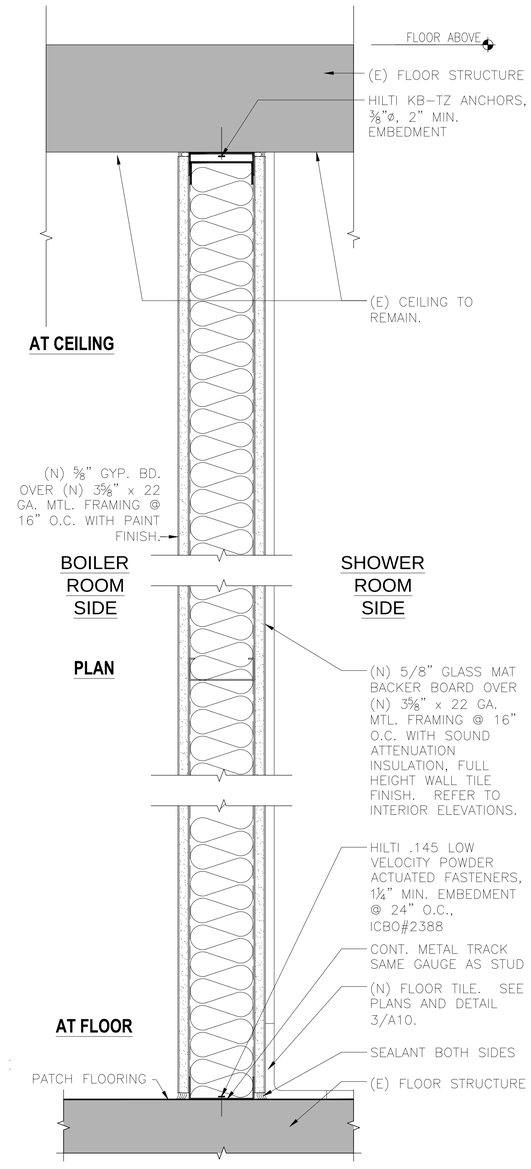
MILITARY DEPARTMENT

STATE OF CALIFORNIA

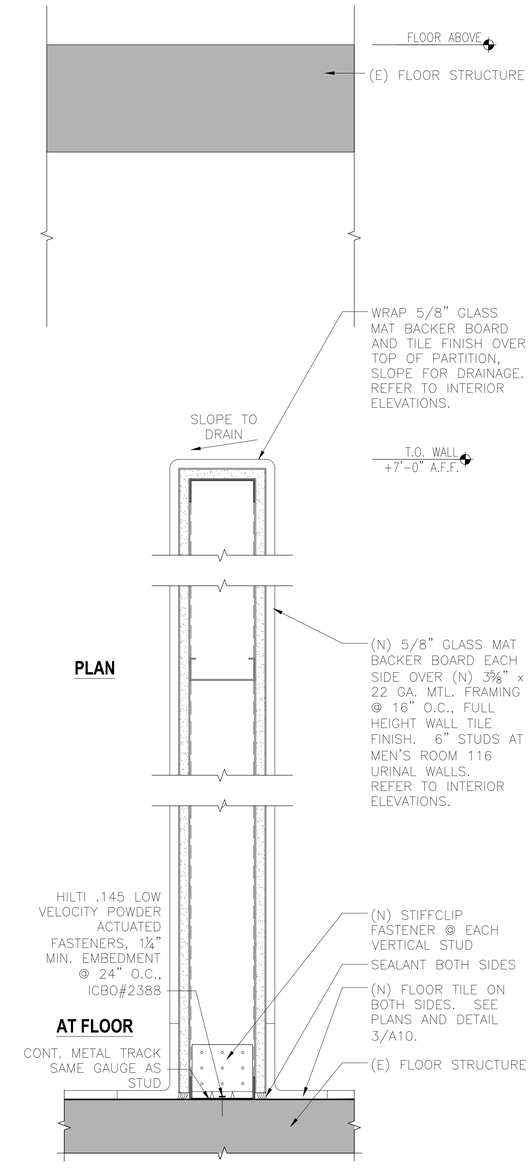
SHEET NUMBER

A7

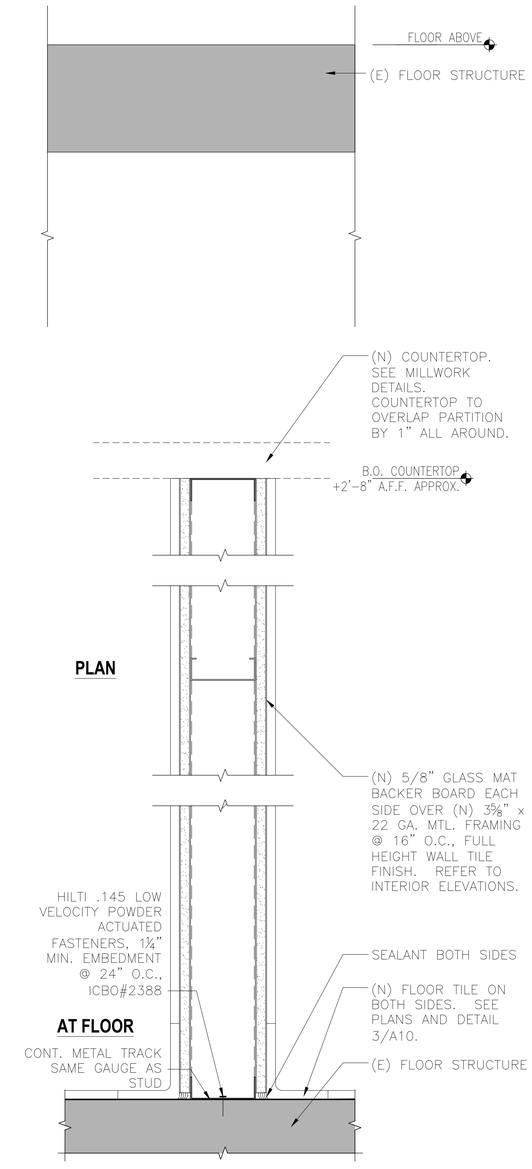
OF 12 OF 43



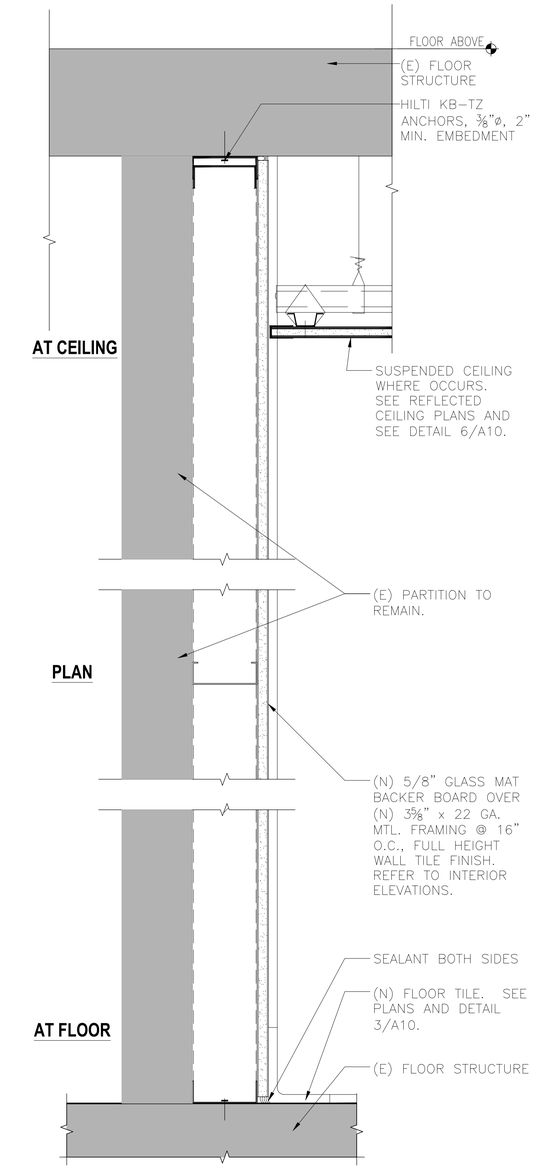
1 A8 PARTITION TYPE DETAIL
3" = 1'-0"



2 A8 PARTITION TYPE DETAIL
3" = 1'-0"



3 A8 PARTITION TYPE DETAIL
3" = 1'-0"



4 A8 PARTITION TYPE DETAIL
3" = 1'-0"

RIM ARCHITECTS
CALIFORNIA ALASKA HAWAII GUAM
1000 SANSOME STREET SUITE 200
SAN FRANCISCO, CA 94111
Phone: 415.247.2400
Fax: 415.247.2401
www.rimarchitects.com

BY:	REMARKS	DATE	PATH_NAME
		REVDATE	

REVISIONS SYMBOL

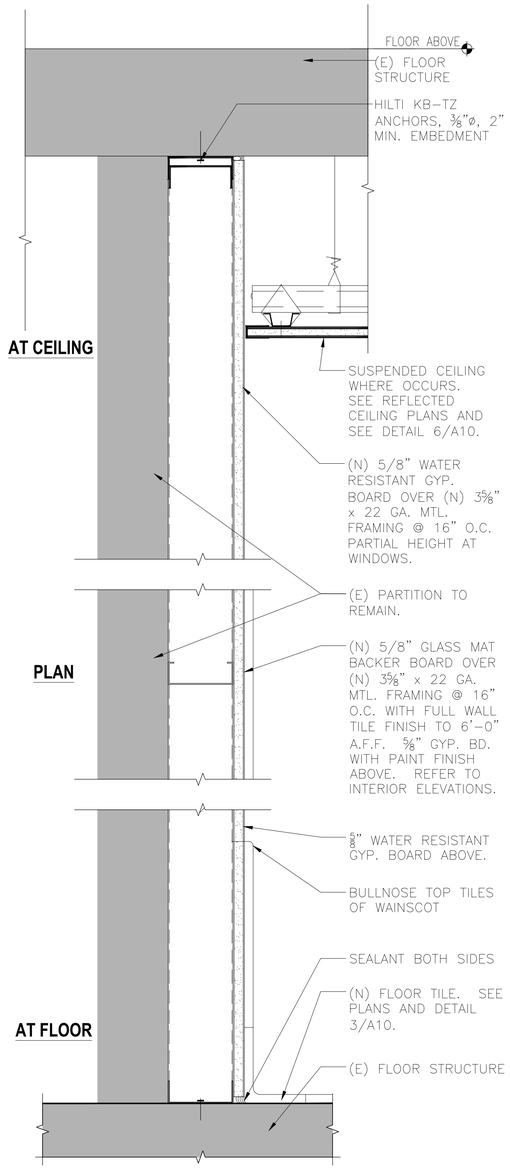
1.20.12

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE:

SHEET TITLE PARTITION TYPES

PROJECT BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
PROJECT NUMBER XXX
LOCATION BURBANK, CALIFORNIA
STATE OF CALIFORNIA
MILITARY DEPARTMENT

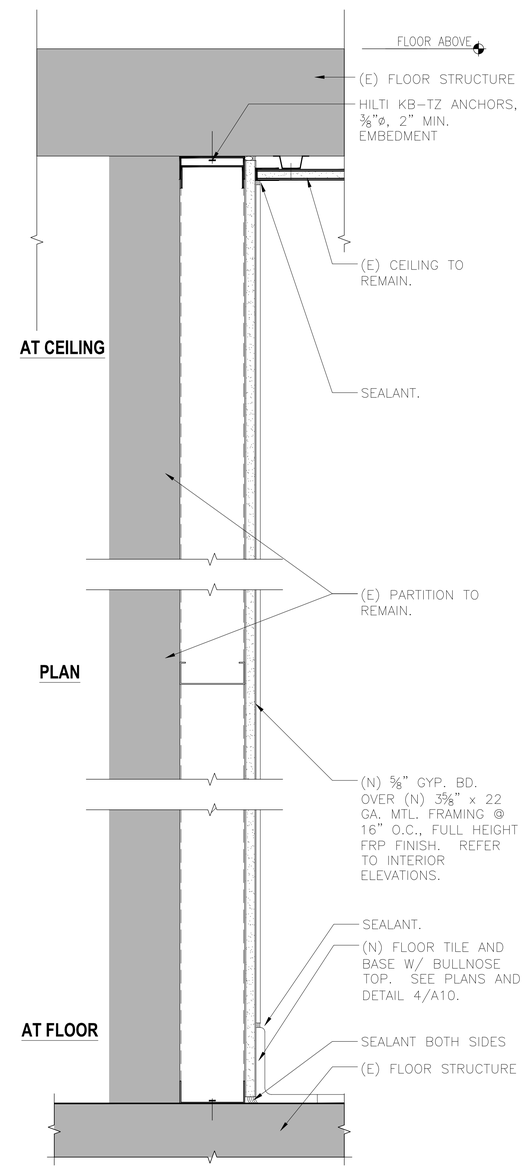
SHEET NUMBER
A8
OF 13 OF 43



PARTITION TYPES W9

1 A9 PARTITION TYPE DETAIL

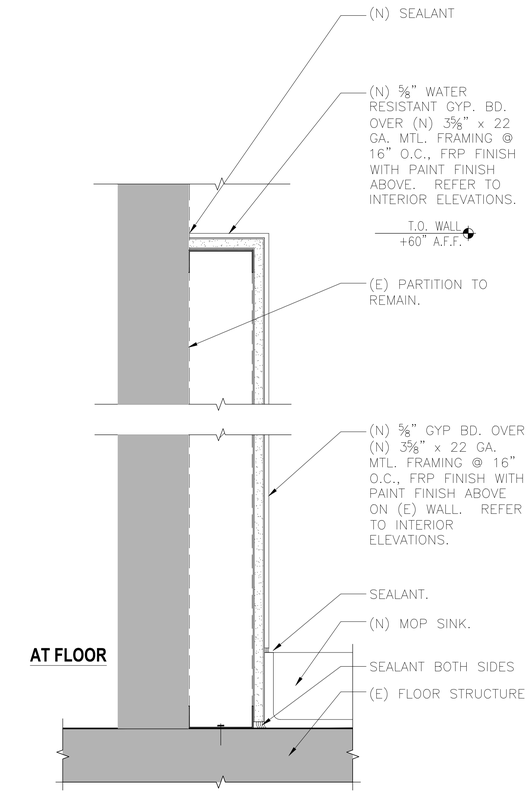
3" = 1'-0"



PARTITION TYPES W10

2 A9 PARTITION TYPE DETAIL

3" = 1'-0"



PARTITION TYPES W11

3 A9 PARTITION TYPE DETAIL

3" = 1'-0"

RIM ARCHITECTS
CALIFORNIA ALASKA MARINE GUAM
1000 SANSOME STREET SUITE 200
SAN FRANCISCO, CA 94111
Phone: 415.247.2400
Fax: 415.247.2401
www.rimarchitects.com

REVISIONS	SYMBOL	DATE	REMARKS	BY:
			REVDATE PATH_NAME	

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE: 1.20.12

PROJECT NUMBER: XXX

SHEET TITLE PARTITION TYPES

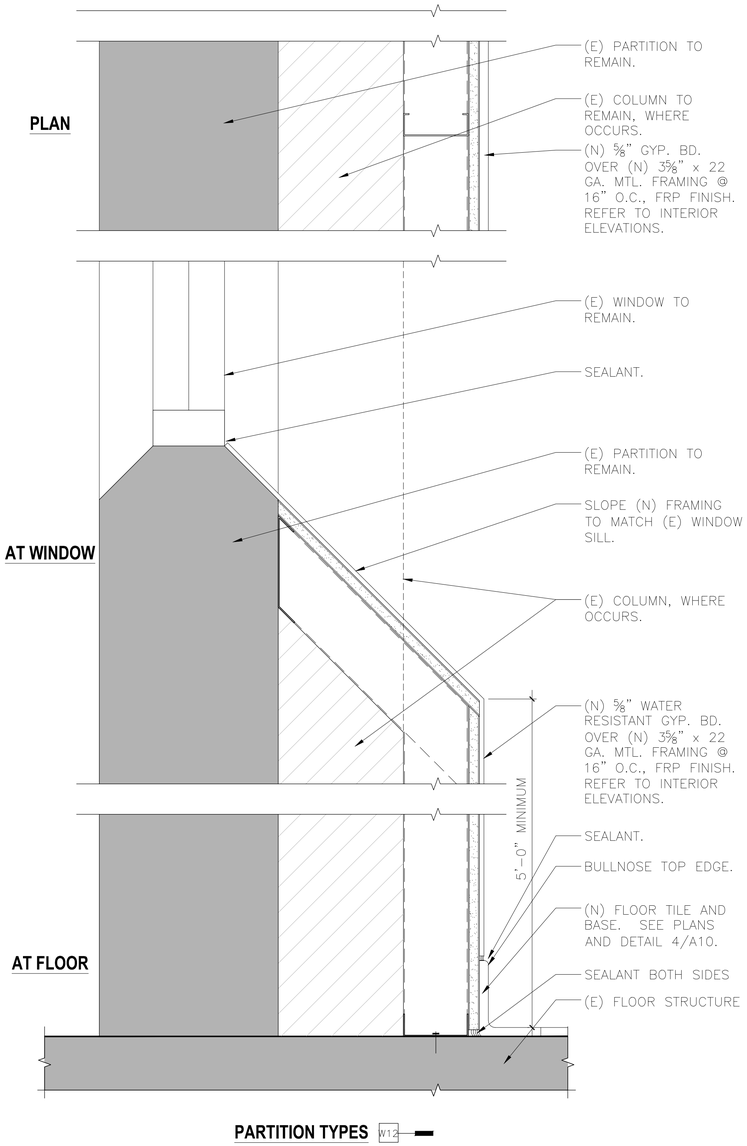
PROJECT BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION

LOCATION BURBANK, CALIFORNIA

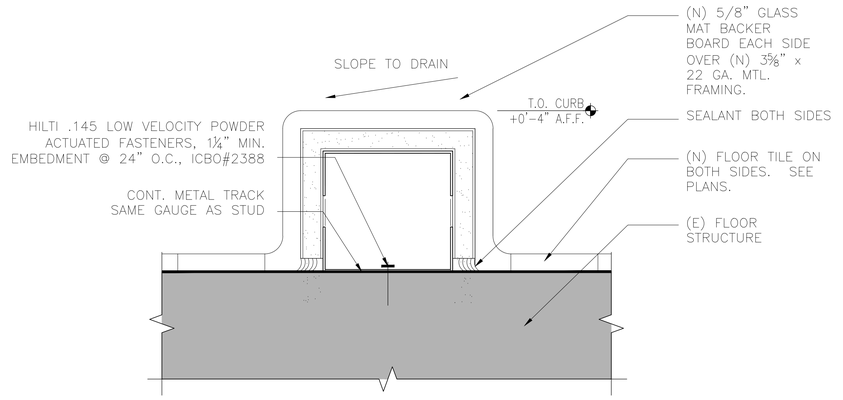
MILITARY DEPARTMENT
STATE OF CALIFORNIA

SHEET NUMBER
A9

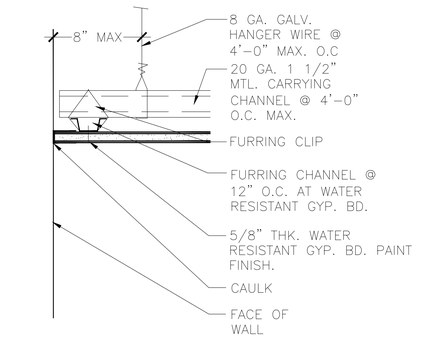
OF 14 OF 43



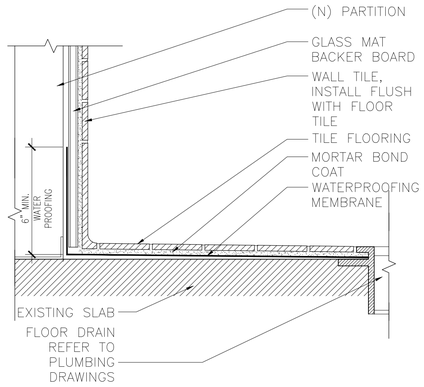
1 A10 PARTITION TYPE DETAIL
3" = 1'-0"



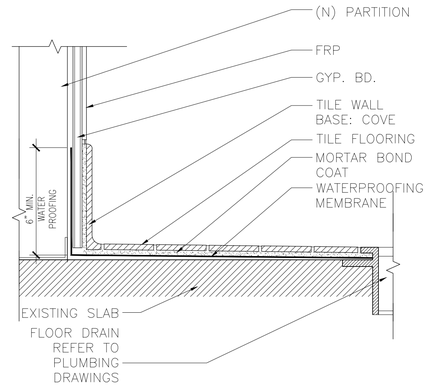
2 A10 SHOWER CURB DETAIL
6" = 1'-0"



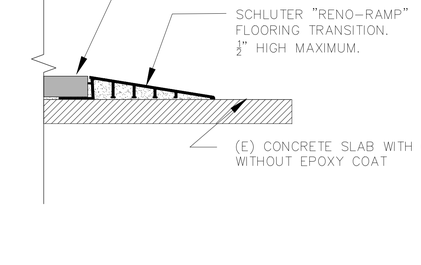
6 A10 SUSPENDED GYP CEILING DETAIL
3" = 1'-0"



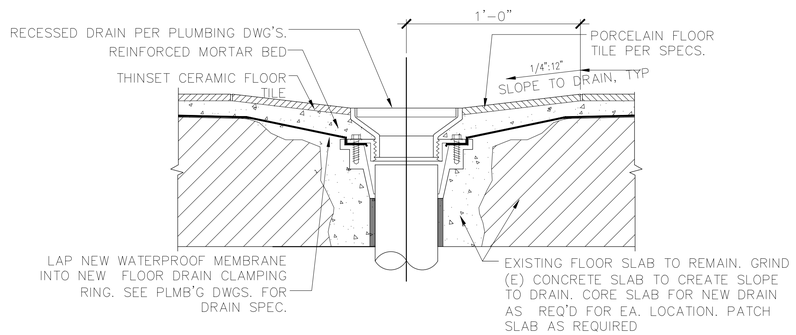
3 A10 RESTROOM FLOOR-WALL DETAIL
3" = 1'-0"



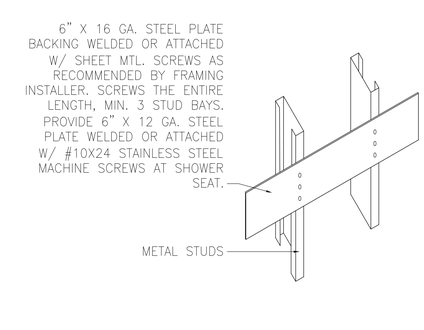
4 A10 KITCHEN FLOOR-WALL DETAIL
3" = 1'-0"



7 A10 FLOORING TRANSITION DETAIL
3" = 1'-0"



5 A10 FLOOR DRAIN DETAIL
3" = 1'-0"



8 A10 BACKING DETAIL
3/4" = 1'-0"

RIM ARCHITECTS
CALIFORNIA ALASKA MARINE CLASS
1000 SANSOME STREET SUITE 200 SAN FRANCISCO, CA 94111
Phone: 415.247.2400 Fax: 415.247.2401
www.rimarchitects.com

BY:	REMARKS	DATE	REVDATE	PATH_NAME

REVISIONS SYMBOL

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE: 1.20.12

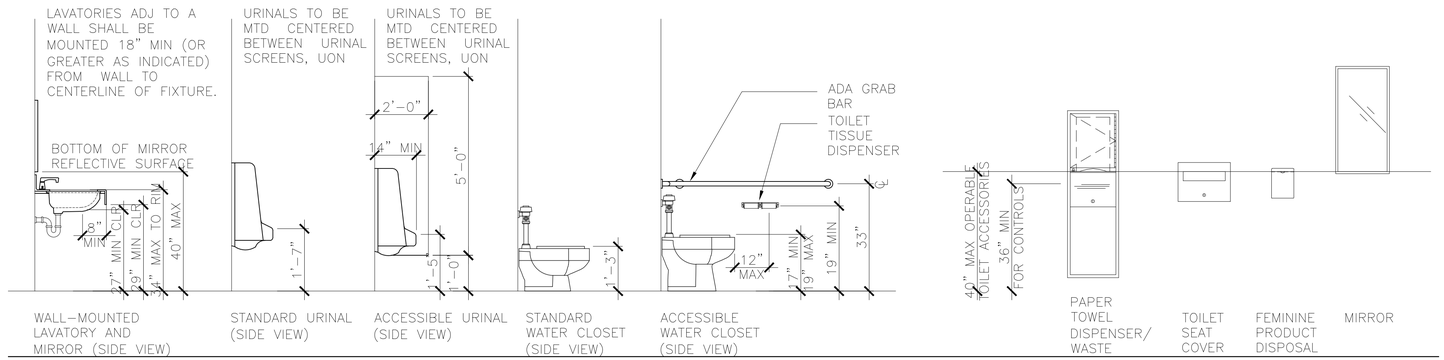
SHEET TITLE PARTITION TYPES & DETAILS

PROJECT BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
PROJECT NUMBER: XXX
LOCATION BURBANK, CALIFORNIA

MILITARY DEPARTMENT
STATE OF CALIFORNIA

SHEET NUMBER
A10

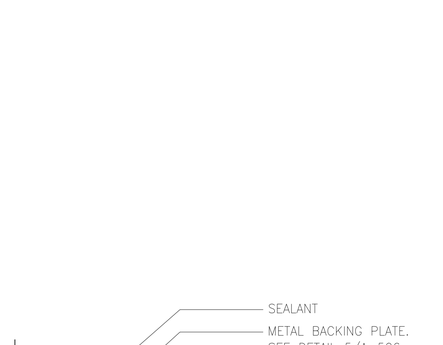
OF 15 OF 43



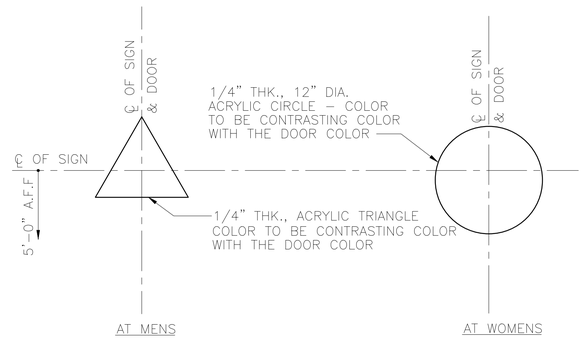
ACCESSIBLE FIXTURE MOUNTING HEIGHTS

TOILET ACCESSORY LIST		
A	B-5181	Reversible Folding Shower Seat
B	B-822	Lavatory-Mounted Soap Dispenser
C	B-165 3636	Series Channel-Framed Mirrors
D	B-290 1836	Series Angle-Framed Mirrors
E	B-3699	Surface-Mounted Paper Towel Dispenser/Waste Receptacle
F	B-682	Hat and Coat Hook - 2 in each shower
G	B-270	Surface-Mounted Sanitary Napkin Disposal
H	B-221	Surface-Mounted Seat-Cover Dispenser
I	204-3	Vinyl Shower Curtain
J	204-1	Shower Curtain Hook
K	B-6047 SERIES	Extra-Heavy-Duty Shower Curtain Rod
L	Accessibility Professionals #APCSSB2-180150-HW	Folding Shower/Dressing-Area Seat with folding legs
M	B-294 1630	Series Tilting Mirrors
N	B-212	Clothes Hook and Bumper - 1 on back of each toilet stall door
O	B-3944	Recessed Paper Towel Dispenser/Waste Receptacle
P	B-3949	Surface-Mounted Paper Towel Dispenser/Waste Receptacle
Q	B-2888	Surface-Mounted Multi-Roll Toilet Tissue Dispenser

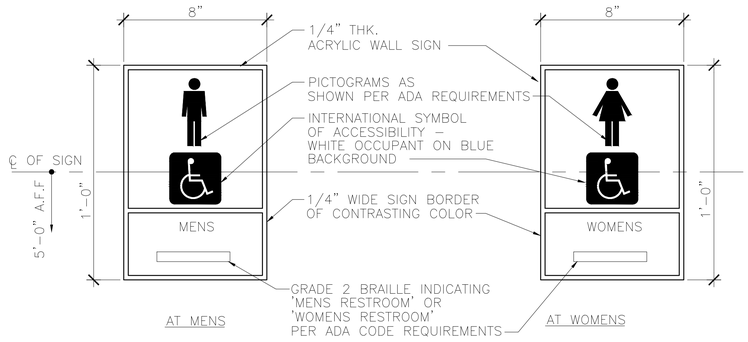
TOILET ACCESSORY SCHEDULE																	
ROOM	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
113 SHOWER ROOM	1	–	–	–	–	8	–	–	4	4	4	3	–	–	–	–	–
116 MEN'S RESTROOM	–	4	3	–	1	–	–	4	–	–	–	–	1	4	2	–	4
118B ADA WOMEN'S ROOM	1	2	–	–	–	2	2	2	1	1	1	–	2	2	–	1	2
202 WOMEN'S ROOM	–	2	–	1	1	4	2	2	–	–	–	2	–	2	–	–	2
204B MEN'S ROOM	–	2	2	–	–	4	–	2	2	2	2	2	–	2	–	1	2



1 A11 COUNTERTOP DETAIL
3/4" = 1'-0"



3 A11 ADA DOOR SIGN DETAIL
3/4" = 1'-0"



2 A11 ADA WALL SIGN DETAIL
3/4" = 1'-0"

RIM ARCHITECTS
CALIFORNIA ALASKA MARINE CLASS
1000 BANSOME STREET SUITE 200
SAN FRANCISCO, CA 94133
Phone: 415.247.0400
Fax: 415.247.0401
www.rimarchitects.com

BY:	REMARKS	DATE	PATH_NAME

REVISIONS	SYMBOL	DATE

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE: 1.20.12

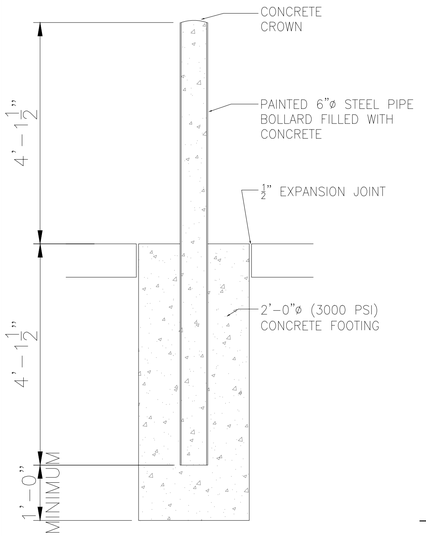
SHEET TITLE DETAILS AND SCHEDULES

PROJECT BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
PROJECT NUMBER: XXX
LOCATION BURBANK, CALIFORNIA

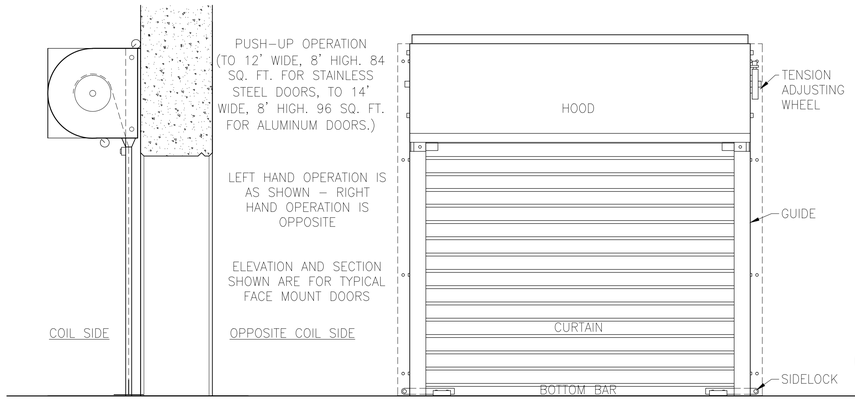
MILITARY DEPARTMENT
STATE OF CALIFORNIA

SHEET NUMBER
A11

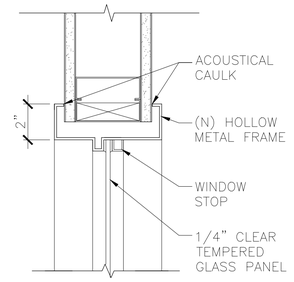
OF 16 OF 43



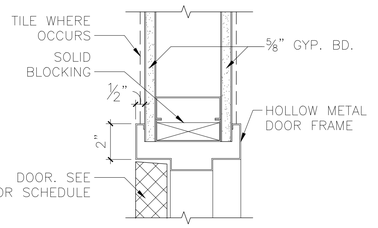
8 A12 BOLLARD DETAIL
3/4" = 1'-0"



6 A12 ROLL-UP OVERHEAD DOOR DETAIL
3/4" = 1'-0"

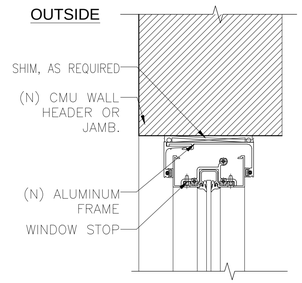


3 A12 WINDOW HEAD/JAMB DETAIL
3" = 1'-0"

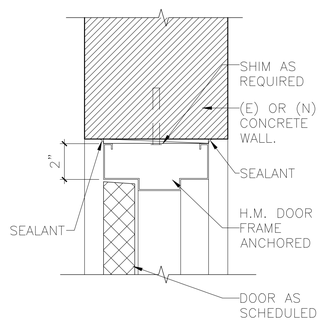


2 A12 DOOR HEAD/JAMB DETAIL
3" = 1'-0"

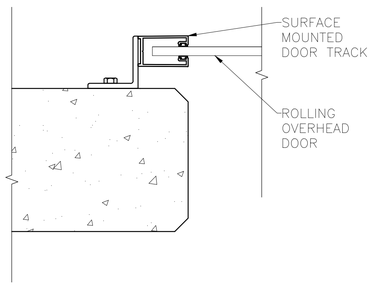
7 A12 ROLL-UP COUNTER DOOR SILL/JAMB/HEAD DETAIL
3" = 1'-0"



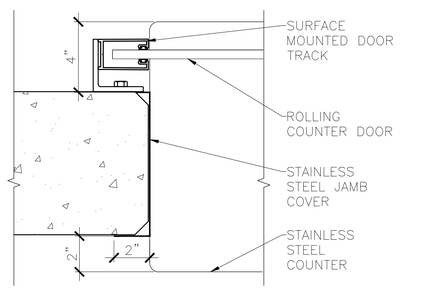
5 A12 WINDOW HEAD/JAMB DETAIL
3" = 1'-0"



4 A12 DOOR HEAD/JAMB DETAIL
3" = 1'-0"



1A A12 ROLL-UP OVERHEAD DOOR
3" = 1'-0"



1 A12 ROLL-UP COUNTER DOOR
3" = 1'-0"

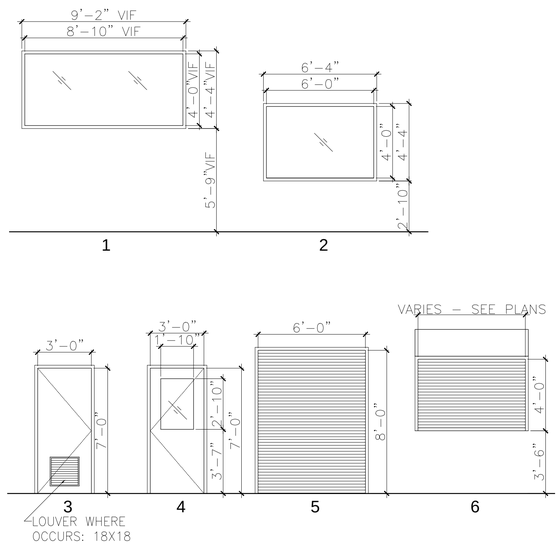
SHEET NOTES

1. SEE MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION.
2. PAINT ALL WALLS WITH SEMI-GLOSS EPOXY PAINT, UNLESS NOTED OTHERWISE.

OPENING SCHEDULE

DOOR OR LITE					FRAME	DETAILS		
OPENING	NAME	TYPE	SIZE	MAT	MAT	HEAD/ JAMB	THRESHOLD /SILL	NOTES
112	SINGLE DOOR	3	3'-0" X 7'-0"	HM	HM	4 A12	7 A10	–
112A	ROLL-UP COUNTER DOOR	6	6'-6" X 4'-0"	SS	SS	1 A12 / 7 A12	1 A12 / 7 A12	–
112B	ROLL-UP COUNTER DOOR	6	4'-0" x 4'-0"	SS	SS	1 A12 / 7 A12	1 A12 / 7 A12	
112C	ROLL-UP OVERHEAD DOOR	5	6'-0" x 8'-0"	IHM	IHM	1A A12 / 7 A12		
112D	SINGLE DOOR	4	3'-0" x 7'-0"	HM	HM	2 A12		TEMPERED GLASS, SOUND CAULKING
112E	INTERIOR LITE	2	6'-4" x 4'-4"	–	HM	3 A12		TEMPERED GLASS, SOUND CAULKING
113	SINGLE DOOR	3	3'-0" x 7'-0"	HM	HM	4 A12	7 A10	LOUVER
113A	EXTERIOR WINDOW	1	9'-2" x 4'-4" VIF	ALUM	ALUM	5 A12		
116	SINGLE DOOR	3	3'-0" x 7'-0"	HM	HM	4 A12	7 A10	LOUVER
116A	EXTERIOR WINDOW	1	9'-2" x 4'-4" VIF	ALUM	ALUM	5 A12		
118B	SINGLE DOOR	3	3'-0" x 7'-0"	HM	HM	4 A12	7 A10	LOUVER; LOCKABLE LATCHSET
202	SINGLE DOOR	3	3'-0" x 7'-0"	HM	HM	2 A12	7 A10	LOUVER

OPENING TYPES



RIM ARCHITECTS
CALIFORNIA ALASKA HAWAII GUAM
1000 SANSOME STREET
SUITE 400
SAN FRANCISCO, CA 94111
Phone: 415.247.2400
Fax: 415.247.2401
www.rimarchitects.com

BY:	REMARKS	DATE	SYMBOL	REVISIONS	S/K	
						1.20.12
				PATH: _NAME	REVDATE	

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE:

SHEET TITLE OPENING SCHEDULE AND DETAILS
PROJECT BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
LOCATION BURBANK, CALIFORNIA
PROJECT NUMBER: XXX
MILITARY DEPARTMENT
STATE OF CALIFORNIA

SHEET NUMBER
A12

OF 17 OF 43

ELECTRICAL SYMBOLS LEGEND

LIGHTING

- FLUORESCENT FIXTURE, RECESSED
- RECESSED DOWN LIGHT FIXTURE
- RECESSED DIRECTIONAL FIXTURE (ARROW INDICATES AIMING)
- FLUORESCENT FIXTURE, SURFACE MOUNTED
- SURFACE, PENDANT OR OTHER FIXTURE
- LARGE DIAMETER PENDANT, DEPICTING APPROXIMATE DIAMETER
- FLUORESCENT FIXTURE, WALL MOUNTED
- WALL–MOUNTED HID, INCANDESCENT, OR COMPACT FLUORESCENT FIXTURE
- FLUORESCENT FIXTURE, PENDANT OR CABLE HUNG
- LIGHT TRACK AND TRACK–MOUNTED FIXTURES
- BATH FAN WITH INTEGRAL LIGHT
- EXIT SIGN, SINGLE FACE WITH DIRECTIONAL ARROWS AS INDICATED
- EXIT SIGN, DOUBLE FACE WITH DIRECTIONAL ARROWS AS INDICATED
- EXIT SIGN, LOW LEVEL (LL)
- COMBINATION EXIT/EMERGENCY LIGHT FIXTURE MOUNTING HEIGHT: +8'–0" AFF, UON
- EMERGENCY FIXTURE MOUNTING HEIGHT: +8'–0" AFF, UON
- DENOTES FIXTURE CONNECTED TO EMERGENCY CIRCUIT
- ADJUSTABLE SPOT OR FLOOD (ARROW INDICATES AIMING)
- OUTDOOR SITE LIGHT, POLE MOUNTED LUMINAIRE ARROW INDICATES AIMING DIRECTION, IF APPLICABLE
- BOLLARD OR POST–TOP FIXTURE

SWITCHING

- $ LIGHT SWITCH, SPST – MOUNTING HEIGHT: +42" AFF, UON
- $2 LIGHT SWITCH, DPST – MOUNTING HEIGHT: +42" AFF, UON
- $3 LIGHT SWITCH, 3–WAY – MOUNTING HEIGHT: +42" AFF, UON
- $a (a DENOTES SWITCH) LOW VOLTAGE SWITCH, MOMENTARY CONTACT, 3–POS., CENTER–OFF, MOUNTING HEIGHT: +42" AFF, UON
- $T TIMER SWITCH – MOUNTING HEIGHT: +42" AFF, UON
- 1a (DENOTES SWITCH; DENOTES CIRCUIT) CIRCUIT AND SWITCH DESIGNATION FOR LIGHTING FIXTURE
- 6R5 (DENOTES RELAY; DENOTES CIRCUIT) CIRCUIT AND RELAY DESIGNATION FOR LIGHTING FIXTURES (SEE CORRESPONDING LIGHTING CONTROL PANEL RELAY SCHEDULE)
- D1 DIMMER SWITCH – MOUNTING HEIGHT: +42" AFF, UON
- PP1 OCCUPANCY SENSOR POWER PACK, 1–CIRCUIT, MOUNTED ABOVE CEILING
- PP2 OCCUPANCY SENSOR POWER PACK, 2–CIRCUIT MOUNTED ABOVE CEILING
- CS1 OCCUPANCY SENSOR, CEILING MOUNTED, LINE VOLTAGE
- CS2 OCCUPANCY SENSOR, CEILING MOUNTED, LOW VOLTAGE
- W1 OCCUPANCY SENSOR, WALL MOUNTED, LINE VOLTAGE, 1–CIRCUIT MOUNTING HEIGHT: +42" AFF, UON
- W2 OCCUPANCY SENSOR, WALL MOUNTED, LINE VOLTAGE, 2–CIRCUIT MOUNTING HEIGHT: +42" AFF, UON
- PC PHOTO CONTROL SWITCH – MOUNT ON BUILDING EXTERIOR
- TC TIME CLOCK FOR LIGHTING CONTROL

POWER

- +48" (DENOTES HEIGHT IN INCHES AFF (INTERIOR) AFG (EXTERIOR)) DUPLEX RECEPTACLE, 15A 125V 2P 3W, GROUNDING TYPE, MOUNTING HEIGHT: +18" AFF UON
- $ DUPLEX RECEPTACLE – SPLIT WIRED, SWITCHED
- DUPLEX RECEPTACLE – EMERGENCY POWER
- C DUPLEX RECEPTACLE – CEILING MOUNTED
- FLOOR RECEPTACLE, 15A 125V 2P 3W, GROUNDING TYPE, FLUSH
- TYPE UON
- DOUBLE DUPLEX RECEPTACLE, 15A 125V 2P 3W, GROUNDING TYPE, MOUNTING HEIGHT: +18" AFF UON
- GFCI OR GFI SINGLE RECEPTACLE, 20A 125V 2P 3W, GROUNDING TYPE, MOUNTING HEIGHT: +18" AFF UON
- SPECIAL PURPOSE RECEPTACLE AS DESIGNATED SEE 'SPECIAL SYMBOLS' ON EACH SHEET
- J OR J DUAL SERVICE RECESSED FLOOR BOX WITH DUPLEX AND DATA RECEPTACLES
- JUNCTION BOX, CODE SIZED UON
- FLOOR JUNCTION BOX
- DISCONNECT SWITCH – FUSED WHERE APPLICABLE
- MOTOR STARTER, COMBINATION WITH DISCONNECT SWITCH
- M MOTOR STARTER OR CONTROLLER
- MOTOR CONNECTION
- WH OR WH CEILING EXHAUST FAN
- P WATER HEATER
- POWER POLE: P=POWER, T=TELEPHONE, D=DATA, C=COMBINATION
- TEST PORT
- GROUND ROD
- T GUY WIRE AND ANCHOR
- BT THERMOSTAT (SEE MECHANICAL DRAWINGS) MOUNTING HEIGHT: +42" AFF UON
- BYPASS TIMER OR TIME SWITCH
- LC PUSHBUTTON
- LIGHTING CONTACTOR

COMMUNICATION

- CCTV CAMERA, CEILING MOUNT
- I INTERCOM CALL IN SWITCH – MOUNTING HEIGHT: +42" AFF, UON
- TELEPHONE OUTLET FOR WALL MOUNTED TELEPHONE MOUNTING HEIGHT: +42" AFF UON
- DATA OUTLET – MOUNTING HEIGHT: +18" AFF UON
- 2 (DENOTES # OF TELEPHONE JACKS); 1 (DENOTES # OF DATA JACKS) TELEPHONE/DATA OUTLET, FLUSH TYPE UON MOUNTING HEIGHT: +18" AFF UON
- 1-2 SURFACE RACEWAY WITH POWER AND TELEPHONE/DATA RECEPTACLES AS INDICATED
- TV CATV OUTLET – MOUNTING HEIGHT: +96" AFF UON
- AV1 AUDIO/VIDEO OUTLET – MOUNTING HEIGHT: +18" AFF UON
- C CLOCK WITH BUZZER – MOUNTING HEIGHT: SEE PLANS
- B BELL, STANDARD 6" – MOUNTING HEIGHT: SEE PLANS PA SYSTEM
- S SPEAKER – WALL MOUNTED
- S PA SYSTEM SPEAKER – CEILING MOUNTED
- PA SYSTEM HORN – MOUNTING HEIGHT: SEE PLANS

EQUIPMENT

- MAIN SWITCHBOARD
- DISTRIBUTION PANEL BOARD
- COMBINATION METER/MAIN SERVICE PANEL
- OR BRANCH CIRCUIT PANEL BOARD, SURFACE OR FLUSH MOUNTED
- OR LIGHTING CONTROL PANEL
- OR SIGNAL TERMINAL CABINET OR CONTROL PANEL SURFACE OR FLUSH MOUNTED
- SIGNAL TERMINAL BACKBOARD
- N30 CONCRETE UNDERGROUND HAND HOLE (NUMBER DENOTES CHRISTY SIZE)
- T OR TRANSFORMER

CONDUIT

- CONDUIT INSTALLED ABOVE GRADE
- CONDUIT INSTALLED UNDERGROUND OR UNDER SLAB
- CONDUIT STUB–OUT WITH CAP
- FLEXIBLE CONDUIT WHIP TO LIGHT FIXTURE OR EQUIPMENT
- L1–4 (INDICATES CIRCUIT BREAKER I.D.; INDICATES BRANCH PANEL) CONDUIT HOME RUN TO DESIGNATED PANEL, TERMINAL, OR CONTROL CABINET
  EXAMPLES: L1–6,8 (COMMA INDICATES MULTIPLE SINGLE POLE CIRCUITS); L1–10/12 (SLASH INDICATES MULTI–POLE CIRCUIT)
- NOTE FOR CONDUIT: THE TIC MARKS INDICATE THE QUANTITY OF #12 AWG WIRES OR, IF INDICATED, THE QUANTITY OF OTHER SIZE WIRE OR CABLES.
- SEE THE SINGLE LINE DIAGRAM FOR FEEDER SIZES.
  EXAMPLES: /// = (3) #12; # #10 = (2) #10; / F1 = (1) TYPE F1 CABLE. SEE CABLE SCHEDULE.

OBJECT LINES

- NEW OBJECTS (WIDE)
- EXISTING OBJECTS TO REMAIN. MAY INCLUDE NEW CIRCUITING ETC. (FINE)
- OBJECTS TO BE DEMOLISHED (EXTRA FINE, SCREENED, DASHED)

ANNOTATION

- 1 KEYNOTE
- 1 DEMOLITION NOTE
- 10 RACEWAY, FEEDER OR CIRCUIT DESIGNATION (SEE SCHEDULE)
- A (DENOTES TYPE) / 180 (DENOTES WATTS) FIXTURE TYPE DESIGNATION (SEE SCHEDULE)
- 1 (DETAIL NUMBER) / E–501 (SHEET NUMBER ON WHICH DETAIL APPEARS) DETAIL INDICATOR
- A (SECTION LETTER) / E–301 (SHEET NUMBER ON WHICH SECTION APPEARS) SECTION INDICATOR
- WH / 1 MECHANICAL EQUIPMENT DESIGNATION (SEE SCHEDULE)

ABBREVIATIONS

(D)	DEMOLITION
(E)	EXISTING
(F)	FUTURE
(N)	NEW
A	AMPERES
AC	ALTERNATING CURRENT
AF	AMP FRAME
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHU	AIR HANDLING UNIT
AIC	AMPS INTERRUPTING CAPACITY
ANN	ANNUNCIATOR
ATS	AUTOMATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAUGE
BAT	BATTERY
BFG	BELOW FINISH GRADE
CATV	CABLE TELEVISION
C	CONDUIT
CB	CIRCUIT BREAKER
CCTV	CLOSED CIRCUIT TELEVISION
CO	CONDUIT ONLY
CPT	CONTROL POWER TRANSFORMER
CT	CURRENT TRANSFORMER
CU	COPPER
DC	DIRECT CURRENT
EF	EXHAUST FAN
EGU	ENGINE GENERATOR UNIT
EM	EMERGENCY
EMT	ELECTRICAL METALLIC CONDUIT
ENT	ELECTRICAL NON–METALLIC CONDUIT
EP	EXPLOSION PROOF
FA	FIRE ALARM
FACP	FIRE ALARM CONTROL PANEL
FC	FAN COIL
FU	FUSE
GND	GROUND
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GFI	GROUND FAULT INTERRUPTER
GFR	GROUND FAULT RELAY
HID	HIGH INTENSITY DISCHARGE
HOA	"HAND–OFF–AUTO" SWITCH
HP	HORSEPOWER
HPS	HIGH PRESSURE SODIUM
HVAC	HEATING, VENTILATION & AIR–CONDITIONING
IG	ISOLATED GROUND
JB	JUNCTION BOX
KAIC	KILO–AMPS INTERRUPTING CAPACITY
KV	KILOVOLT
KVA	KILOVOLT–AMP
KW	KILOWATT
KWH	KILOWATT–HOUR
LPS	LOW PRESSURE SODIUM
LV	LOW VOLTAGE
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MCP	MOTOR CIRCUIT PROTECTOR
MFR	MANUFACTURER
MH	METAL HALIDE
MLO	MAIN LUGS ONLY
MV	MEDIUM VOLTAGE
NIC	NOT IN CONTRACT
NL	NIGHT LIGHT
NTS	NOT TO SCALE
OC	ON CENTER
PA	PUBLIC ADDRESS
PT	POTENTIAL TRANSFORMER
PVC	POLYVINYL CHLORIDE
PB	PULL BOX, ELECTRICAL
RECPT	RECEPTACLE, OUTLET
RGS	RIGID GALVANIZED STEEL
RVSS	REDUCED VOLTAGE SOFT START
RTU	REMOTE TERMINAL UNIT
TV	TELEVISION MONITOR (SET)
TVSS	TRANS. VOLT. SURGE SUPPRESSOR
UF	UNDER FLOOR
UG	UNDERGROUND
UON	UNLESS OTHERWISE NOTED
UPS	UNINTERRUPTIBLE POWER SUPPLY
V	VOLT
VA	VOLT–AMP
VFD	VARIABLE FREQUENCY DRIVE
WP	WEATHERPROOF
XFMR	TRANSFORMER

REGISTERED PROFESSIONAL ENGINEER — RICHARD P. GUDIANA — No. E15580 — Exp. 12/31/13 — ELECTRICAL — STATE OF CALIFORNIA

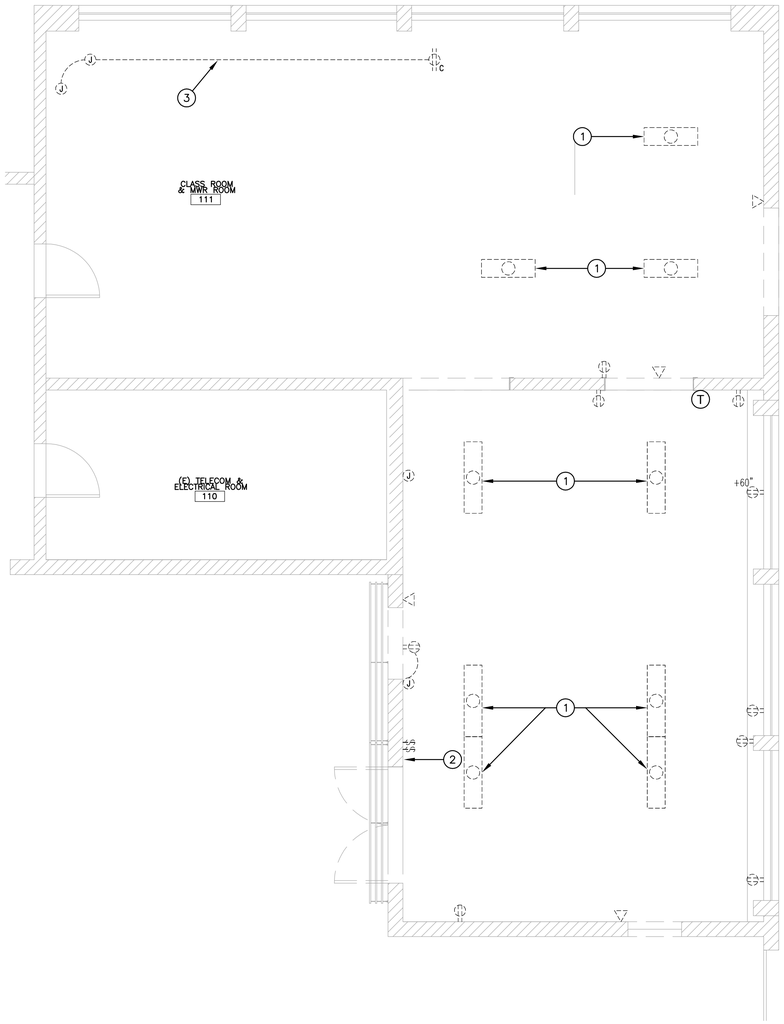
WINZLER & KELLY
2235 Mercury Way, Suite 150
Santa Rosa, CA 95407
Tel: 707 823 1010 | Fax: 707 527 8679
www.winzler.com

BY:	REMARKS	SYMBOL	DATE	REVDATE	PATH_NAME

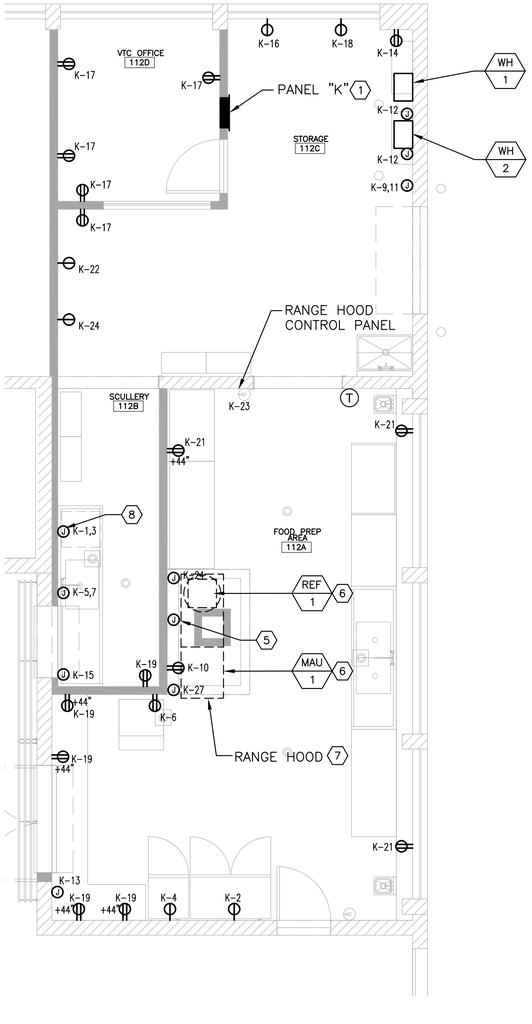
REVISIONS				3 JULY 2011
DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:	

SHEET TITLE: ELECTRICAL SYMBOLS, LEGEND AND NOTES
PROJECT: BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
PROJECT NUMBER: XXX
LOCATION: BURBANK, CALIFORNIA
MILITARY DEPARTMENT
STATE OF CALIFORNIA

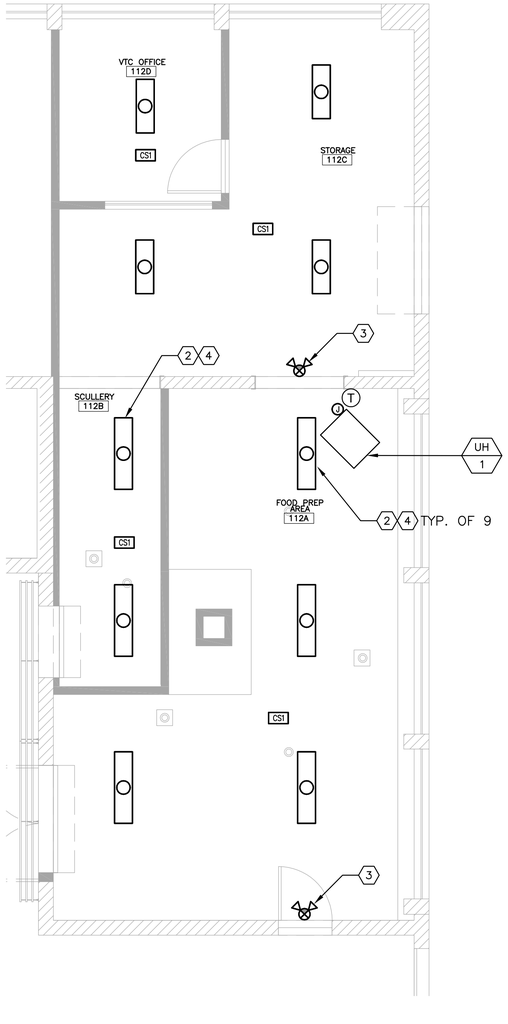
SHEET NUMBER: E0



3 / E1 DEMOLITION PLAN – NEW KITCHEN
1/4" = 1'–0"



2 / E1 FLOOR PLAN – NEW KITCHEN
1/4" = 1'–0"



1 / E1 RCP PLAN – NEW KITCHEN
1/4" = 1'–0"

SHEET GENERAL NOTES

1. REMOVE CONDUITS AND WIREMOLD RUNNING AROUND PERIMETER OF EXISTING WALLS. REMOVE POWER CIRCUITS BACK TO SOURCE.
2. REMOVE TELEPHONE/DATA CIRCUITS RUNNING EXPOSED AND IN WIREMOLD. PULL WIRES BACK TO ROOM 111; COIL UP FOR FUTURE USE.
3. EXISTING CIRCUITS ARE FED FROM PANEL #3 (SEE SHEET E2 FOR LOCATION). COORDINATE WITH BUILDING STAFF BEFORE TURNING OFF ANY BREAKERS.
4. ROUTE CONDUIT AND/OR ARMORED CABLE, AND PROVIDE BOXES, CONCEALED IN FURRED WALL AND CEILING SPACES WHERE POSSIBLE. PROVIDE EXPOSED SURFACE–MOUNTED CONDUIT ONLY ON WALLS AND CEILINGS WITHOUT FURRED SPACES.
5. COREDRILL WHERE NEW CONDUITS PASS THROUGH EXISTING CONCRETE WALLS. COREDRILL AND PROVIDE SLEEVES WHERE NEW ARMORED CABLE PASSES THROUGH EXISTING CONCRETE WALLS.
6. PROVIDE 2–#12 AWG AND 1–#12 GND IN A 3/4" CONDUIT OR IN A TYPE MC CABLE, FOR ALL CIRCUITS UNLESS NOTED OTHERWISE.
7. SEE DRAWING M4 FOR KITCHEN HOOD CONTROL PANEL WIRING DIAGRAM.
8. PROVIDE DISCONNECT SWITCHES FOR ALL HARDWIRED FANS, HEATERS, AND OTHER MECHANICAL EQUIPMENT.

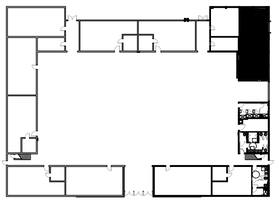
○ DEMOLITION NOTES

1. REMOVE EXISTING LIGHT FIXTURE.
2. REMOVE SWITCHES FROM BOX.
3. REMOVE SURFACE–MOUNT CONDUIT AND BOXES FROM CEILING.

⬡ KEYNOTES

1. SEE DRAWING E4 FOR FEEDER CONDUIT ROUTE FROM ELECTRICAL ROOM.
2. PROVIDE POWER TO LIGHT FIXTURES VIA EXISTING LIGHTING CIRCUIT FROM PANEL #3.
3. PROVIDE EXIT SIGN WITH EMERGENCY LIGHTING UNIT, LITHONIA LHQM–S–3–R, OR EQUAL. CONNECT AHEAD OF SWITCHING IN EACH ROOM.
4. PROVIDE SURFACE–MOUNT FLUORESCENT LOW–PROFILE WRAPAROUND FIXTURE, SUITABLE FOR DAMP LOCATION, LITHONIA LB–2–32–120–GEB10RS–GMF, OR EQUAL.
5. PROVIDE POWER TO GAS SHUTOFF VALVE FROM KITCHEN HOOD CONTROL PANEL, SEE CONTROL DIAGRAM.
6. PROVIDE POWER TO REF–1 AND MAU–1 VIA CONTACTOR IN KITCHEN HOOD CONTROL PANEL. SEE CONTROL DIAGRAM.
7. PROVIDE POWER TO HOOD LIGHTS VIA CONTRACTOR IN KITCHEN HOOD CONTROL PANEL.
8. PROVIDE 2–#6 AWG AND 1–#10 GND IN A 1" CONDUIT, OR IN A TYPE MC CABLE, BETWEEN THE DISHWASHER AND PANEL "K".

REGISTERED PROFESSIONAL ENGINEER
RICHARD P. GUERZAN
No. E15580
Exp. 12/31/13
ELECTRICAL
STATE OF CALIFORNIA



KEY PLAN

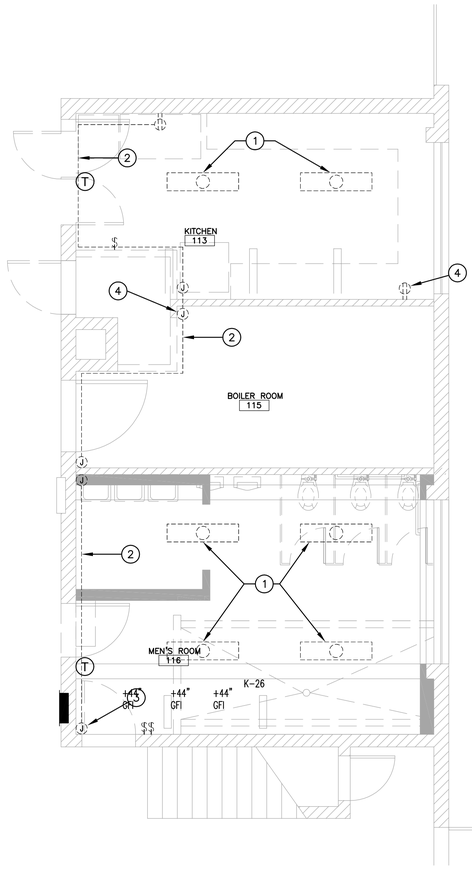
WINZLER & KELLY
2235 Mercury Way, Suite 150
Santa Rosa, CA 95407
Tel: 707.823.1010 | Fax: 707.527.8879
www.w-k.com

BY:	REMARKS	DATE	SYMBOL	REVISIONS

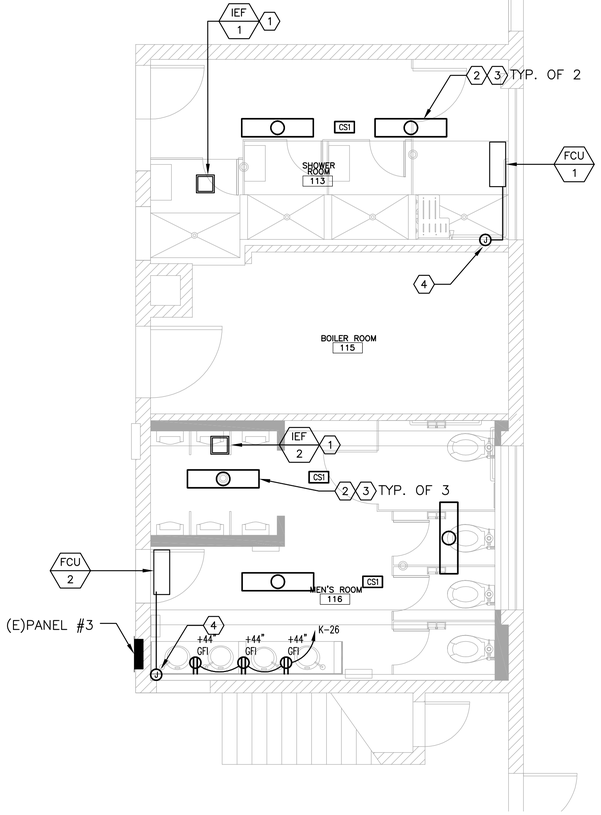
DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE: 3 JULY 2011

SHEET TITLE: FIRST FLOOR ELECTRICAL KITCHEN PLAN – DEMO AND NEW
PROJECT: BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
PROJECT NUMBER: XXX
LOCATION: BURBANK, CALIFORNIA
STATE OF CALIFORNIA
MILITARY DEPARTMENT

SHEET NUMBER: E1
OF 38 OF 43



2 / E2 DEMO PLAN – SHOWER & MEN'S ROOM
1/4" = 1'-0"
0" 2' 4' 8'



1 / E2 FLOOR PLAN – SHOWER & MEN'S ROOM
1/4" = 1'-0"
0" 2' 4' 8'

SHEET GENERAL NOTES

1. ROUTE CONDUIT AND/OR ARMORED CABLE, AND PROVIDE BOXES, CONCEALED IN FURRED WALL AND CEILING SPACES WHERE POSSIBLE. PROVIDE EXPOSED SURFACE–MOUNTED CONDUIT ONLY ON WALLS AND CEILINGS WITHOUT FURRED SPACES.
2. COREDRILL WHERE NEW CONDUITS PASS THROUGH EXISTING CONCRETE WALLS. COREDRILL AND PROVIDE SLEEVES WHERE NEW ARMORED CABLE PASSES THROUGH EXISTING CONCRETE WALLS.
3. ALL CIRCUITS TO BE 2–#12 AWG AND 1–#12 GND, IN A 3/4" CONDUIT OR IN A TYPE AC CABLE, UNLESS NOTED OTHERWISE.
4. EXISTING CIRCUITS ARE FED FROM PANEL #3 (SEE SHEET E2 FOR LOCATION). COORDINATE WITH BUILDING STAFF BEFORE TURNING OFF ANY BREAKERS.

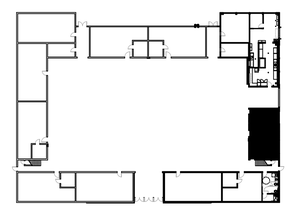
◯ DEMOLITION NOTES

1. REMOVE EXISTING LIGHT FIXTURES.
2. REMOVE SURFACE–MOUNTED CONDUIT AND BOXES.
3. PROTECT (E) JUNCTION BOX AND CIRCUIT FOR REUSE.
4. REMOVE COVER PLATE AND DEVICES FROM FLUSH BOX.

⬡ KEYNOTES

1. SWITCH EXHAUST FANS VIA OCCUPANCY SENSOR.
2. PROVIDE POWER TO LIGHT FIXTURES VIA EXISTING LIGHTING CIRCUIT FROM PANEL #3.
3. PROVIDE SURFACE–MOUNT FLUORESCENT LOW–PROFILE WRAPAROUND FIXTURE, SUITABLE FOR DAMP LOCATION, LITHONIA LB–2–32–120–GEB10RS–GMF, OR EQUAL.
4. EXTEND POWER TO FCU FROM EXISTING CIRCUIT.

REGISTERED PROFESSIONAL ENGINEER
RICHARD P. GUSTAVA
No. E15580
Exp. 12/31/13
ELECTRICAL
STATE OF CALIFORNIA



KEY PLAN

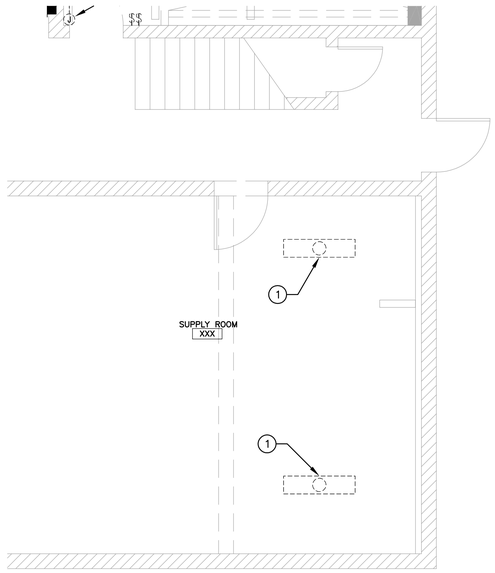
WINZLER & KELLY
2235 Mercury Way, Suite 150
Santa Rosa, CA 95407
Tel: 707.523.1010 | Fax: 707.527.8679
www.winzler.com

REVISIONS	SYMBOL	DATE	REMARKS	BY:

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE: 3 JULY 2011

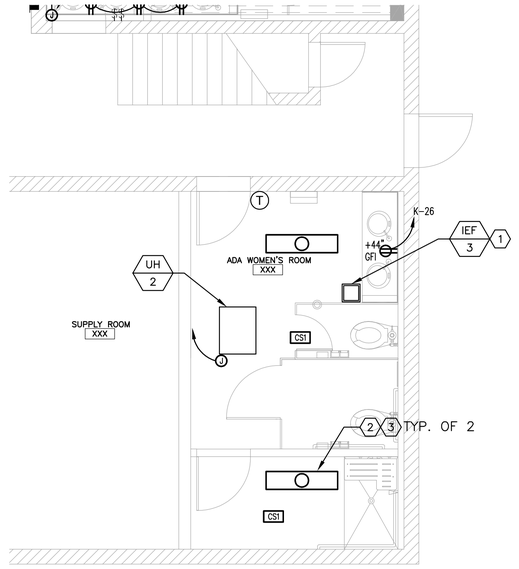
SHEET TITLE: FIRST FLOOR ELECTRICAL RESTROOM PLANS – DEMO AND NEW
PROJECT: BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
PROJECT NUMBER: XXX
LOCATION: BURBANK, CALIFORNIA
STATE OF CALIFORNIA
MILITARY DEPARTMENT

SHEET NUMBER
E2
OF 39 OF 43



2 E2a DEMO PLAN – ADA WOMEN'S ROOM
1/4" = 1'-0"

0" 2' 4' 8'



1 E2a FLOOR PLAN – ADA WOMEN'S ROOM
1/4" = 1'-0"

0" 2' 4' 8'

SHEET GENERAL NOTES

1. ROUTE CONDUIT AND/OR ARMORED CABLE, AND PROVIDE BOXES, CONCEALED IN FURRED WALL AND CEILING SPACES WHERE POSSIBLE. PROVIDE EXPOSED SURFACE–MOUNTED CONDUIT ONLY ON WALLS AND CEILINGS WITHOUT FURRED SPACES.
2. COREDRILL WHERE NEW CONDUITS PASS THROUGH EXISTING CONCRETE WALLS. COREDRILL AND PROVIDE SLEEVES WHERE NEW ARMORED CABLE PASSES THROUGH EXISTING CONCRETE WALLS.
3. ALL CIRCUITS TO BE 2–#12 AWG AND 1–#12 GND, IN A 3/4" CONDUIT OR IN A TYPE AC CABLE, UNLESS NOTED OTHERWISE.
4. EXISTING CIRCUITS ARE FED FROM PANEL #3 (SEE SHEET E2 FOR LOCATION). COORDINATE WITH BUILDING STAFF BEFORE TURNING OFF ANY BREAKERS.
5. PROVIDE DISCONNECT SWITCHES FOR UNIT HEATERS AND EXHAUST FANS.

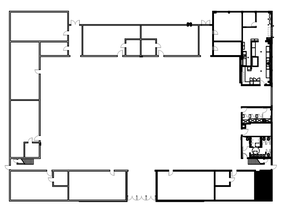
◯ DEMOLITION NOTES

1. REMOVE EXISTING LIGHT FIXTURE.

⬡ KEYNOTES

1. SWITCH EXHAUST FANS VIA OCCUPANCY SENSOR.
2. PROVIDE POWER TO LIGHT FIXTURES VIA EXISTING LIGHTING CIRCUIT FROM PANEL #3.
3. PROVIDE SURFACE–MOUNT FLUORESCENT LOW–PROFILE WRAPAROUND FIXTURE, SUITABLE FOR DAMP LOCATION, LITHONIA LB–2–32–120–GEB10RS–GMF, OR EQUAL.

REGISTERED PROFESSIONAL ENGINEER
RICHARD P. GUIDUGLI
No. E15580
Exp. 12/31/13
ELECTRICAL
STATE OF CALIFORNIA



KEY PLAN

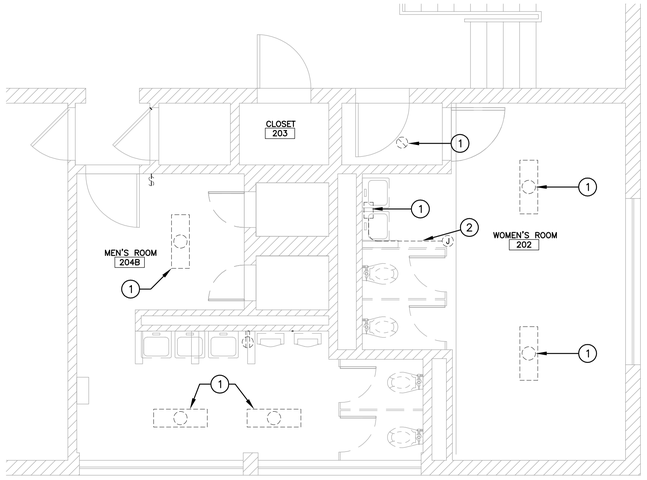
WINZLER & KELLY
2235 Mercury Way, Suite 150
Santa Rosa, CA 95407
Tel: 707.523.1010 | Fax: 707.527.8679
www.w-and-k.com

BY:	REMARKS		
DATE		REVDATE	PATH_NAME
SYMBOL			
REVISIONS			
			3 JULY 2011
DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:

SHEET TITLE: FIRST FLOOR ELECTRICAL ADA RESTROOM PLANS – DEMO AND NEW
PROJECT: BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
PROJECT NUMBER: XXX
LOCATION: BURBANK, CALIFORNIA
STATE OF CALIFORNIA
MILITARY DEPARTMENT

SHEET NUMBER
E2a

OF 40 OF 43

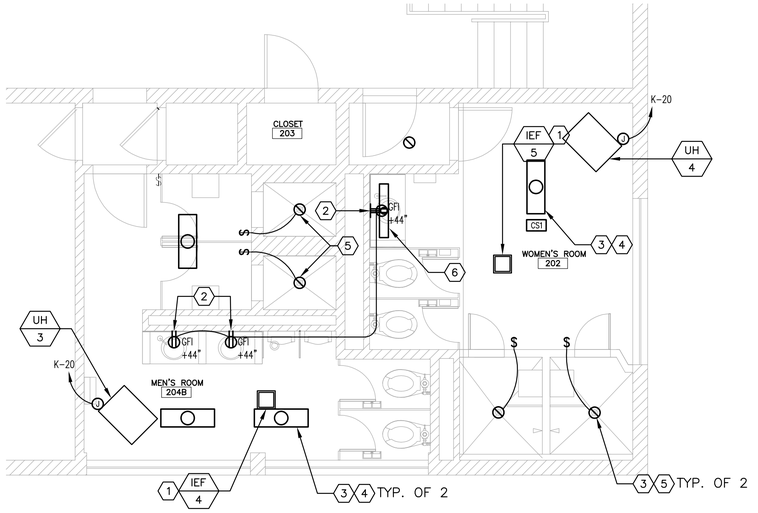


2 E3 DEMO PLAN – WOMEN'S & MEN'S ROOM

1/4" = 1'–0"

0" 2' 4' 8'

N



1 E3 FLOOR PLAN – WOMEN'S & MEN'S ROOM

1/4" = 1'–0"

0" 2' 4' 8'

N

SHEET GENERAL NOTES

1. ROUTE CONDUIT AND/OR ARMORED CABLE, AND PROVIDE BOXES, CONCEALED IN FURRED WALL AND CEILING SPACES WHERE POSSIBLE. PROVIDE EXPOSED SURFACE–MOUNTED CONDUIT ONLY ON WALLS AND CEILINGS WITHOUT FURRED SPACES.
2. COREDRILL WHERE NEW CONDUITS PASS THROUGH EXISTING CONCRETE WALLS. COREDRILL AND PROVIDE SLEEVES WHERE NEW ARMORED CABLE PASSES THROUGH EXISTING CONCRETE WALLS.
3. ALL CIRCUITS TO BE 2–#12 AWG AND 1–#12 GND, IN A 3/4" CONDUIT OR IN A TYPE AC CABLE, UNLESS NOTED OTHERWISE.
4. EXISTING CIRCUITS ARE FED FROM PANEL #3 (SEE SHEET E2 FOR LOCATION). COORDINATE WITH BUILDING STAFF BEFORE TURNING OFF ANY BREAKERS.
5. PROVIDE DISCONNECT SWITCHES FOR UNIT HEATERS AND EXHAUST FANS.

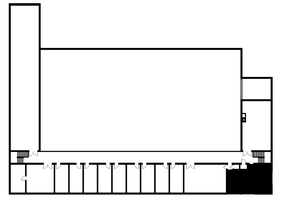
◯ DEMOLITION NOTES

1. REMOVE EXISTING LIGHT FIXTURE.
2. PRESERVE (E) SURFACE MOUNTED CONDUIT FOR REUSE.

⬡ KEYNOTES

1. SWITCH EXHAUST FANS VIA OCCUPANCY SENSOR.
2. EXTEND (E) RECEPTACLE CIRCUIT IN ROOM 204B TO NEW RECEPTACLES.
3. PROVIDE POWER TO LIGHT FIXTURES VIA EXISTING CIRCUIT FROM PANEL #3.
4. PROVIDE SURFACE–MOUNT FLUORESCENT LOW–PROFILE WRAPAROUND FIXTURE, WITH RAPID–START OR PROGRAM–START BALLAST, SUITABLE FOR DAMP LOCATION, LITHONIA LB–2–32–120–GEB10RS–GMF, OR EQUAL.
5. PROVIDE RECESS–MOUNT LED LENSED FIXTURE, SUITABLE FOR WET LOCATION, LITHONIA DOM6–600L–120–DL61, OR EQUAL.
6. PROVIDE WALL–MOUNT FLUORESCENT WITH WHITE ACRYLIC LENS AND RAPID–START OR PROGRAM–START BALLAST, LITHONIA WC–1–25–120–GEB10PS, OR EQUAL.

REGISTERED PROFESSIONAL ENGINEER
RICHARD P. GORGIAN
No. E15580
Exp. 12/31/13
ELECTRICAL
STATE OF CALIFORNIA



KEY PLAN

WINZLER & KELLY
2235 Mercury Way, Suite 150
Santa Rosa, CA 95407
Tel: 707.823.1010 | Fax: 707.527.8879
www.w-k-e.com

BY:	REMARKS

REVISIONS	SYMBOL	DATE	REVDATE	PXRL_NAME

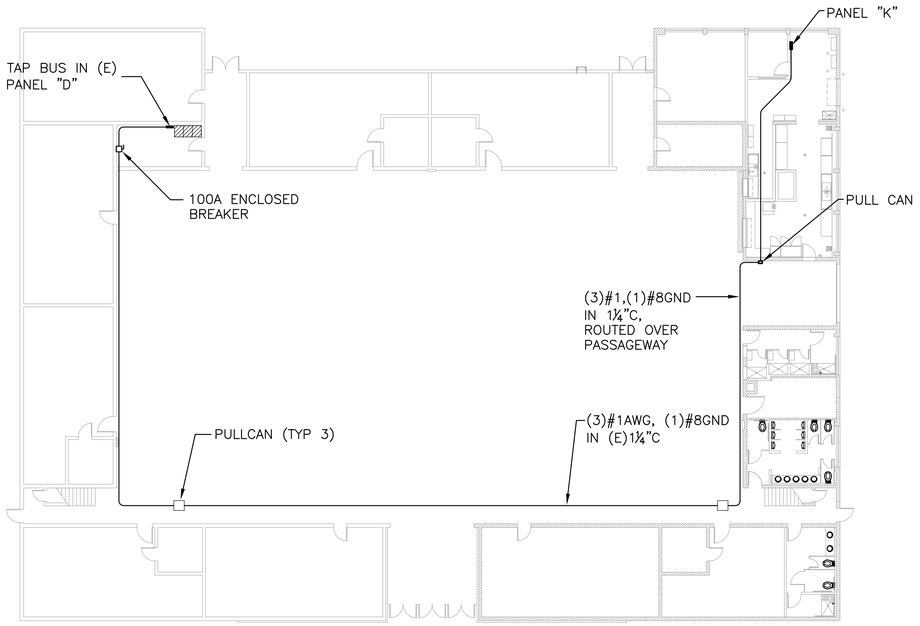
DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE: 3 JULY 2011

SHEET TITLE: SECOND FLOOR ELECTRICAL RESTROOM PLANS – DEMO AND NEW

PROJECT: BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
PROJECT NUMBER: XXX
LOCATION: BURBANK, CALIFORNIA

MILITARY DEPARTMENT
STATE OF CALIFORNIA

SHEET NUMBER
E3
OF 41 OF 43



1/E4 FLOOR PLAN – KITCHEN FEEDER ROUTING

1/16" = 1'–0"

0" 8' 16' 32'

REGISTERED PROFESSIONAL ENGINEER
RICHARD P. GUISSANI
No. E15580
Exp. 12/31/13
ELECTRICAL
STATE OF CALIFORNIA

WINZLER & KELLY
2235 Mercury Way, Suite 150
Santa Rosa, CA 95407
Tel: 707.523.1010 | Fax: 707.527.8879
www.w-k.com

BY:	REMARKS	DATE	SYMBOL	REVISIONS
		REVDATE		
	PATH_NAME			

DRAWN BY:

CHECKED BY:

APPROVED BY:

DATE: 3 JULY 2011

SHEET TITLE ELECTRICAL DETAILS

PROJECT BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION PROJECT NUMBER XXX

LOCATION BURBANK, CALIFORNIA

STATE OF CALIFORNIA MILITARY DEPARTMENT

SHEET NUMBER E4

OF 42 OF 43

PANEL SCHEDULE

PANEL NAME: K | VOLTAGE: 240 | NEMA RATING: 1 | NOTES:
MAINS RATING: 100 A MCB | PHASE: 1 | AIC RATING: 10,000 | MOUNTING: SURFACE
BUS RATING: 100 A | WIRE: 3 | DEMAND FACTOR: 0.5 | LOCATION: KITCHEN STORAGE

CKT NO.	USE	DESCRIPTION	BKR SIZE	BKR OPTS	BKR KVA	PHASE	BKR KVA	BKR OPTS	BKR SIZE	DESCRIPTION	USE	CKT NO.
1	O	DISHWASHER	60/2		6.00	A	1.44		20/1	REFRIGERATOR	O	2
3	O				6.00	B	1.26		20/1	FREEZER	O	4
5	M	DISPOSER	15/2		0.89	A	1.20		20/1	ICE MAKER	O	6
7	M				0.89	B			20/1	SPARE	H	8
9	M	ROLL-UP DOOR	15/2		0.60	A	0.12		20/1	RANGE IGNITION	O	10
11	M				0.60	B	0.12		20/1	WATER HEATER IGNITION	O	12
13		SPARE	20/1			A	0.36		20/1	HOT WATER RECIRC PUMP	M	14
15		SPARE	20/1			B	1.44		20/1	REFRIGERATOR	O	16
17	R	RECEPTACLES	20/1		1.20	A	1.26		20/1	REFRIGERATOR	O	18
19	R	RECEPTACLES	20/1		1.20	B	0.68		15/1	RESTROOM UNIT HEATERS	O	20
21	R	RECEPTACLES	20/1		1.20	A	1.44		20/1	REFRIGERATOR	O	22
23	O	RANGE HOOD CONTROL	20/1		0.12	B	1.26		20/1	REFRIGERATOR	O	24
25	L	RANGE HOOD LIGHTS	20/1		0.30	A	0.72		20/1	RESTROOM RECEPTACLES	R	26
27	M	REF-1	20/1		0.70	B			20/1	SPARE		28
29	M	MAU-1	20/1		0.70	A			20/1	SPARE		30
31		SPACE	20/1			B			20/1	SPACE		32
33		SPACE	20/1			A			20/1	SPACE		34
35		SPACE	20/1			B			20/1	SPACE		36
37		SPACE	20/1			A			20/1	SPACE		38
39		SPACE	20/1			B			20/1	SPACE		40
41		SPACE	20/1			A			20/1	SPACE		42

CONNECTED KVA		DEMAND KVA	DEMAND AMPS
PHASE A:	17.4	8.7	72.6
PHASE B:	14.3	7.1	59.5

USE LEGEND	LOAD TYPE
H	HVAC
L	LIGHTING
M	MOTOR
O	OTHER
R	RECEPTACLE
P	PANEL

BREAKER OPTIONS

GFCI - GROUND FAULT CIRCUIT INTERRUPTER
LO - LOCK-ON DEVICE
PA - PADLOCK ATTACHMENT
ST - SHUNT TRIP

REGISTERED PROFESSIONAL ENGINEER
RICHARD P. GURGANUS
No. E15580
Exp. 12/31/13
ELECTRICAL
STATE OF CALIFORNIA

WINZLER & KELLY
2235 Mercury Way, Suite 150
Santa Rosa, CA 95407
Tel: 707.523.1010 | Fax: 707.527.8879
www.winzler.com

BY:	REMARKS	DATE	SYMBOL	REVISIONS

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE: 3 JULY 2011

SHEET TITLE: ELECTRICAL SCHEDULES AND DIAGRAMS

PROJECT: BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION — PROJECT NUMBER: XXX
LOCATION: BURBANK, CALIFORNIA

STATE OF CALIFORNIA
MILITARY DEPARTMENT

SHEET NUMBER: E5
OF 43 OF 43

ABBREVIATIONS

A	AMPERES, AREA
ABS	ACRYLONITRILE–BUTADIENE –STYRENE
AD	AREA DRAIN
AFF	ABOVE FINISHED FLOOR
AG	ABOVE GRADE
APPROX	APPROXIMATE
AS	AIR SEPARATOR
AVG	AVERAGE
BD	BALANCE DAMPER
BDD	BACK DRAFT DAMPER
BFP	BACK FLOW PREVENTER
BG	BELOW GRADE
BHP	BRAKE HORSEPOWER
BOD	BOTTOM OF DUCT
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNIT PER HOUR
C	CELSIUS
℄	CENTERLINE
CCW	COUNTER CLOCKWISE
CD	CEILING DIFFUSER, CONDENSATE DRAIN
CFM	CUBIC FEET PER MINUTE
CH	CHILLER
CHWP	CHILLED WATER PUMP
CHWR	CHILLED WATER RETURN
CHWS	CHILLED WATER SUPPLY
CI	CAST IRON
CMPR	COMPRESSOR
CONT	CONTINUED
CT	COOLING TOWER
CU	COPPER
CU FT	CUBIC FEET
CU IN	CUBIC INCHES
CW	COLD WATER, CLOCKWISE
CWP	CONDENSER WATER PUMP
CWR	CONDENSER WATER RETURN,
CWS	CONDENSER WATER SUPPLY
CWV	COMBINATION WASTE & VENT
D	DEPTH
DB	DECIBEL, DRY BULB
DEG	DEGREE(S)
DIA	DIAMETER
DN	DOWN
DPT	DIFFERENTIAL PRESSURE TRANSMITTER
DS	DOWN SPOUT
DWG	DRAWING
(E)	EXISTING
EA	EACH
EAT	ENTERING AIR TEMPERATURE
EF	EXHAUST FAN
EFF	EFFICIENCY
EG	EXHAUST GRILLE
ELEV	ELEVATION
ENT	ENTERING
ESP	EXTERNAL STATIC PRESSURE
F	FLOW
FACP	FIRE ALARM CONTROL PANEL
FCO	FLOOR CLEAN OUT
FD	FLOOR DRAIN, FIRE DAMPER
FDC	FIRE DEPARTMENT CONNECTION
FM	FLOW METER
FP	FIRE PROTECTION
FPI	FINS PER INCH
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FS	FLOW SWITCH
FSD	FIRE/SMOKE DAMPER
FSP	FIRE SPRINKLER
FT	FOOT, FEET
G	GAS
GA	GAUGE
GALV	GALVANIZED
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GPS	GALLONS PER SECOND
HD	HEAD
HG	MERCURY
HWR	HEATING WATER RETURN
HWS	HEATING WATER SUPPLY
HP	HORSEPOWER
HR	HOSE REEL, HOUR
HT	HEIGHT
HVAC	HEATING, VENTILATION &CONDITIONING
HW	HOT WATER
HWR	HOT WATER RETURN
HZ	FREQUENCY
ID	INSIDE DIAMETER
INVERT	INVERT ELEVATION
IW	INDIRECT WASTE
KW	KILOWATTS
KWH	KILOWATTS PER HOUR
L	LENGTH
LAT	LEAVING AIR TEMPERATURE
LBS	POUNDS
LF	LINEAR FEET
LPG	LIQUID PETROLEUM GAS
LTG	LIGHTING
LVG	LEAVING
LWT	LEAVING WATER TEMPERATURE
MAX	MAXIMUM
MBH	1,000 BTUH
MCC	MOTOR CONTROL CENTER
MD	MOTORIZED DAMPER
MFR	MANUFACTURER
MIN	MINIMUM, MINUTE
MTD	MOUNTED
MUA	MAKE UP AIR
(N)	NEW
NC	NORMALLY CLOSED, NOISE CRITERIA
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN, NUMBER
NTS	NOT TO SCALE
OA	OUTSIDE AIR
OBD	OPPOSED BLADE DAMPER
OC	ON CENTER
OD	OUTSIDE DIAMETER
ORD	OVERFLOW ROOF DRAIN
PB	POLYBUTYLENE
PE	POLYETHYLENE
PPM	PARTS PER MILLION
POC	POINT OF CONNECTION
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PSIA	POUNDS PER SQUARE INCH, ABSOLUTE
PSIG	POUNDS PER SQUARE INCH, GAGE
PVC	POLYVINYL CHLORIDE
RA	RETURN AIR
RD	ROOF DRAIN
REQ	REQUIRED
RG	RETURN GRILLE
RH	RELATIVE HUMIDITY
RPM	REVOLUTIONS PER MINUTE
RPS	REVOLUTIONS PER SECOND
SAD	SEE ARCHITECTURAL DRAWINGS
STD	STANDARD
SOV	SHUT OFF VALVE
SD	SUPPLY DIFFUSER, STORM DRAIN
SS	SANITARY SEWER, STAINLESS STEEL
TD	TEMPERATURE DIFFERENTIAL
TEMP	TEMPERATURE
TOD	TOP OF DUCT
TP	TOTAL STATIC PRESSURE
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED
V	VENT, VOLT
VEL	VELOCITY
VFD	VARIABLE FREQUENCY DRIVE
VOL	VOLUME
VP	VELOCITY PRESSURE
VTR	VENT THROUGH ROOF
W	WIDTH
W/	WITH
WB	WET BULB
WG	WATER GAGE
W/O	WITHOUT
WRG	WALL RETURN GRILLE
WSR	WALL SUPPLY REGISTER
WH	WATER HEATER
WHA	WATER HAMMER ARRESTOR
XFMR	TRANSFORMER
YR	YEAR
Z	ZONE

HVAC SYMBOLS

SYMBOL	DESCRIPTION
	DUCT SECTION, SUPPLY AIR UP
	DUCT SECTION, RETURN AIR UP
	DUCT SECTION, EXHAUST AIR UP
	DUCT SECTION, SUPPLY AIR DN
	DUCT SECTION, RETURN AIR DN
	DUCT SECTION, EXHAUST AIR DN
	FLEXIBLE DUCT
FSD	FIRE AND SMOKE DAMPER
FD	FIRE DAMPER
	DIRECTION OF FLOW
	MANUAL VOLUME DAMPER
	WALL SUPPLY OUTLET, RETURN GRILLE
	CEILING DIFFUSER
	CEILING RETURN
	CEILING EXHAUST
DD	DUCT SMOKE DETECTOR
T	THERMOSTAT
S	REMOTE SENSOR
CO2	CARBON DIOXIDE SENSOR
M	MOTORIZED ACTUATOR

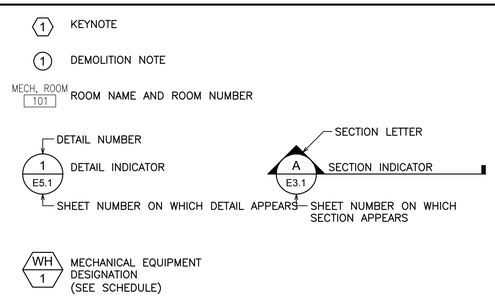
PIPING SYMBOLS

SYMBOL	DESCRIPTION
FOS	FUEL OIL (SUPPLY)
FOR	FUEL OIL (RETURN)
CWS	CHILLED WATER SUPPLY
CWR	CHILLED WATER RETURN
HHWS	HEATING HOT WATER SUPPLY
HHWR	HEATING HOT WATER RETURN
CS	CONDENSER WATER SUPPLY
CR	CONDENSER WATER RETURN
RL	REFRIGERANT LIQUID
RS	REFRIGERANT SUCTION
AV	AUTOMATIC AIR VENT
	BLOW OFF STRAINER
	FILTER AND STRAINER LINE
P	PRESSURE GAGE
	PRESSURE GAGE AND COCK
	PRESSURE REDUCING VALVE
	RELIEF OR SAFETY VALVE
	STRAINER
	TEMPERATURE GAGE
	PUMP (PLAN)
	PUMP (SCHEMATIC)
	EXPANSION LOOP
	CAP
	CONCENTRIC REDUCER
	UNION
	THREE–WAY MANUAL VALVE
	BALL VALVE
	BUTTERFLY VALVE
	DIAPHRAGM VALVE
	GATE VALVE
	GLOBE VALVE
	CHECK VALVE
	POINT OF CONNECTION
	FLEXIBLE CONNECTOR
	THERMOMETER
	PETE'S PLUG

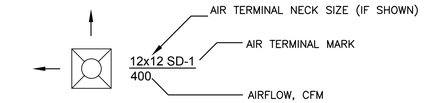
GENERAL MECHANICAL NOTES

1. THESE DRAWINGS ARE BASED UPON AVAILABLE DOCUMENTS, WHICH MAY NOT ACCURATELY PORTRAY AS–BUILT CONDITIONS. EXISTING EQUIPMENT AND PIPING SIZES, LOCATIONS, AND DIMENSIONS SHALL BE VERIFIED IN THE FIELD PRIOR TO DEMOLITION AND CONSTRUCTION. NOTIFY THE ENGINEER IMMEDIATELY OF ALL DISCREPANCIES AFFECTING THE REMOVAL OF EXISTING EQUIPMENT AND PIPING, AND THE INSTALLATION OF NEW EQUIPMENT AND PIPING.
2. INSTALL PIPING AND DUCTWORK TO BEST SUIT FIELD CONDITIONS AND COORDINATE WITH THE INSTALLATION WORK OF OTHER TRADES. THESE DRAWINGS ARE DIAGRAMMATIC, DO NOT SCALE TO DETERMINE EXACT LOCATION OF PIPING.
3. PROTECT ALL EXISTING EQUIPMENT THAT IS TO REMAIN. VERIFY WITH OWNER WHAT SYSTEMS WILL REMAIN OPERATIONAL THROUGHOUT CONSTRUCTION. NOTIFY THE OWNER PRIOR TO SHUTTING DOWN ANCILLARY SYSTEMS OR EQUIPMENT.
4. REPAIR AND/OR REPLACE ALL EXISTING UTILITIES, STRUCTURAL ELEMENTS, EQUIPMENT, PIPING, CONDUIT, DUCTWORK, ETC. THAT IS DAMAGED OR BECOMES INOPERABLE AS A RESULT OF THIS WORK.
5. COORDINATE MODIFICATIONS TO EXISTING SYSTEMS WITH OWNER TO MINIMIZE SHUTDOWN TIME OF BUILDING SYSTEMS.
6. FOR ALL MECHANICAL SYSTEMS CONTROLS, PROVIDE CONDUIT AND WIRING IN ACCORDANCE WITH DIVISION 26 SPECIFICATIONS AND MANUFACTURER'S REQUIREMENTS.
7. ALL SANITARY AND SANITARY VENT PIPING SHALL SLOPE AT ¼" PER 12" UNLESS OTHERWISE NOTED.

SHEET ANNOTATION



AIR TERMINAL IDENTIFICATION



NOTE:
ARROWS INDICATE DIRECTION OF AIRFLOW
NO ARROWS INDICATE 4–WAY AIRFLOW

REGISTERED PROFESSIONAL ENGINEER
TERRY WONG
No. M29562
Exp. 6/30/13
MECHANICAL
STATE OF CALIFORNIA

WINZLER & KELLY
2235 Mercury Way, Suite 150
Santa Rosa, CA 95407
Tel: 707 823 1010 | Fax: 707 527 8679
www.winzler.com

BY:	REMARKS	DATE	SYMBOL	REVISIONS

3 JULY 2011

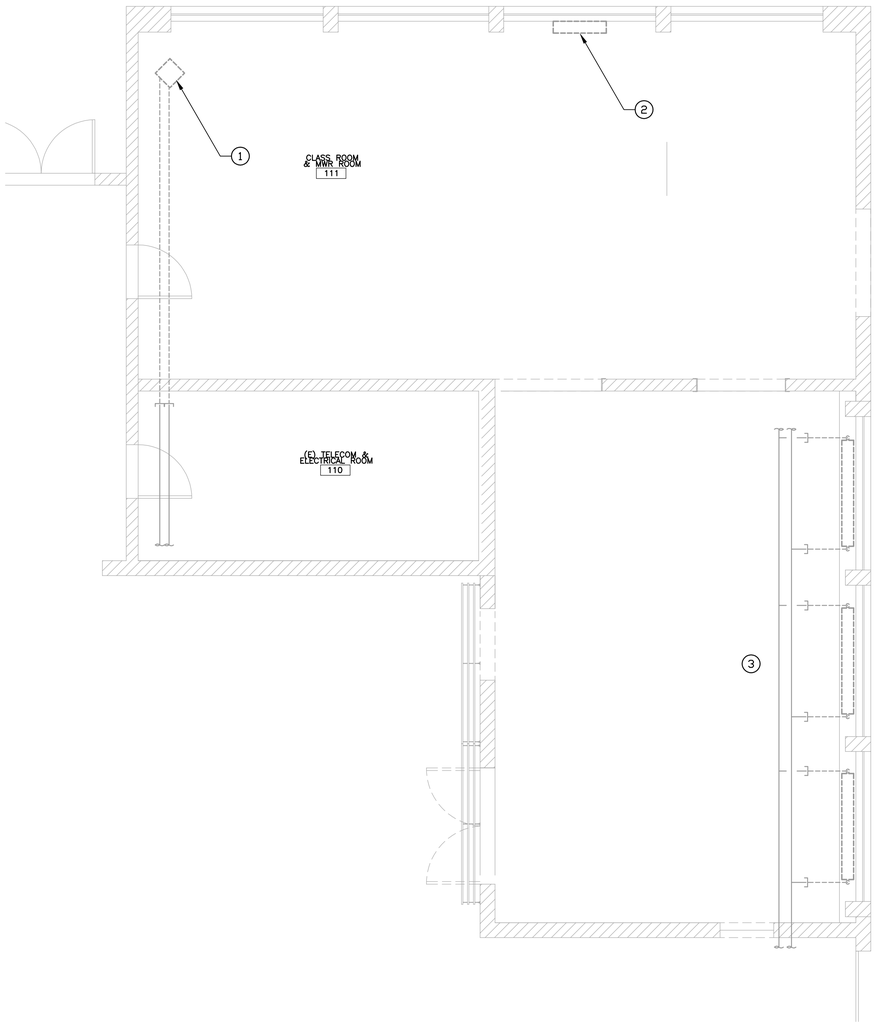
DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE:

SHEET TITLE: MECHANICAL SYMBOLS, LEGEND AND NOTES

PROJECT: BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
PROJECT NUMBER: XXX
LOCATION: BURBANK, CALIFORNIA

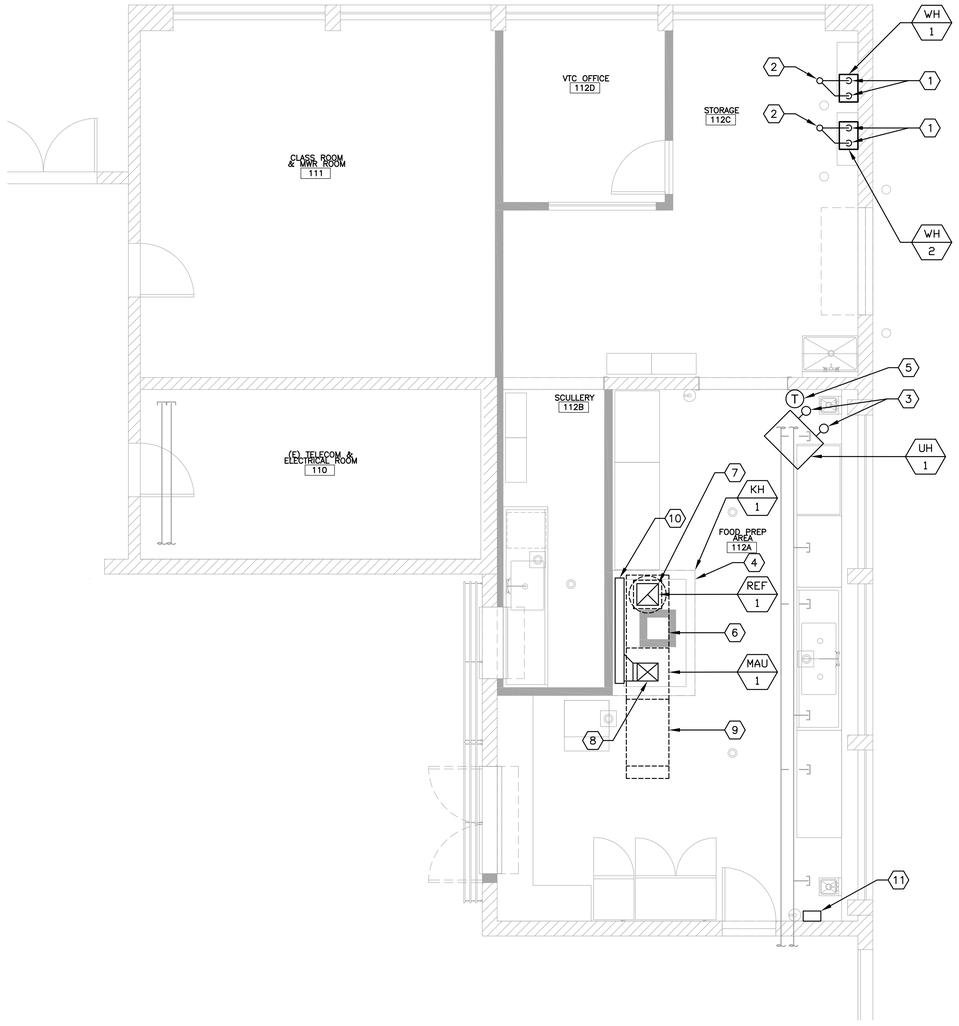
MILITARY DEPARTMENT
STATE OF CALIFORNIA

SHEET NUMBER
M0



2 / M1 DEMOLITION PLAN – NEW KITCHEN

1/4" = 1'–0" 0" 2' 4' 8'



1 / M1 FLOOR PLAN – NEW KITCHEN

1/4" = 1'–0" 0" 2' 4' 8'

KITCHEN RANGE HOOD AND FIRE SUPPRESION NOTES

1. INSTALL A KITCHEN RANGE EXHAUST, MAKE–UP AIR, AND FIRE SUPPRESSION SYSTEM IN ACCORDANCE WITH THESE PLANS, AND IN COMPLIANCE WITH NFPA 17A & 96 (2011), AND CMC (2010) CHAPTER 5 REQUIREMENTS FOR A MEDIUM TEMPERATURE TYPE 1 KITCHEN GREASE HOOD.
2. INSTALLATION OF THE FIRE SUPPRESSION SYSTEM SHALL NOT BE STARTED UNTIL COMPLETE PLANS AND SPECIFICATIONS HAVE BEEN APPROVED BY THE CALIFORNIA STATE FIRE MARSHAL. UPON COMPLETION OF THE SYSTEM IT SHALL BE TESTED IN THE PRESENCE OF THE CALIFORNIA STATE FIRE MARSHAL.
3. THE AUTOMATIC SEISMIC GAS SHUT–OFF VALVE SHALL BE ELECTRICAL TYPE.
4. BASIS OF DESIGN PRODUCTS ARE BASED ON COVERING A 72" WIDE BY 42" DEEP RANGE WITH A 84" WIDE X 54" DEEP HOOD. IF RANGE IS LARGER, CONTACT OWNER'S ENGINEER BEFORE PROCEEDING WITH A SUBMITTAL FOR REVIEW.

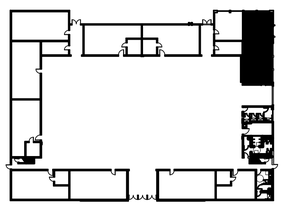
◯ DEMOLITION NOTES

1. REMOVE EXISTING UNIT HEATER, HEATING HOT WATER PIPING, THERMOSTAT AND ASSOCIATED APPURTENANCES. CAP PIPING IN EXISTING TELECOM & ELECTRICAL ROOM 110.
2. REMOVE EXISTING WINDOW AC UNIT AND ASSOCIATED APPURTENANCES.
3. REMOVE THREE EXISTING WALL CONVECTOR UNITS, HEATING HOT WATER PIPING AND ASSOCIATED APPURTENANCES. CAP BRANCH PIPING AT MAIN.

⬡ KEYNOTES

1. 4"ø COMBUSTION AIR AND INTAKE AIR VENT CONNECTIONS AT WATER HEATER.
2. 4"ø CONCENTRIC VENT THRU ROOF.
3. 4" COMBUSTION AIR AND INTAKE AIR VENT CONNECTIONS AT UNIT HEATER. PROVIDE 4"ø CONCENTRIC VENT THRU ROOF AT MINIMUM OF 3 FEET FROM ROOF EDGE.
4. KITCHEN HOOD CONTROL PANEL CABINET WITH ANSUL FIRE SUPPRESSION SYSTEM INTEGRAL TO HOOD, SEE DETAILS ON SHEET M4.
5. MOUNT UH–1 THERMOSTAT AT 48" AFF.
6. COMBINATION CURB FOR MAU–1 AND REF–1.
7. 14½" x 14½" STAINLESS STEEL EXHAUST DUCT WITH FIRE WRAP DOWN THRU ROOF IN RATED SHAFT, CONNECT DUCT TO GREASE HOOD, SEE DETAIL ON SHEET M5 AND SEE ARCHITECTURAL SHEETS.
8. 14" x 12" DUCT DOWN THRU ROOF, CONNECT DUCT TO SUPPLY PLENUM.
9. EXTENDED OUTSIDE AIR DUCT WITH WEATHERHOOD. MAINTAIN 10 FOOT SETBACK FROM REF–1 EXHAUST.
10. BACK SUPPLY PLENUM, SEE SCHEDULES ON M4.
11. MANUAL CABLE PULL–STATION FOR EMERGENCY SHUT–OFF OF KITCHEN HOOD, SEE ELECTRICAL DRAWINGS.

REGISTERED PROFESSIONAL ENGINEER TERRY WONG No. M29562 Exp. 6/30/13 MECHANICAL STATE OF CALIFORNIA



KEY PLAN

WINZLER & KELLY
2235 Mercury Way, Suite 150
Santa Rosa, CA 95407
Tel: 707.523.1010 | Fax: 707.527.8879
www.w-and-k.com

BY:	SYMBOL	DATE	REMARKS
			REVDATE PATH_NAME

REVISIONS

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE: 3 JULY 2011

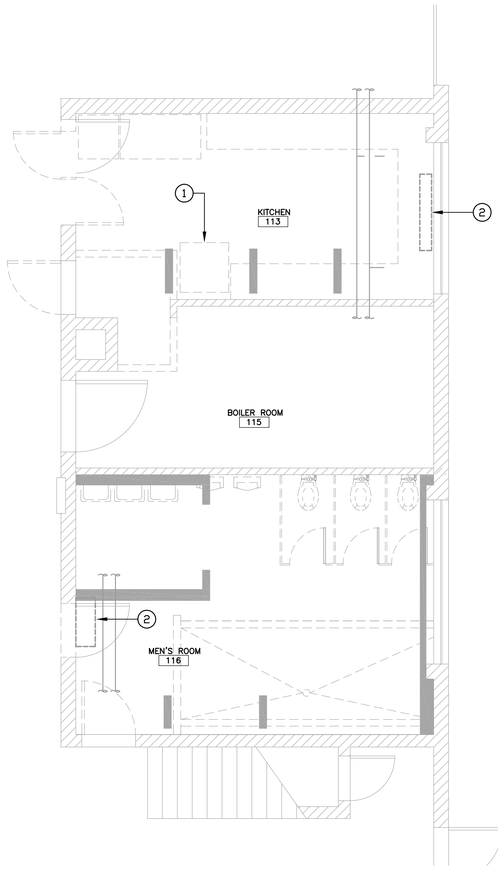
SHEET TITLE: FIRST FLOOR MECHANICAL KITCHEN PLAN – DEMO AND NEW

PROJECT: BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
PROJECT NUMBER: XXX
LOCATION: BURBANK, CALIFORNIA

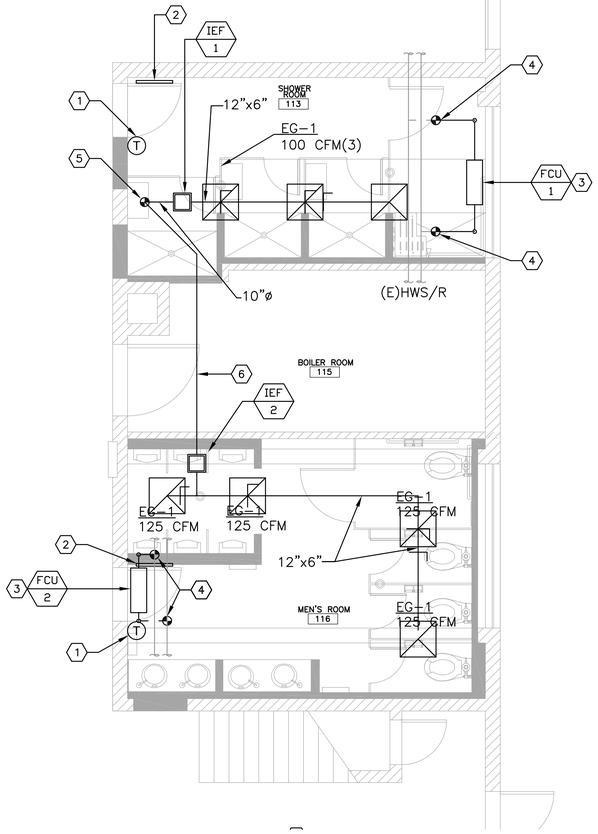
STATE OF CALIFORNIA
MILITARY DEPARTMENT

SHEET NUMBER
M1

OF 25 OF 43



2 / M2 DEMO PLAN – SHOWER & MEN'S ROOM
1/4" = 1'-0"
0" 2' 4' 8'
N



1 / M2 FLOOR PLAN – SHOWER & MEN'S ROOM
1/4" = 1'-0"
0" 2' 4' 8'
N

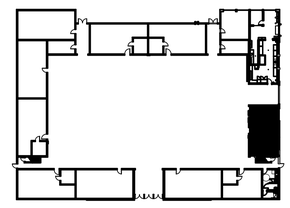
DEMOLITION NOTES

1. REMOVE EXISTING FOUR BURNER WOLF RANGE/OVEN AND ASSOCIATED APPURTENANCES. CAP EXISTING GAS PIPING INSIDE BOILER ROOM.
2. REMOVE EXISTING WALL CONVECTOR UNIT, HEATING HOT WATER PIPING AND ASSOCIATED APPURTENANCES. CAP BRANCH PIPING AT MAIN.
3. REMOVE EXISTING WALL CONVECTOR UNIT AND ASSOCIATED APPURTENANCES.

KEYNOTES

1. MOUNT FAN COIL UNIT THERMOSTAT AT 48" AFF.
2. DOOR LOUVER, SEE ARCHITECTURAL DRAWINGS. MINIMUM FREE AREA IS 1.0 SQ. FT.
3. MOUNT HORIZONTAL FAN COIL UNIT JUST BELOW CEILING. CONNECT NEW ¾"ø HWS/R TO EXISTING HWS/R.
4. POINT OF CONNECTION TO EXISTING HWS/R.
5. TERMINATE EXHAUST DUCT AT OPENING IN DUCT SHAFT, SEAL OPENING AROUND EXHAUST DUCT PERIMETER.
6. ROUTE TO OPENING IN DUCT SHAFT BETWEEN MECHANICAL ROOM AND THE EXISTING KITCHEN. ROUTE 10"ø DUCT IN THE SHAFT. CONTRACTOR SHALL VERIFY THERE IS SUFFICIENT SPACE FOR ROUTING THE DUCT OVER TO AND IN SHAFT PRIOR TO INSTALLATION OF RESTROOM 111B EXHAUST SYSTEM.

REGISTERED PROFESSIONAL ENGINEER
TERRY WONG
No. M29562
Exp. 6/30/13
MECHANICAL
STATE OF CALIFORNIA



KEY PLAN

WINZLER & KELLY
2235 Mercury Way, Suite 150
Santa Rosa, CA 95407
Tel: 707.823.1010 | Fax: 707.527.8879
www.w-k.com

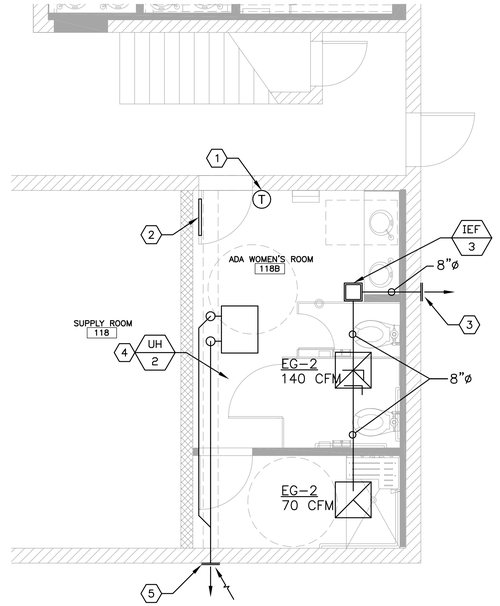
BY:	REMARKS

REVISIONS	SYMBOL	DATE	REVDATE	PATH_NAME

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE: 3 JULY 2011

SHEET TITLE FIRST FLOOR MECHANICAL RESTROOM PLANS – DEMO AND NEW
PROJECT BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
PROJECT NUMBER XXX
LOCATION BURBANK, CALIFORNIA
MILITARY DEPARTMENT
STATE OF CALIFORNIA

SHEET NUMBER
M2



1 / M2a FLOOR PLAN – ADA WOMEN'S ROOM

1/4" = 1'-0"

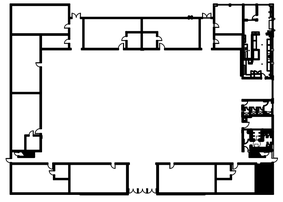
0" 2' 4' 8'

N

KEYNOTES

1. MOUNT UH–2 THERMOSTAT AT 48" AFF.
2. DOOR LOUVER, SEE ARCHITECTURAL DRAWINGS. MINIMUM FREE AREA IS 0.5 SQ. FT.
3. TERMINATE EXHAUST VENT THRU WALL WITH VENT CAP.
4. MOUNT UNIT HEATER JUST BELOW CEILING. ROUTE 4"ø COMBUSTION AIR AND INTAKE AIR VENTS OVER TO CONCENTRIC VENT AT WALL.
5. 4ø CONCENTRIC VENT THRU WALL.

REGISTERED PROFESSIONAL ENGINEER
TERRY WONG
No. M29562
Exp. 6/30/13
MECHANICAL
STATE OF CALIFORNIA



KEY PLAN

WINZLER & KELLY
2235 Mercury Way, Suite 150
Santa Rosa, CA 95407
Tel: 707.523.1010 | Fax: 707.527.8879
www.w-and-k.com

BY:	REMARKS	DATE	SYMBOL	REVISIONS

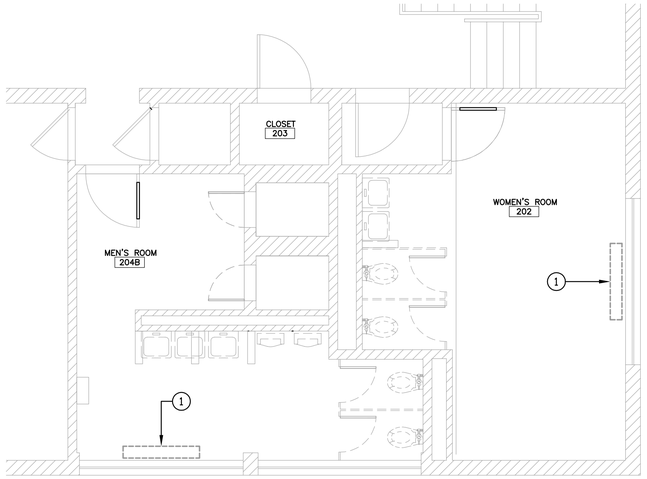
DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE: 3 JULY 2011

SHEET TITLE: FIRST FLOOR MECHANICAL ADA RESTROOM PLAN

PROJECT: BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
PROJECT NUMBER: XXX
LOCATION: BURBANK, CALIFORNIA

STATE OF CALIFORNIA
MILITARY DEPARTMENT

SHEET NUMBER
M2a

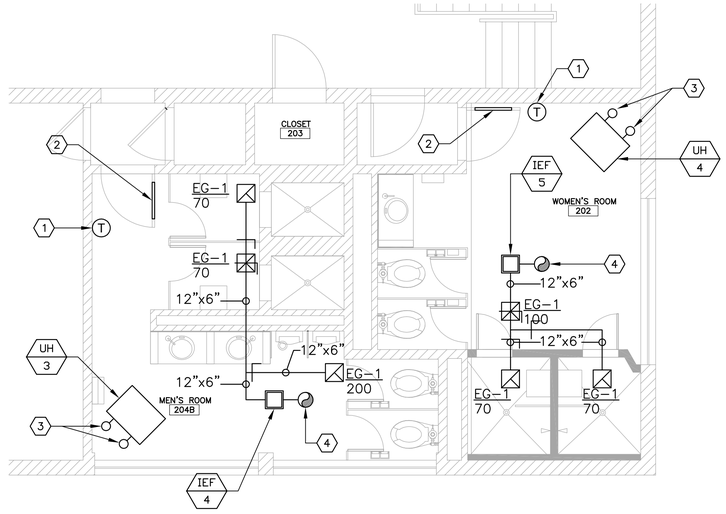


3 / M3 DEMO PLAN – WOMEN'S & MEN'S ROOM

1/4" = 1'-0"

0" 2' 4' 8'

N



1 / M3 FLOOR PLAN – WOMEN'S & MEN'S ROOM

1/4" = 1'-0"

0" 2' 4' 8'

N

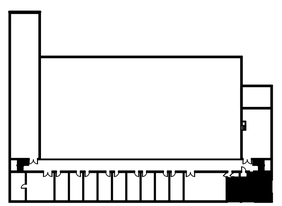
DEMOLITION NOTES

1. REMOVE EXISTING WALL CONVECTOR UNIT AND ASSOCIATED APPURTENANCES.

KEYNOTES

1. MOUNT UNIT HEATER THERMOSTAT AT 48" AFF.
2. DOOR LOUVER, SEE ARCHITECTURAL DRAWINGS. MINIMUM FREE AREA IS 0.75 SQ. FT.
3. 4"ø COMBUSTION AIR AND INTAKE AIR VENT CONNECTIONS AT UNIT HEATER. PROVIDE 4"ø CONCENTRIC VENT THRU ROOF A MINIMUM OF 3 FEET FROM ROOF EDGE.
4. 10"ø EXHAUST DUCT THRU ROOF, TERMINATE WITH VENT CAP.

REGISTERED PROFESSIONAL ENGINEER
TERRY WONG
No. M29562
Exp. 6/30/13
MECHANICAL
STATE OF CALIFORNIA



KEY PLAN

WINZLER & KELLY
2235 Mercury Way, Suite 150
Santa Rosa, CA 95407
Tel: 707.823.1010 | Fax: 707.527.8879
www.winzler.com

BY:	REMARKS	DATE	SYMBOL	REVISIONS

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE: 3 JULY 2011

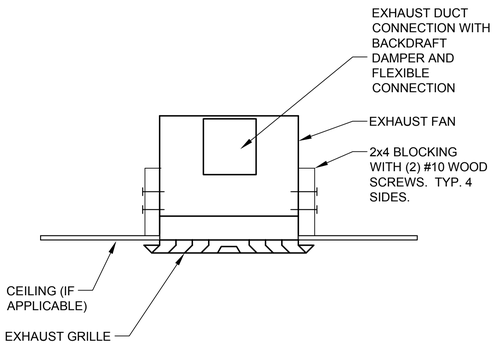
SHEET TITLE: SECOND FLOOR MECHANICAL RESTROOM PLANS – DEMO AND NEW

PROJECT: BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
PROJECT NUMBER: XXX

LOCATION: BURBANK, CALIFORNIA

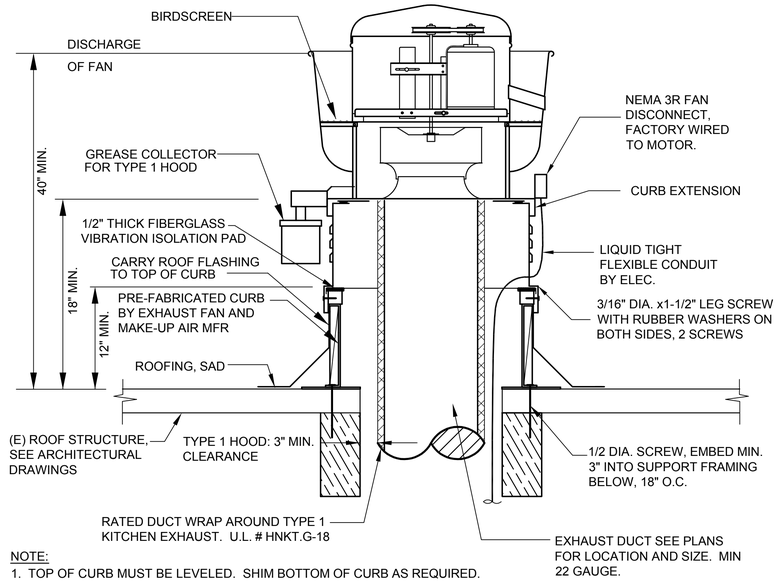
STATE OF CALIFORNIA
MILITARY DEPARTMENT

SHEET NUMBER
M3



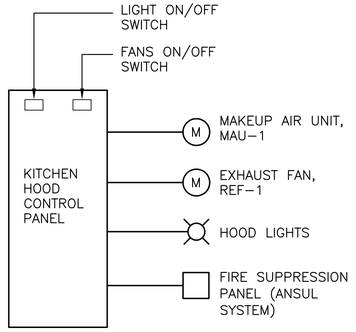
NOTE:
1. IF MOUNTING INLINE FAN, BRACE 2 SUPPORT BLOCKS TO NEAREST JOIST

1 CEILING OR INLINE EXHAUST FAN NOT TO SCALE



NOTE:
1. TOP OF CURB MUST BE LEVELED. SHIM BOTTOM OF CURB AS REQUIRED.

2 KITCHEN EXHAUST FAN & ROOF CURB DETAIL NOT TO SCALE



CONTROLS FOR KITCHEN HOOD AND EXHAUST FAN
1. CONTROLS FOR THE KITCHEN HOOD EXHAUST FAN REF-1, MAKE-UP AIR UNIT MAU-1 AND LIGHTS SHALL BE LOCATED IN A SINGLE CONTROL PANEL. THE CONTROL PANEL SHALL INCLUDE ALL CONTROL RELAYS, SWITCHES, POWER AND TERMINAL BLOCKS, WIRING, LIGHT INDICATORS, AND ALL NECESSARY ITEMS REQUIRED FOR A COMPLETE OPERATING SYSTEM AS REQUIRED FOR COMPLIANCE WITH THE CALIFORNIA MECHANICAL CODE, 507.0.

KITCHEN HOOD & MAKE-UP AIR CONTROL SEQUENCE
1. MAU-1 SHALL BE INTERLOCKED WITH THE REF-1 ON/OFF SWITCH LOCATED ON THE KITCHEN HOOD CONTROL PANEL. WHEN THE KITCHEN HOOD REF-1 SWITCH IS "ON", MAU-1 SHALL START AND RUN.
2. WHEN THE KITCHEN HOOD EF SWITCH IS TURNED "OFF", MAU-1 SHALL TURN OFF.

ANSUL FIRE SUPPRESSION SYSTEM
1. KITCHEN HOOD SHALL BE PROTECTED WITH AN ANSUL TYPE FIRE SUPPRESSION SYSTEM THAT SHALL BE INTERLOCKED WITH THE MAU-1 AND KITCHEN HOOD LIGHTS SUCH THAT UPON THE ACTIVATION OF THE SUPPRESSION SYSTEM, THE MAU-1 AIR SUPPLY FAN AND KITCHEN HOOD LIGHTS SHALL BE DEACTIVATED. IN ADDITION, THE GAS SUPPLY SHALL HAVE A GAS VALVE INTERLOCK SUCH THAT UPON ACTIVATION OF THE FIRE SUPPRESSION SYSTEM THE GAS SUPPLY TO THE RANGE SHALL BE SHUT-OFF.

EMERGENCY PULL STATION
1. PROVIDE A MANUAL PULL STATION AT EXIT TO KITCHEN WHICH WILL ACTIVATE THE FIRE SUPPRESSION SYSTEM WHEN PULLED.

3 KITCHEN HOOD CONTROL PANEL NOT TO SCALE

INLINE EXHAUST FAN SCHEDULE

MARK	MANUFACTURER	MODEL	AIRFLOW (CFM)	EXT. STATIC PRESS. (IN W.G.)	ELECTRICAL WATTS	VOLT	PHASE	ACOUSTIC (SONES)	WEIGHT (LBS)	SERVICE	REMARKS
IEF-1	GREENHECK	CSP-A410	300	0.375	135	120	1	2	36	SHOWER ROOM 113	1,2
IEF-2	GREENHECK	CSP-A710	500	0.375	325	120	1	2	36	MEN'S ROOM 116	1,2
IEF-3	GREENHECK	CSP-A250	210	0.375	83	120	1	2.5	23	ADA WOMEN'S ROOM 118B	1,2
IEF-4	GREENHECK	CSP-A390	340	0.375	140	120	1	3	23	MEN'S ROOM 204B	1,2
IEF-5	GREENHECK	CSP-A290	240	0.375	81	120	1	2.5	23	WOMEN'S ROOM 202	1,2

1. OCCUPANCY SENSOR
2. BACKDRAFT DAMPER

ROOFTOP UNTEMPERED MAKE-UP AIR UNIT SCHEDULE

MARK	MANUFACTURER	MODEL	AIRFLOW (CFM)	STATIC PRESSURE (IN W.G.)	ELECTRICAL HP	VOLT	PHASE	MCA/MOCP	WEIGHT (LBS)	SERVICE	REMARKS
MAU-1	GREENHECK	KSFB-109-H15-01	1050	0.375	1/4	115	60	7.3/15	225	FOOD PREP 112A	1,2,3,4,5,6

1. RAIN HOOD AIR INLET WITH AUTOMATIC INLET DAMPER AND BIRDSCREEN
2. DOWN DISCHARGE PLENUM
3. COMBINATION ROOF CURB FOR MAU-1 & REF-1
4. INTERLOCK TO REF-1 AND FIRE SUPPRESSION SYSTEM, SEE DETAILS FOR ADDITIONAL CONTROLS INFORMATION
5. 115 V CONVENIENCE OUTLET (SEPARATE POWER SOURCE)
6. PROVIDE SINGLE KITCHEN HOOD CONTROL PANEL FOR MAU-1, REF-1, AND HOOD LIGHTS.

KITCHEN HOOD

MARK	MANUFACTURER	MODEL	DIMENSIONS (INCHES) LENGTH	WIDTH	HEIGHT	SERVICE	REMARKS
KH-1	GREENHECK	GHEW	84	54	24	GAS RANGE	1,2,3,4,5,6

1. TYPE 1 HOOD FOR GREASE AND SMOKE, LOW TEMPERATURE.
2. PROVIDE GREASE FILTERS, TROUGH AND COLLECTION CONTAINER, STAINLESS STEEL TYPE 304 POLISHED.
3. PROVIDE EXTERNAL BACK SUPPLY PLENUM EXTENDED 6" BELOW WORKING RANGE SURFACE, STAINLESS STEEL.
4. UTILITY CABINET FOR FIRE SUPPRESSION SYSTEM AT RIGHT SIDE OF HOOD.
5. PROVIDE ANSUL R-102 AUTOMATIC, PRE-ENGINEERED FIRE SUPPRESSION SYSTEM FOR KITCHEN HOOD.
6. SEE DETAIL ON M-4 FOR CONTROLS AND SEQUENCE OF OPERATIONS.
7. HOOD DIMENSIONS ARE BASED ON A 72"(L) X 42"(W) RANGE.
8. SCREW-IN CFL LIGHT FIXTURES.

HORIZONTAL CABINENT FAN COIL UNIT SCHEDULE

MARK	MANUFACTURER	MODEL	AIRFLOW (CFM)	STATIC PRESSURE (IN W.G.)	HEATING MBH	ENT. WATER TEMP (°F)	LVG. WATER TEMP (°F)	GPM	ELECTRICAL VOLT	PHASE	FLA/MOCP	OPERATING WEIGHT (LBS)	SERVICE	REMARKS
FCU-1	TRANE	FCD-060	531	0.25	30	180	160	3	115	1	3.1/15	160	SHOWER ROOM 113	1,2,3
FCU-2	TRANE	FCD-060	531	0.25	30	180	160	3	115	1	3.1/15	160	MEN'S ROOM 116	1,2,3

1. PROGRAMMABLE THERMOSTAT
2. PROVIDE TWO-POSITION HEATING HOT WATER CONTROL VALVE
3. MERV 8 FILTER

AIR DISTRIBUTION DEVICES

NOTES:
1. MOUNTING - CEILING, DUCT, SIDE WALL OR OTHER
2. MATERIAL - STEEL, ALUMINUM OR OTHER
3. FINISH - FACTORY WHITE (WH), FIELD PAINT (FP)
REFER TO ARCHITECTURAL PLANS FOR FINISH SCHEDULE
4. DAMPER -
"A" - OPPOSED BLADE
"B" - RADIAL OPPOSED BLADE
"C" - RUSKIN CFD OR CFDR WITH VOLUME DAMPER
5. BORDER STYLE -
"A" - SURFACE MOUNTED
"B" - LAY-IN WITH MODEL #XY-13363 PLASTER FRAME FOR DRYWALL CEILING MOUNT
"C" - LAY-IN FRAME FOR T-BAR CEILING

MARK	TITUS CATALOG NUMBER	DEVICE SIZE (IN x IN) MODULE	MOUNTING	MATERIAL	FINISH	DAMPER	BORDER	REMARKS
EG-1	355ZFL	10x10	DUCT	ALUMINUM	WHITE	B	A	
EG-2	PAR-AA	24x24	CEILING	ALUMINUM	WHITE	C	A	8" DIA. NECK SIZE

UNIT HEATER SCHEDULE

MARK	MANUFACTURER	MODEL	AIRFLOW (CFM)	STATIC PRESSURE (IN W.G.)	HEATING (MBH) INPUT	OUTPUT	ELECTRICAL VOLT	PHASE	FLA	MOCP	WEIGHT (LBS)	SERVICE	REMARKS
UH-1	REZNOR	UDAP-60	769	0.40	60	49.8	115	1	2.4	15	70	FOOD PREP AREA 112A	1,2
UH-2	REZNOR	UDAP-30	456	0.25	30	24.6	115	1	1.9	15	60	ADA WOMEN'S ROOM	1,2
UH-3	REZNOR	UDAP-30	456	0.25	30	24.6	115	1	1.9	15	60	MEN'S ROOM 204B	1,2
UH-4	REZNOR	UDAP-30	456	0.25	30	24.6	115	1	1.9	15	60	WOMEN'S ROOM 202	1,2

1. PROGRAMMABLE THERMOSTAT
2. CONCENTRIC VENT KIT

UPBLAST ROOFTOP EXHAUST FAN SCHEDULE

MARK	MANUFACTURER	MODEL	AIRFLOW (CFM)	EXT. STATIC PRESS. (IN W.G.)	ELECTRICAL HP	VOLT	PHASE	ACOUSTIC (SONES)	WEIGHT (LBS)	SERVICE	REMARKS
REF-1	GREENHECK	USGF-121-4	1,050	0.625	1/4	115	60	9.8	70	GREASE HOOD	1,2,3,4,5, 6,7

1. KITCHEN GREASE HOOD EXHAUST - ON/OFF SWITCH AT KITCHEN HOOD CONTROL PANEL
2. INTERLOCK TO MAU-1.
3. FITS ON COMBINATION CURB FOR MAU-1 & REF-1
4. BIRDSCREEN
5. GREASE DRAIN AND COLLECTOR
6. UL 762 LISTING FOR GREASE EXHAUST
7. NEMA 3R DISCONNECT FACTORY WIRED FROM MOTOR TO DISCONNECT THROUGH THE BREATHER TUBE.

REGISTERED PROFESSIONAL ENGINEER TERRY WONG No. M29562 Exp. 6/30/13 MECHANICAL STATE OF CALIFORNIA

WINZLER & KELLY
2235 Mercury Way, Suite 150
Santa Rosa, CA 95407
Tel: 707.823.1010 | Fax: 707.527.8679
www.w-k.com

BY:	REMARKS	DATE	SYMBOL	REVISIONS

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE: 3 JULY 2011

SHEET TITLE: MECHANICAL SCHEDULES AND DETAILS
PROJECT: BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
PROJECT NUMBER: XXX
LOCATION: BURBANK, CALIFORNIA
MILITARY DEPARTMENT
STATE OF CALIFORNIA

SHEET NUMBER M4

ABBREVIATIONS

A	AMPERES, AREA
ABS	ACRYLONITRILE–BUTADIENE –STYRENE
AD	AREA DRAIN
AFF	ABOVE FINISHED FLOOR
AG	ABOVE GRADE
APPROX	APPROXIMATE
AS	AIR SEPARATOR
AVG	AVERAGE
BD	BALANCE DAMPER
BDD	BACK DRAFT DAMPER
BFP	BACK FLOW PREVENTER
BG	BELOW GRADE
BHP	BRAKE HORSEPOWER
BOD	BOTTOM OF DUCT
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNIT PER HOUR
C	CELSIUS
℄	CENTERLINE
CCW	COUNTER CLOCKWISE
CD	CEILING DIFFUSER, CONDENSATE DRAIN
CFM	CUBIC FEET PER MINUTE
CH	CHILLER
CHWP	CHILLED WATER PUMP
CHWR	CHILLED WATER RETURN
CHWS	CHILLED WATER SUPPLY
CI	CAST IRON
CMPR	COMPRESSOR
CONT	CONTINUED
CT	COOLING TOWER
CU	COPPER
CU FT	CUBIC FEET
CU IN	CUBIC INCHES
CW	COLD WATER, CLOCKWISE
CWP	CONDENSER WATER PUMP
CWR	CONDENSER WATER RETURN,
CWS	CONDENSER WATER SUPPLY
CWV	COMBINATION WASTE & VENT
D	DEPTH
DB	DECIBEL, DRY BULB
DEG	DEGREE(S)
DIA	DIAMETER
DN	DOWN
DPT	DIFFERENTIAL PRESSURE TRANSMITTER
DS	DOWN SPOUT
DWG	DRAWING
(E)	EXISTING
EA	EACH
EAT	ENTERING AIR TEMPERATURE
EF	EXHAUST FAN
EFF	EFFICIENCY
EG	EXHAUST GRILLE
ELEV	ELEVATION
ENT	ENTERING
ESP	EXTERNAL STATIC PRESSURE
F	FLOW
FACP	FIRE ALARM CONTROL PANEL
FCO	FLOOR CLEAN OUT
FD	FLOOR DRAIN, FIRE DAMPER
FDC	FIRE DEPARTMENT CONNECTION
FM	FLOW METER
FP	FIRE PROTECTION
FPI	FINS PER INCH
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FS	FLOW SWITCH
FSD	FIRE/SMOKE DAMPER
FSP	FIRE SPRINKLER
FT	FOOT, FEET
G	GAS
GA	GAUGE
GALV	GALVANIZED
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GPS	GALLONS PER SECOND
HD	HEAD
HG	MERCURY
HWR	HEATING WATER RETURN
HWS	HEATING WATER SUPPLY
HP	HORSEPOWER
HR	HOSE REEL, HOUR
HT	HEIGHT
HVAC	HEATING, VENTILATION &CONDITIONING
HW	HOT WATER
HWR	HOT WATER RETURN
HZ	FREQUENCY
ID	INSIDE DIAMETER
INVERT	INVERT ELEVATION
IW	INDIRECT WASTE
KW	KILOWATTS
KWH	KILOWATTS PER HOUR
L	LENGTH
LAT	LEAVING AIR TEMPERATURE
LBS	POUNDS
LF	LINEAR FEET
LPG	LIQUID PETROLEUM GAS
LTG	LIGHTING
LVG	LEAVING
LWT	LEAVING WATER TEMPERATURE
MAX	MAXIMUM
MBH	1,000 BTUH
MCC	MOTOR CONTROL CENTER
MD	MOTORIZED DAMPER
MFR	MANUFACTURER
MIN	MINIMUM, MINUTE
MTD	MOUNTED
MUA	MAKE UP AIR
(N)	NEW
NC	NORMALLY CLOSED, NOISE CRITERIA
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN, NUMBER
NTS	NOT TO SCALE
OA	OUTSIDE AIR
OBD	OPPOSED BLADE DAMPER
OC	ON CENTER
OD	OUTSIDE DIAMETER
ORD	OVERFLOW ROOF DRAIN
PB	POLYBUTYLENE
PE	POLYETHYLENE
PPM	PARTS PER MILLION
POC	POINT OF CONNECTION
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PSIA	POUNDS PER SQUARE INCH, ABSOLUTE
PSIG	POUNDS PER SQUARE INCH, GAGE
PVC	POLYVINYL CHLORIDE
RA	RETURN AIR
RD	ROOF DRAIN
REQ	REQUIRED
RG	RETURN GRILLE
RH	RELATIVE HUMIDITY
RPM	REVOLUTIONS PER MINUTE
RPS	REVOLUTIONS PER SECOND
SAD	SEE ARCHITECTURAL DRAWINGS
STD	STANDARD
SOV	SHUT OFF VALVE
SD	SUPPLY DIFFUSER, STORM DRAIN
SS	SANITARY SEWER, STAINLESS STEEL
TD	TEMPERATURE DIFFERENTIAL
TEMP	TEMPERATURE
TOD	TOP OF DUCT
TP	TOTAL STATIC PRESSURE
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED
V	VENT, VOLT
VEL	VELOCITY
VFD	VARIABLE FREQUENCY DRIVE
VOL	VOLUME
VP	VELOCITY PRESSURE
VTR	VENT THROUGH ROOF
W	WIDTH
W/	WITH
WB	WET BULB
WG	WATER GAGE
W/O	WITHOUT
WRG	WALL RETURN GRILLE
WSR	WALL SUPPLY REGISTER
WH	WATER HEATER
WHA	WATER HAMMER ARRESTOR
XFMR	TRANSFORMER
Z	ZONE

PLUMBING SYMBOLS

SYMBOL	DESCRIPTION
	SANITARY/ WASTE (ABOVE FLOOR/GRADE)
	SANITARY/ WASTE (BELOW FLOOR/GRADE)
GW	GREASE WASTE (BELOW FLOOR/GRADE)
SD	STORM DRAIN (ABOVE FLOOR/GRADE)
SD	STORM DRAIN (BELOW FLOOR/GRADE)
SV	COMBINATION WASTE AND VENT
CD	CONDENSATE DRAIN
	SANITARY VENT
	COLD WATER (DOMESTIC)
	HOT WATER (DOMESTIC)
	HOT WATER RETURN (DOMESTIC)
T	TEMPERED WATER
G	NATURAL GAS
MG	NATURAL GAS (MEDIUM PRESSURE)
LPG	LIQUEFIED PETROLEUM GAS
F	FIRE SUPPRESSION
	POINT OF CONNECTION
	FLOOR CLEANOUT
	CLEANOUT TO GRADE
	CLEANOUT
P	PRESSURE GAGE
	PRESSURE GAGE AND COCK
	PRESSURE REDUCING VALVE
	RELIEF OR SAFETY VALVE
	STRAINER
	TEMPERATURE GAGE
	PUMP (PLAN)
	PUMP (SCHEMATIC)
	EXPANSION LOOP
	CAP
	CONCENTRIC REDUCER
	UNION
	THREE–WAY MANUAL VALVE
	BALL VALVE
	BUTTERFLY VALVE
SD	DIAPHRAGM VALVE
	GATE VALVE
	GLOBE VALVE
	CHECK VALVE
	THERMOMETER
	PETE'S PLUG

GENERAL PLUMBING NOTES

1. THESE DRAWINGS ARE BASED UPON AVAILABLE DOCUMENTS, WHICH MAY NOT ACCURATELY PORTRAY AS-BUILT CONDITIONS. EXISTING EQUIPMENT AND PIPING SIZES, LOCATIONS, AND DIMENSIONS SHALL BE VERIFIED IN THE FIELD PRIOR TO DEMOLITION AND CONSTRUCTION. NOTIFY THE ENGINEER IMMEDIATELY OF ALL DISCREPANCIES AFFECTING THE REMOVAL OF EXISTING EQUIPMENT AND PIPING, AND THE INSTALLATION OF NEW EQUIPMENT AND PIPING.
2. INSTALL PIPING AND DUCTWORK TO BEST SUIT FIELD CONDITIONS AND COORDINATE WITH THE INSTALLATION WORK OF OTHER TRADES. THESE DRAWINGS ARE DIAGRAMMATIC, DO NOT SCALE TO DETERMINE EXACT LOCATION OF PIPING.
3. PROTECT ALL EXISTING EQUIPMENT THAT IS TO REMAIN. VERIFY WITH OWNER WHAT SYSTEMS WILL REMAIN OPERATIONAL THROUGHOUT CONSTRUCTION. NOTIFY THE OWNER PRIOR TO SHUTTING DOWN ANCILLARY SYSTEMS OR EQUIPMENT.
4. REPAIR AND/OR REPLACE ALL EXISTING UTILITIES, STRUCTURAL ELEMENTS, EQUIPMENT, PIPING, CONDUIT, DUCTWORK, ETC. THAT IS DAMAGED OR BECOMES INOPERABLE AS A RESULT OF THIS WORK.
5. COORDINATE MODIFICATIONS TO EXISTING SYSTEMS WITH OWNER TO MINIMIZE SHUTDOWN TIME OF BUILDING SYSTEMS.
6. FOR ALL MECHANICAL SYSTEMS CONTROLS, PROVIDE CONDUIT AND WIRING IN ACCORDANCE WITH DIVISION 26 SPECIFICATIONS AND MANUFACTURER'S REQUIREMENTS.
7. ALL SANITARY AND SANITARY VENT PIPING SHALL SLOPE AT ¼" PER 12" UNLESS OTHERWISE NOTED.
8. ALL DOMESTIC WATER PIPE SIZES BASED ON TYPE L COPPER.

SHEET ANNOTATION

1 KEYNOTE

1 DEMOLITION NOTE

MECH, ROOM 101 ROOM NAME AND ROOM NUMBER

1 / E5.1 DETAIL NUMBER, DETAIL INDICATOR, SHEET NUMBER ON WHICH DETAIL APPEARS

A / E3.1 SECTION LETTER, SECTION INDICATOR, SHEET NUMBER ON WHICH SECTION APPEARS

WH 1 MECHANICAL EQUIPMENT DESIGNATION (SEE SCHEDULE)

REGISTERED PROFESSIONAL ENGINEER TERRY WONG No. M29562 Exp. 6/30/13 MECHANICAL STATE OF CALIFORNIA

WINZLER & KELLY
2235 Mercury Way, Suite 150
Santa Rosa, CA 95407
Tel: 707 823 1010 | Fax: 707 527 8879
www.w-and-k.com

BY:	REMARKS	DATE	SYMBOL	REVISIONS

3 JULY 2011

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE:

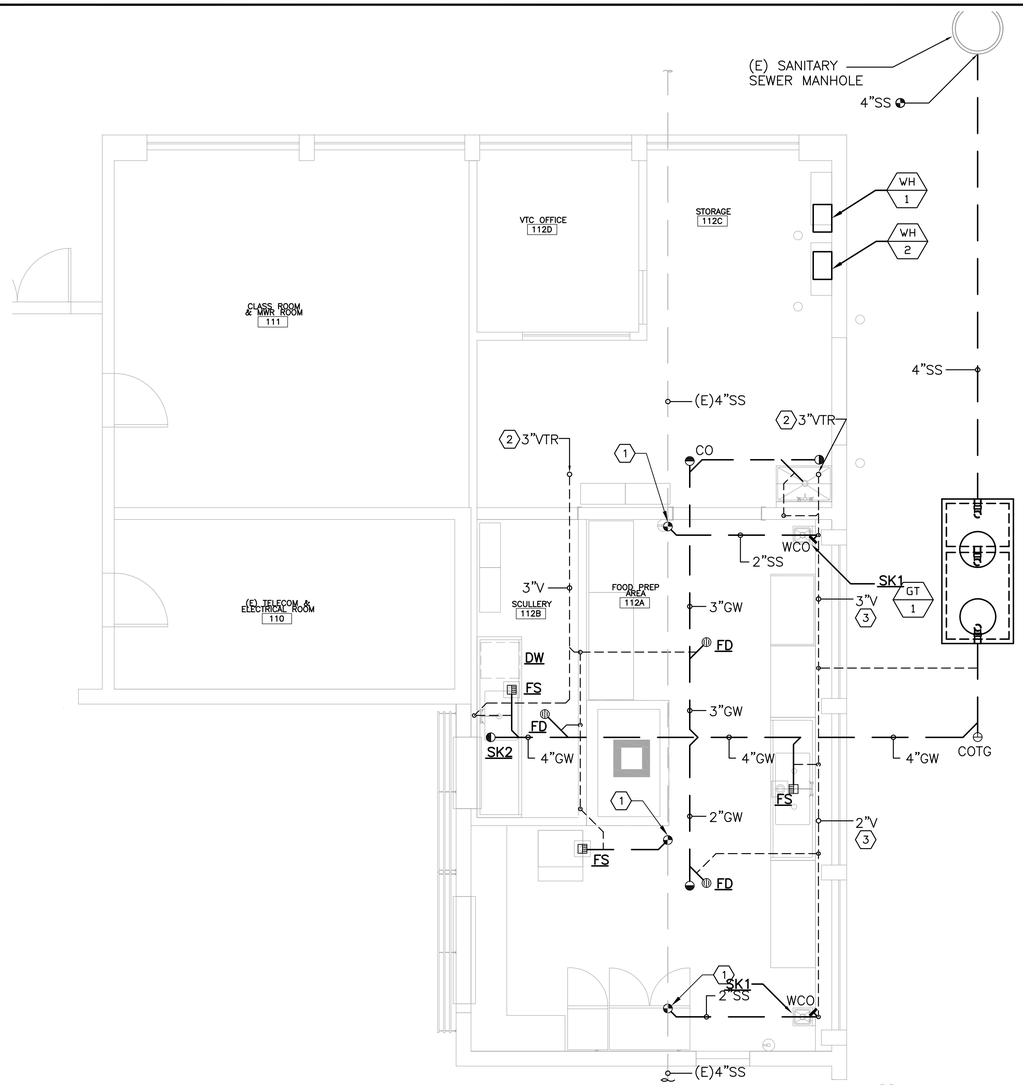
SHEET TITLE PLUMBING SYMBOLS, LEGEND AND NOTES

PROJECT BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
PROJECT NUMBER XXX
LOCATION BURBANK, CALIFORNIA

STATE OF CALIFORNIA
MILITARY DEPARTMENT

SHEET NUMBER
P0

OF 30 OF 43

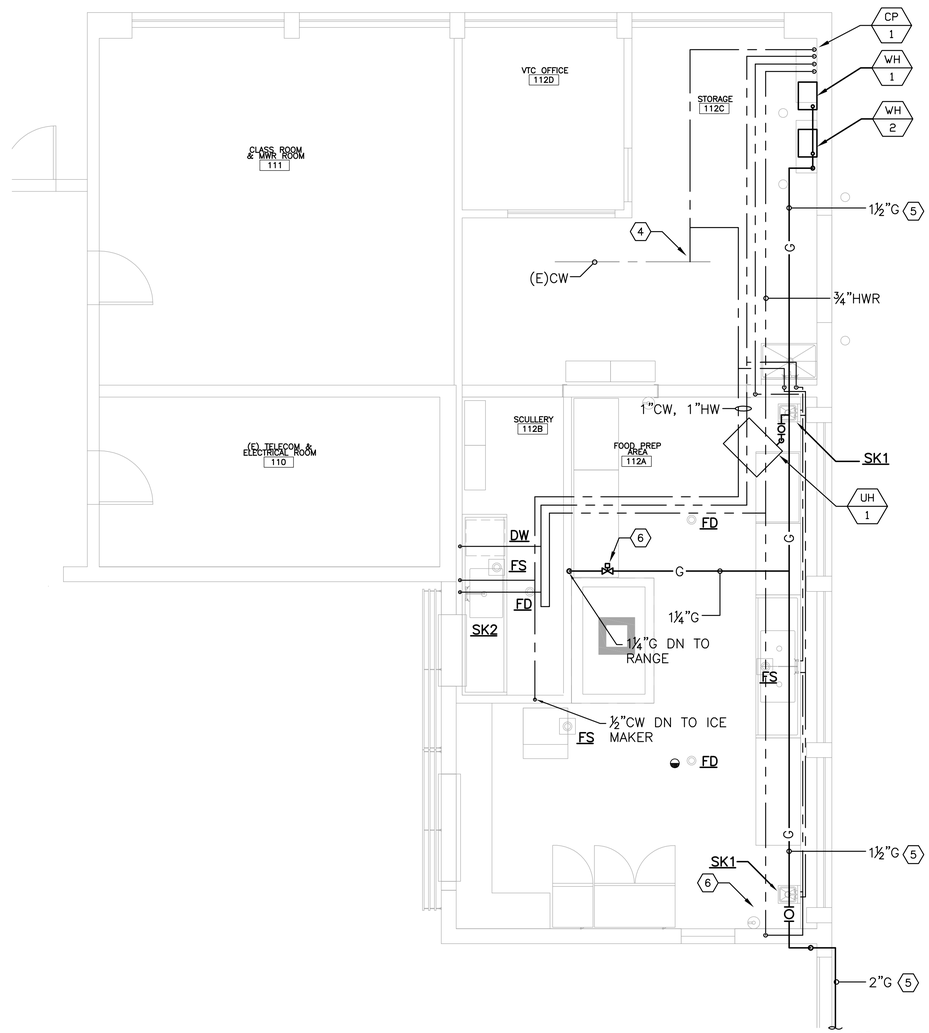


1 P1 KITCHEN PLAN – WASTE AND VENT

1/4" = 1'-0"

0" 2' 4' 8'

N



1 P1 KITCHEN PLAN – DOMESTIC WATER & GAS

1/4" = 1'-0"

0" 2' 4' 8'

N

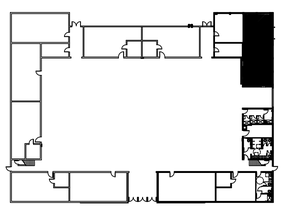
SHEET GENERAL NOTES

1. PROVIDE JR SMITH PRIME–EZE FIGURE 2698 AT SINKS.

KEYNOTES

1. CONNECT TO EXISTING 4"SS.
2. ROUTE VENT PIPING UP THROUGH ROOF, MAINTAIN 10' CLEARANCE FROM OUTSIDE AIR INTAKE.
3. ROUTE SANITARY VENT IN FURRED WALL.
4. CONNECT 1½" CW TO EXISTING, VERIFY EXACT SIZE AND LOCATION IN FIELD.
5. ROUTE GAS PIPING ALONG EXTERIOR WALL ABOVE FIRST FLOOR WINDOWS, PAINT TO MATCH EXISTING WALL.
6. GAS SHUTOFF SOLENOID VALVE, INTERLOCK WITH HOOD FIRE PROTECTION SYSTEM. VALVE TO SHUT OFF GAS UPON ACTIVATION OF HOOD/RANGE FIRE PROTECTION SYSTEM.

REGISTERED PROFESSIONAL ENGINEER TERRY WONG No. M29562 Exp. 6/30/13 MECHANICAL STATE OF CALIFORNIA



KEY PLAN

WINZLER & KELLY
2235 Mercury Way, Suite 150
Santa Rosa, CA 95407
Tel: 707.823.1010 | Fax: 707.527.8879
www.w-and-k.com

BY:	REMARKS	DATE	SYMBOL	REVISIONS

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE: 3 JULY 2011

DEMO
NEW

PROJECT NUMBER XXX

SHEET TITLE FIRST FLOOR PLUMBING KITCHEN PLAN – DEMO AND NEW

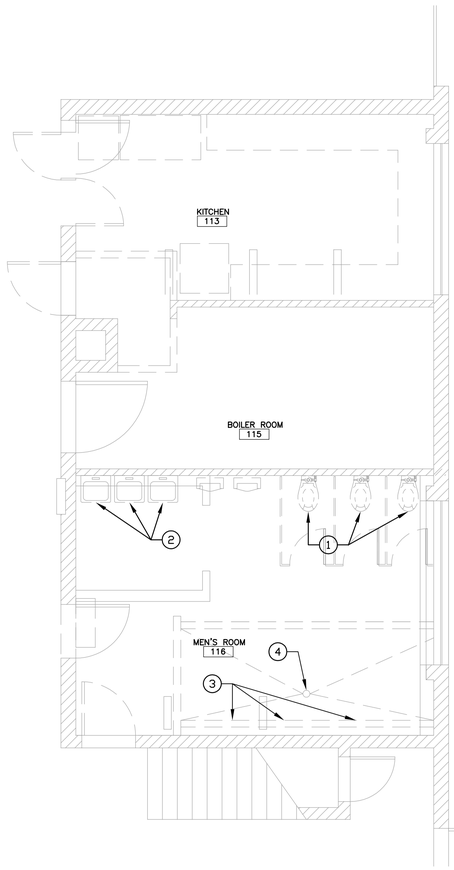
PROJECT BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION

LOCATION BURBANK, CALIFORNIA

MILITARY DEPARTMENT
STATE OF CALIFORNIA

SHEET NUMBER P1

PAGE 31 OF 43

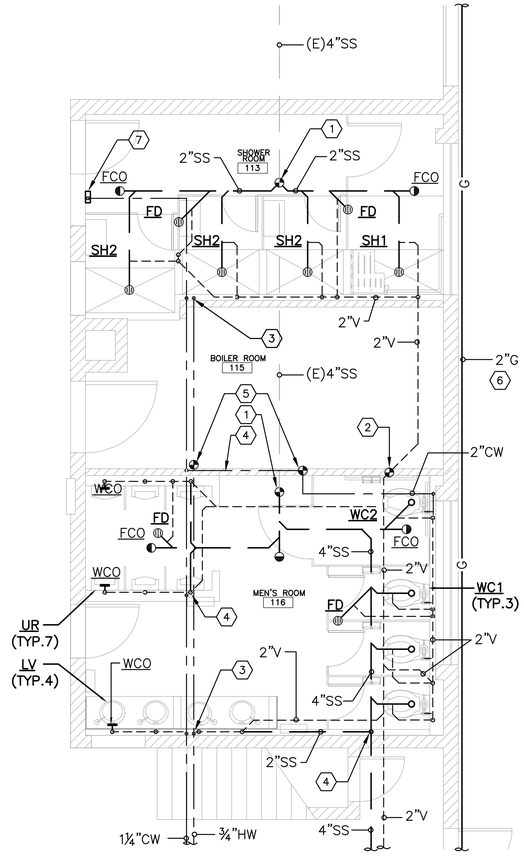


2 P2 DEMO PLAN – SHOWER & MEN'S ROOM

1/4" = 1'-0"

0" 2' 4' 8'

N



1 P2 FLOOR PLAN – SHOWER & MEN'S ROOM

1/4" = 1'-0"

0" 2' 4' 8'

N

SHEET GENERAL NOTES

1. REMOVE ALL PIPING TO BE DEMOLISHED BACK TO MAINS UNLESS NOTED OTHERWISE AND CAP BEHIND FINISHED SURFACES.
2. FIELD VERIFY ALL UTILITIES BEFORE COMMENCEMENT OF CONSTRUCTION, NOTIFY ENGINEER OF ANY SIGNIFICANT CHANGES.

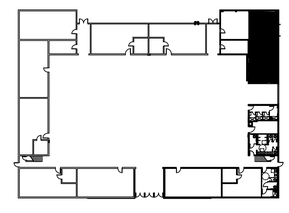
DEMOLITION NOTES

1. REMOVE EXISTING WATER CLOSET, CW, SANITARY SEWER, VENT PIPING AND OTHER APPURTENANCES. PATCH SURFACES TO REMAIN TO MATCH EXISTING, SEE ARCHITECTURAL DRAWINGS.
2. REMOVE EXISTING LAVATORY, HW, CW, SANITARY SEWER, VENT PIPING AND OTHER APPURTENANCES. PATCH SURFACES TO REMAIN TO MATCH EXISTING, SEE ARCHITECTURAL DRAWINGS.
3. REMOVE EXISTING GANG SHOWER, CW, HW AND OTHER APPURTENANCES. PATCH SURFACES TO REMAIN TO MATCH EXISTING, SEE ARCHITECTURAL DRAWINGS.
4. REMOVE EXISTING FLOOR DRAIN, SANITARY SEWER, VENT PIPING BACK TO MAIN CONNECTIONS AND CAP.

KEYNOTES

1. CONNECT NEW SANITARY SEWER TO EXISTING
2. CONNECT SANITARY VENT TO EXISTING
3. ¾"CW, ¾"HW DOWN TO FIXTURES
4. ROUTE 2" SS DOWN IN WALL TO BELOW GRADE
5. CONNECT CW/HW PIPING TO EXISTING
6. ROUTE GAS PIPING ALONG EXTERIOR WALL, ABOVE FIRST FLOOR WINDOWS AND PAINT TO MATCH EXISTING WALL.
7. PROVIDE PPP TRAP PRIMER FOR FLOOR DRAINS IN WALL BOX. MOUNT BOX AT 48" AFF.

REGISTERED PROFESSIONAL ENGINEER
TERRY WONG
No. M29562
Exp. 6/30/13
MECHANICAL
STATE OF CALIFORNIA



KEY PLAN

WINZLER & KELLY
2235 Mercury Way, Suite 150
Santa Rosa, CA 95407
Tel: 707.523.1010 | Fax: 707.527.8679
www.winzler.com

BY:	REMARKS	DATE	SYMBOL	REVISIONS

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE: 3 JULY 2011

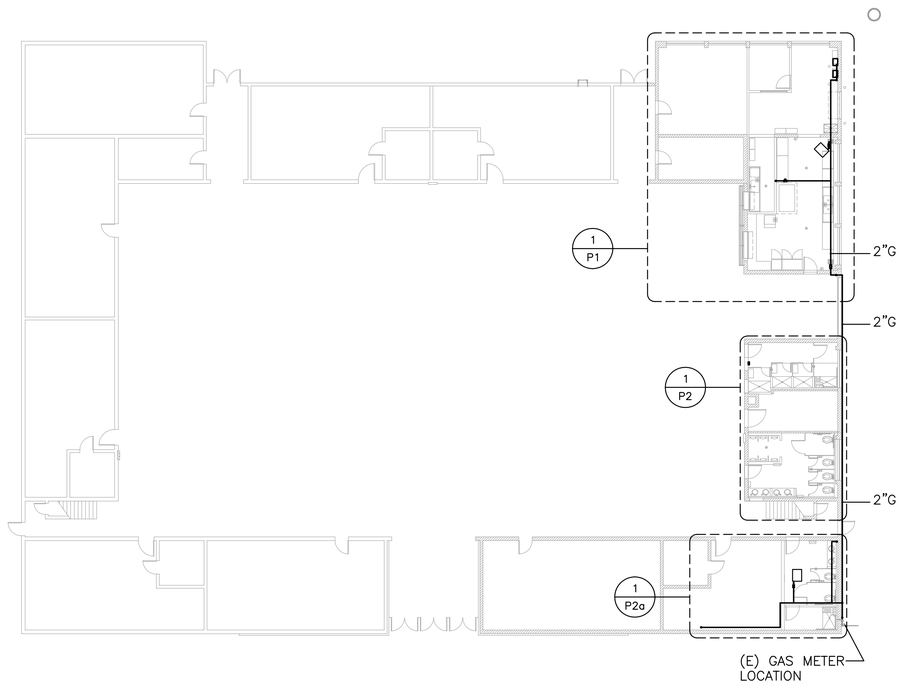
SHEET TITLE: FIRST FLOOR RESTROOM PLUMBING PLANS – DEMO AND NEW

PROJECT: BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
PROJECT NUMBER: XXX
LOCATION: BURBANK, CALIFORNIA

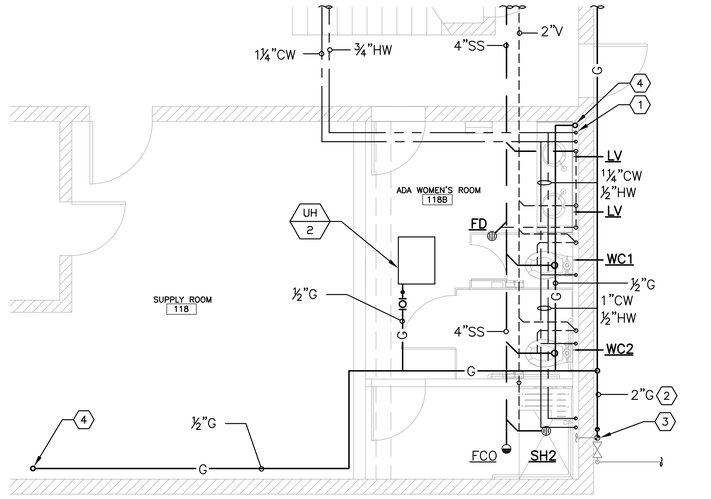
STATE OF CALIFORNIA
MILITARY DEPARTMENT

SHEET NUMBER
P2

PAGE 32 OF 43



1 P2a FLOOR PLAN – NATURAL GAS PIPING PLAN
1/4" = 1'-0"
0" 2' 4' 8'
N



1 P2a FLOOR PLAN – ADA WOMEN'S ROOM
1/4" = 1'-0"
0" 2' 4' 8'
N

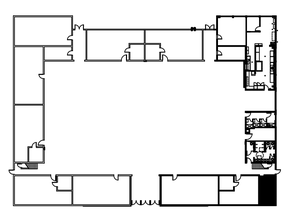
SHEET GENERAL NOTES

1. REMOVE ALL PIPING TO BE DEMOLISHED BACK TO MAINS UNO AND CAP BEHIND FINISHED SURFACES.
2. FIELD VERIFY ALL UTILITIES BEFORE COMMENCEMENT OF CONSTRUCTION, NOTIFY ENGINEER OF ANY SIGNIFICANT CHANGES.
3. PRIOR TO ANY CORE DRILLING OPERATION, INSPECT ABOVE AND BELOW LOCATION AND PROVIDE RADAR OR OTHER NONDESTRUCTIVE TEST TO LOCATE AND AVOID STRUCTURAL MEMBERS.

KEYNOTES

1. ½"CW & ½"HW DOWN TO FIXTURES.
2. ROUTE GAS PIPING ALONG EXTERIOR WALL, PAINT TO MATCH EXISTING WALL.
3. CONNECT 2" GAS TO EXISTING AT METER/REGULATOR.
4. ROUTE ½" NATURAL GAS PIPE UP THROUGH CEILING TO SECOND FLOOR. SEE SHEET P3 FOR CONTINUATION.

REGISTERED PROFESSIONAL ENGINEER
TERRY WONG
No. M29562
Exp. 6/30/13
MECHANICAL
STATE OF CALIFORNIA



KEY PLAN

WINZLER & KELLY
2235 Mercury Way, Suite 150
Santa Rosa, CA 95407
Tel: 707.523.1010 | Fax: 707.527.8679
www.winzler.com

BY:	REMARKS	DATE	SYMBOL	REVISIONS
		REVDATE	PATH_NAME	

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE: 3 JULY 2011

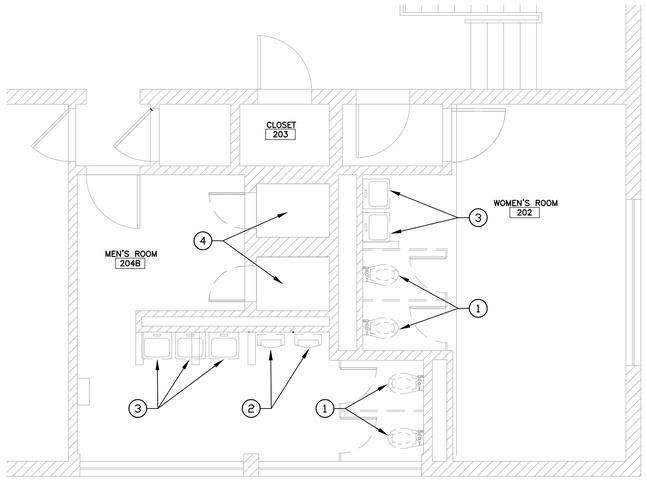
SHEET TITLE FIRST FLOOR ADA RESTROOM PLUMBING PLAN – DEMO AND NEW

PROJECT BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
PROJECT NUMBER XXX
LOCATION BURBANK, CALIFORNIA

STATE OF CALIFORNIA
MILITARY DEPARTMENT

SHEET NUMBER
P2a

PAGE
33 OF 43

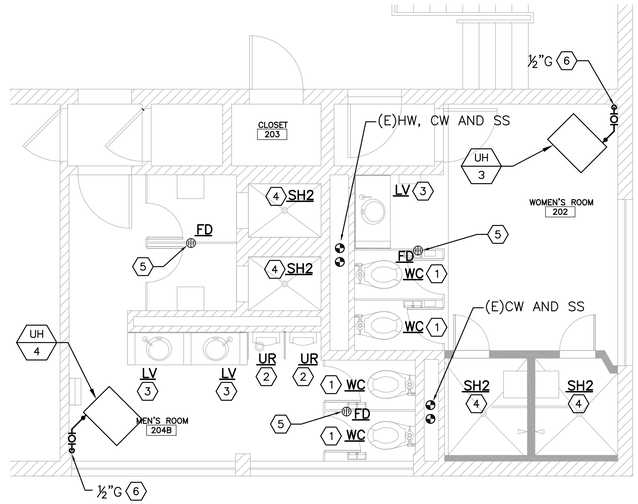


2 P3 DEMO PLAN – WOMEN'S & MEN'S ROOM

1/4" = 1'–0"

0" 2' 4' 8'

N



1 P3 FLOOR PLAN – WOMEN'S & MEN'S ROOM

1/4" = 1'–0"

0" 2' 4' 8'

N

SHEET GENERAL NOTES

1.

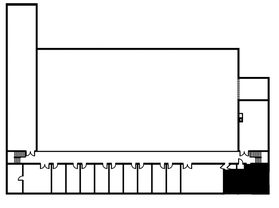
DEMOLITION NOTES

1. REMOVE EXISTING WATER CLOSET, CW, SANITARY SEWER, VENT PIPING AND OTHER APPURTENANCES. PATCH SURFACES TO REMAIN TO MATCH EXISTING, SEE ARCHITECTURAL DRAWINGS.
2. REMOVE EXISTING URINAL, CW, SANITARY SEWER, VENT PIPING AND OTHER APPURTENANCES. PATCH SURFACES TO REMAIN TO MATCH EXISTING, SEE ARCHITECTURAL DRAWINGS
3. REMOVE EXISTING LAVATORY, HW, CW, SANITARY SEWER, VENT PIPING AND OTHER APPURTENANCES. PATCH SURFACES TO REMAIN TO MATCH EXISTING, SEE ARCHITECTURAL DRAWINGS.
4. REMOVE EXISTING SHOWER, CW, HW AND OTHER APPURTENANCES. PATCH SURFACES TO REMAIN TO MATCH EXISTING, SEE ARCHITECTURAL DRAWINGS.
5. REMOVE EXISTING FLOOR DRAIN, SANITARY SEWER, VENT PIPING BACK TO MAIN CONNECTIONS AND CAP.

KEYNOTES

1. INSTALL NEW WATER CLOSET & FLUSH VALVE. CONNECT TO EXISTING.
2. INSTALL NEW URINAL AND FLUSH VALVE. CONNECT TO EXISTING UTILITIES.
3. INSTALL NEW LAVATORY AND FAUCET. CONNECT TO EXISTING UTILITIES. PROVIDE NEW P–TRAP AND ANGLE STOP/SUPPLIES.
4. INSTALL NEW SHOWER AND FLOOR DRAIN. CONNECT TO EXISTING UTILITIES.
5. INSTALL NEW FLOOR DRAIN. CONNECT TO EXISTING UTILITIES.
6. ROUTE NEW ½" NATURAL GAS LINE ALONG WALL AND DOWN THROUGH FLOOR TO FIRST FLOOR CEILING. SEE SHEET P2A FOR CONTINUATION.

REGISTERED PROFESSIONAL ENGINEER
TERRY WONG
No. M29562
Exp. 6/30/13
MECHANICAL
STATE OF CALIFORNIA



KEY PLAN

WINZLER & KELLY
2235 Mercury Way, Suite 150
Santa Rosa, CA 95407
Tel: 707.823.1010 | Fax: 707.527.8879
www.w-and-k.com

BY:	REMARKS	DATE	SYMBOL	REVISIONS

DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:
			3 JULY 2011

REVDATE	PATH_NAME

SHEET TITLE SECOND FLOOR RESTROOM PLUMBING PLANS – DEMO AND NEW

PROJECT BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION PROJECT NUMBER XXX

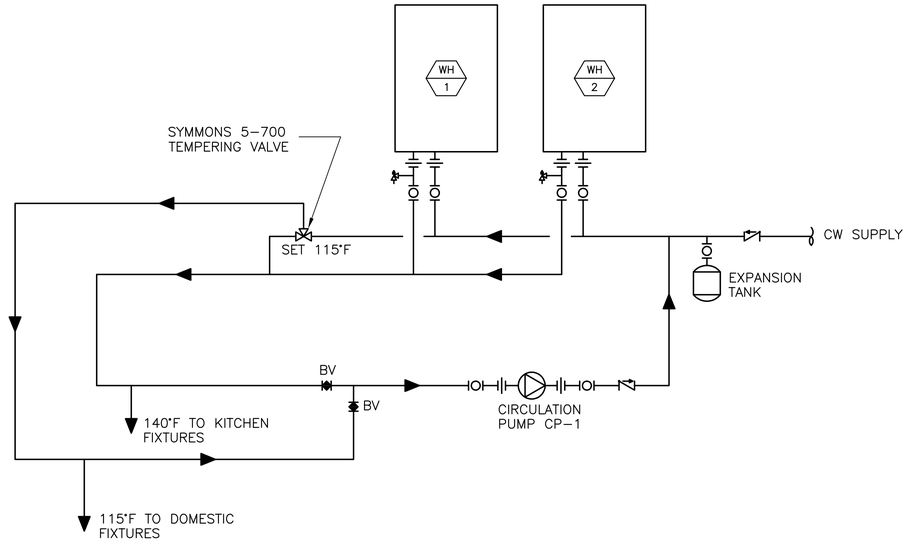
LOCATION BURBANK, CALIFORNIA

MILITARY DEPARTMENT

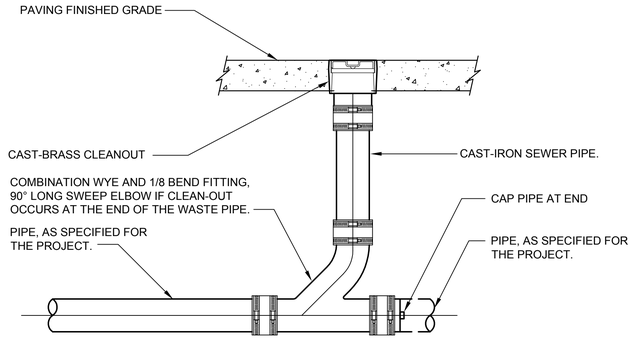
STATE OF CALIFORNIA

SHEET NUMBER P3

OF 34 OF 43

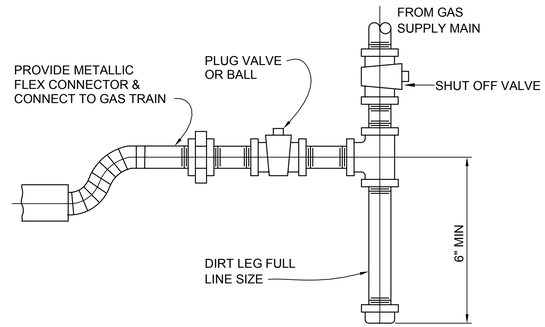


1 **WATER HEATER DIAGRAM** NOT TO SCALE

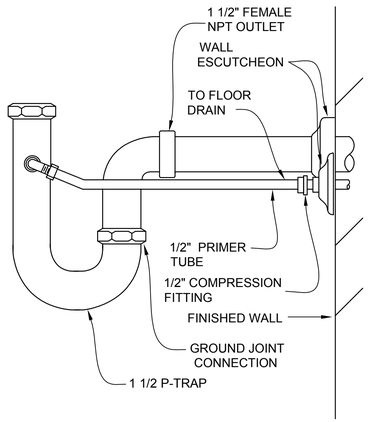


NOTES:
1. CLEAN-OUTS AT FINISHED CONCRETE OR PAVED SURFACES, SHALL BE BROUGHT UP TO GRADE IN A CONCRETE, YARD ACCESS BOX WITH VEHICLE TRAFFIC WEIGHT, REMOVABLE COVER.
2. CLEAN-OUTS IN UNFINISHED SURFACES SHALL BE SET IN CONCRETE PADS.
3. REQUIRED AT WASTE MAIN ON EXIT OF BUILDING EXTERIOR.

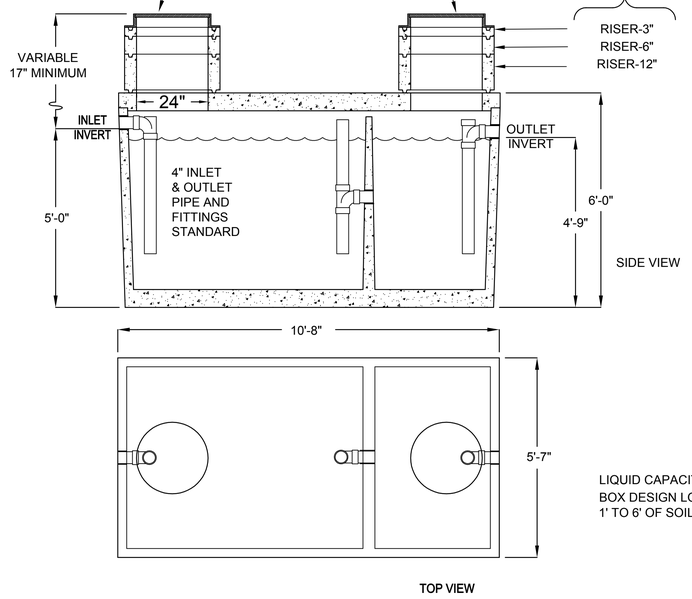
2 **CLEANOUT** NOT TO SCALE



3 **GAS CONNECTION** NOT TO SCALE



4 **TRAP PRIMER** NOT TO SCALE



LIQUID CAPACITY: 1,500 GALLONS.
BOX DESIGN LOAD: H-20 TRAFFIC FROM 1' TO 6' OF SOIL COVER.

5 **GREASE INTERCEPTOR** NOT TO SCALE

REGISTERED PROFESSIONAL ENGINEER
TERRY WONG
No. M29562
Exp. 6/30/13
MECHANICAL
STATE OF CALIFORNIA

WINZLER & KELLY
2235 Mercury Way, Suite 150
Santa Rosa, CA 95407
Tel: 707 823-1010 | Fax: 707 527-8879
www.w-and-k.com

BY:	REMARKS	DATE	SYMBOL	REVISIONS

REVDATE PATH_NAME

3 JULY 2011

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE:

SHEET TITLE PLUMBING SCHEDULES AND DETAILS

PROJECT BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION PROJECT NUMBER XXX

LOCATION BURBANK, CALIFORNIA

STATE OF CALIFORNIA
MILITARY DEPARTMENT

SHEET NUMBER
P4

LOCAL CONNECTION SCHEDULE

MARK	DESCRIPTION	MANUFACTURER	MODEL No.	FLOW RATE	WASTE	VENT	CW	HW	ADA	NOTES
WC1	WATER CLOSET	KOHLER	K-4406	1.28 GPF	4"	2"	1/2"	-	NO	1,2
	FLUSH VALVE	ZURN	ZGEN6200EV							
WC2	WATER CLOSET	KOHLER	K-4405	1.28 GPF	4"	2"	1/2"	-	YES	1,2
	FLUSH VALVE	ZURN	ZGEN6200EV							
UR	URINAL	KOHLER	K-4904-ET	0.125 GPF	2"	2"	1/2"	-	YES	
	FLUSH VALVE	ZURN	ZGEN6203EV-ULF							
	CARRIER	ZURN	Z-1222							
LV	LAVATORY	SEE ARCH.	-	0.5 GPM	2"	2"	1/2"	1/2"	YES	2,3,4,7
	FAUCET	ZURN	Z6915-XL							
SK1	SINK	ADVANCE TABCO	7-PS-85	2.2 GPM	2"	2"	1/2"	1/2"	2,3	
	FAUCET	CHICAGO	521-GN2AE1CP							
SK2	SINK	BY OTHERS	SEE ARCH	1.24GPM	2"	2"	1/2"	1/2"	2,4	
	FAUCET	T&S	B-0123-BC							
	DISPOSER	HOBART	FD3-150							
SH1	SHOWER VALVE/HEAD	SYMMONS	C-96-300-B30-1.5	1.5 GPM	2"	2"	1/2"	1/2"	YES	6
SH2	SHOWER VALVE/HEAD	SYMMONS	C-96-1-X-1.5	1.5 GPM	2"	2"	1/2"	1/2"	NO	7
										5
MS	SINK	ZURN	Z1996-36-HH-SF	2.2 GPM	3"	2"	1/2"	1/2"	NO	
FD	FLOOR DRAIN	ZURN	Z-415-B	-	2"	2"	-	-	NA	
FS	FLOOR SINK	ZURN	Z-1901	-	2"	2"	-	-	NA	
DW	DISHWASHER	CHAMPION	UH-170B	28.2 GPM	-	-	-	1/2"	NA	8

NOTES:
1. OLSONITE #95 SEAT.
2. INCLUDE ANGLE STOP & SUPPLY.
3. INSULATE WITH TRUBRO LAV-GUARD # 101, WHITE
4. ZURN P6900-MV MIXING VALVE UNDER COUNTER
5. 1/2 OR 3/4 GRATE AS NECESSARY
6. SHOWER DRAIN SAME AS FLOOR DRAIN, EXCEPT TRAP PRIMER NOT REQUIRED.
7. JR SMITH TRAP PRIMER FIGURE 2698
8. 240V/1PHASE, 60HZ, 50AMPS, MDCP=60AMPS, FIELD MOUNTED PRESSURE REDUCING VALVE, SET AT 20-22PSI

WATER HEATER SCHEDULE

MARK	MANUFACTURER	MODEL	OUTPUT AT 120°F	INPUT (MBH)	OUTPUT (MBH)	ELECTRICAL			WEIGHT (LBS)	SERVICE	REMARKS
						VOLTS	PHASE	HZ			
WH-1	TAKAGI	T-HD2-DV	6.1 GPM	199	179	120	1	60	73	DOMESTIC	1
WH-2	TAKAGI	T-HD2-DV	6.1 GPM	199	179	120	1	60	73	DOMESTIC	1

REMARKS:
1. INSTALL TH-NT01 NEUTRALIZER KIT

PUMP SCHEDULE

MARK	MANUFACTURER	MODEL	FLOW (GPM)	HEAD (FT)	ELECTRICAL				HP	WEIGHT (LBS)	SERVICE	REMARKS
					VOLT	PHASE	FL AMPS	RPM				
CP-1	GRUNDFOS	UP26-99BF	5	15	120	1	2.15	3300	-	13	DOMESTIC HOT WATER RETURN	1

REMARKS:
1. PROVIDE TIMER AND AQUASTAT

GREASE INTERCEPTOR SCHEDULE

MARK	MANUFACTURER	MODEL	CAPACITY (GALLONS)	SERVICE	REMARKS
GT-1	JENSEN PRECAST	JP1500EE-G	1500	KITCHEN	

REGISTERED PROFESSIONAL ENGINEER
TERRY WONG
No. M29562
Exp. 6/30/13
MECHANICAL
STATE OF CALIFORNIA

WINZLER & KELLY
2235 Mercury Way, Suite 150
Santa Rosa, CA 95407
Tel: 707 823-1010 | Fax: 707 527-8879
www.winzler.com

REVISIONS | SYMBOL | DATE | REMARKS
BY:
3 JULY 2011 | PATH_NAME

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE:

SHEET TITLE: PLUMBING SCHEDULES
PROJECT: BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
PROJECT NUMBER: XXX
LOCATION: BURBANK, CALIFORNIA
MILITARY DEPARTMENT
STATE OF CALIFORNIA

SHEET NUMBER
P5
OF 36 OF 43

STRUCTURAL ABBREVIATIONS

AB	ANCHOR BOLT	EQ	EQUAL	MO	MASONRY OPENING
ABC	AGGREGATE BASE COURSE	EQUIP	EQUIPMENT	MOD	MODIFIED
ABV	ABOVE	ETC	ET CETERA	MTL	METAL
ACI	AMERICAN CONCRETE INSTITUTE	EW	EACH WAY		
ADD'L	ADDITIONAL	EWEF	EACH WAY EACH FACE	N	NEW
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION	EXIST	EXISTING	NIC	NOT IN CONTRACT
		EXP	EXPANSION	NOM	NOMINAL
AISI	AMERICAN IRON AND STEEL INSTITUTE	EXT	EXTERIOR	NS	NEAR SIDE
				NTS	NOT TO SCALE
AITC	AMERICAN INSTITUTE OF TIMBER CONSTRUCTION	FF	FINISHED FLOOR	#	NUMBER
		FG	FINISHED GRADE		
ALT	ALTERNATE	FH	FULL HEIGHT	OC	ON CENTER
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE	FIN	FINISH	OD	OUTSIDE DIAMETER
		FL	FLOOR	OF	OUTSIDE FACE
APA	AMERICAN PLYWOOD ASSOCIATION	FLG	FLANGE	OPG	OPENING
		FN	FACE NAIL	OPP	OPPOSITE
ARCH	ARCHITECT/ARCHITECTURAL	FND	FOUNDATION	PEB	PRE ENGINEERED BUILDING
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS	FO	FACE OF	PEMB	PRE ENGINEERED METAL BLDG
		FOM	FACE OF MASONRY	PL	PLATE
AWS	AMERICAN WELDING SOCIETY	FOW	FACE OF WALL	PLCS	PLACES
&	AND	FRMG	FRAMING	PLYWD	PLYWOOD
@	AT	FS	FAR SIDE	PNL	PANEL
		FTG	FOOTING	PREFAB	PREFABRICATED
B	BOTTOM			PT	POINT, PRESSURE TREATED
B/	BOTTOM OF	GA	GAUGE	PVMT	PAVEMENT
BB	BOTTOM BARS	GALV	GALVANIZED		
BO	BOND	GF	GOVERNMENT FURNISHED	QTY	QUANTITY
BLDG	BUILDING	GRT	GROUT		
BLKG	BLOCKING	GSN	GENERAL STRUCTURAL NOTES	R	RADIUS
BM	BEAM	GYP	GYPSUM	REF	REFERENCE
BN	BOUNDARY NAIL			REINF	REINFORCING
BRG	BEARING	HAS	HEADED ANCHOR STUDS	REQD	REQUIRED
BS	BOTH SIDES	HD	HAND	RF	ROOF
BTWN	BETWEEN	HEF	HORIZONTAL EACH FACE	RM	ROOM
		HIF	HORIZONTAL INSIDE FACE		
C	CHANNEL	HK	HOOK	SCHED	SCHEDULE
C/C	CENTER TO CENTER	HM	HOLLOW METAL	SHT	SHEET
CANT	CANTILEVER	HOF	HORIZONTAL OUTSIDE FACE	SIM	SIMILAR
CAP	CAPACITY	HORIZ	HORIZONTAL	SP	SPACE/SPACES
CBC	CALIFRONIA BUILDING CODE	HP	HIGH POINT	SPC'G	SPACING
CF	CONTRACTOR FURNISHED	HT	HEIGHT	SPEC	SPECIFICATIONS
CI	CONTRACTOR INSTALLED			SST	STAINLESS STEEL
CJ	CONTRACTION/CONTROL JOINT	ID	INSIDE DIAMETER	STD	STANDARD
CL	CENTERLINE	IE	FOR EXAMPLE	STIFF	STIFFENER
CLR	CLEAR	INFO	INFORMATION	STL	STEEL
CLG	CEILING	INT	INTERIOR	STRUCT	STRUCTURAL
CMU	CONCRETE MASONRY UNIT	INTERMED	INTERMEDIATE	SYMM	SYMMETRICAL
COL	COLUMN	INTERSECT	INTERSECTION		
CONC	CONCRETE	INV	INVERT	T	TOP
CONN	CONNECTION	IBC	INTERNATIONAL BUILDING CODE	T/	TOP OF
CONSTR	CONSTRUCTION			T & B	TOP AND BOTTOM
CONT	CONTINUOUS	JST	JOIST	TB	TOP OF BAR
COORD	COORDINATE	JT	JOINT	THK	THICK
CRSI	CONCRETE REINFORCING STEEL INSTITUTE			TOC	TOP OF CONCRETE
		L	ANGLE	TOS	TOP OF STEEL
CTR/CTR'D	CENTER/CENTERED	LG	LONG	TS	TUBE STEEL
		LL	LIVE LOAD	TYP	TYPICAL
d	PENNY (NAIL SIZE)	LLH	LONG LEG HORIZONTAL		
DBL	DOUBLE	LLV	LONG LEG VERTICAL	UBC	UNIFORM BUILDING CODE
DET	DETAIL	LOC	LOCATION	UNO	UNLESS NOTED OTHERWISE
DF	DOUGLAS FIR	LONGIT	LONGITUDINAL	UON	UNLESS OTHERWISE NOTED
DIA	DIAMETER	LP	LOW POINT		
DIAG	DIAGONAL	LT	LEFT	VEF	VERTICAL EACH FACE
DIM	DIMENSION			VERT	VERTICAL
DISCONT	DISCONTINUE	MACH	MACHINE	VIF	VERTICAL INSIDE FACE
DL	DEAD LOAD	MAINT	MAINTENANCE	VOF	VERTICAL OUTSIDE FACE
DN	DOWN	MAS	MASONRY		
Do	DITTO	MAX	MAXIMUM	W/	WITH
DP	DEEP	MB	MACHINE BELT	W OR WF	WIDE FLANGE (BEAM)
DWG	DRAWING	MC	CHANNEL	W/O	WITHOUT
DWL	DOWEL	MCJT	MASONRY CONTROL JOINT	WP	WORK POINT
		MECH	MECHANICAL	WS	WATERSTOP
E	EXISTING	MFR	MANUFACTURER	WT	WEIGHT
EA	EACH	MIN	MINIMUM		
EF	EACH FACE	MNTG	MOUNTING		
EG	EXAMPLE				
EL	ELEVATION				
EMBED	EMBEDMENT				
EN	EDGE NAIL				
ENGR	ENGINEER				

STRUCTURAL SYMBOLS LEGEND

MATERIALS

CONCRETE IN SECTION

EARTH IN SECTION

GROUT IN SECTION

STEEL IN SECTION

INDEX OF STRUCTURAL DRAWINGS

GENERAL STRUCTURAL NOTES

GENERAL

1. DESIGN CRITERIA:
   2010 CALIFORNIA BUILDING CODE (2010 CBC)
2. UNLESS NOTED OTHERWISE, REFER TO DRAWINGS OTHER THAN STRUCTURAL FOR FINISHES, SLOPES, DEPRESSIONS, OPENINGS, CURBS, STAIRS, RAMPS, TRENCHES, EQUIPMENT AND LOCATIONS AND EXTENT OF SUCH CONDITIONS.
3. CONTRACTOR TO COORDINATE ALL NEW WORK WITH EXISTING SITE CONDITIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER PRIOR TO CONSTRUCTION.
4. DETAILS OR CONDITIONS NOT FULLY DEVELOPED ON STRUCTURAL DOCUMENTS ARE SIMILAR TO DEVELOPED DETAILS.
5. SEE ARCHITECTURAL AND MECHANICAL DRAWINGS FOR WATERPROOFING, DAMP-PROOFING, AND DRAINAGE REQUIREMENTS.
6. ALL BUILDING FOUNDATION PLANS, FLOOR PLANS AND ROOF PLANS TO BE COORDINATED WITH GENERAL NOTES AND TYPICAL DETAILS AS APPLICABLE.
7. THE STRUCTURE HAS BEEN DESIGNED TO BE STABLE AND SELF SUPPORTING AFTER THE CONSTRUCTION IS COMPLETE. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY FOR THE BUILDING'S STABILITY DURING CONSTRUCTION. THIS RESPONSIBILITY ALSO INCLUDES BUT IS NOT LIMITED TO METHOD AND SEQUENCE OF ERECTION, TEMPORARY SHORING AND TEMPORARY BRACING.
8. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO FOLLOW ALL APPLICABLE SAFETY CODES AND REGULATIONS DURING ALL PHASES OF CONSTRUCTION.

CONCRETE

1. ALL CONCRETE SHALL BE NORMAL WEIGHT, WITH A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI AT 28 DAYS.
2. CONCRETE REINFORCING COVER SHALL BE AS FOLLOWS:

   CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH .....3 INCHES
   CONCRETE EXPOSED TO EARTH OR WEATHER:
   NO. 6 OR LARGER BARS .....2 INCHES
   NO. 5 OR SMALLER BARS .....1.5 INCHES

   CONCRETE NOT EXPOSED TO EARTH OR IN CONTACT WITH GROUND:
   SLABS OR WALLS .....0.75 INCHES
3. ALL CONCRETE DIMENSIONS SHOWN ARE MINIMUM DIMENSIONS. CONTRACTOR TO REVIEW FORMING, REINFORCING DETAILS AND ANY EMBEDDED ITEMS AND DETERMINE PRIOR TO FABRICATION OF ANY REINFORCING, PLACEMENT REQUIREMENTS AND CLEARANCES.

REINFORCING

1. ALL CONCRETE REINFORCING SHALL BE ASTM A615, Fy = 60 KSI., UNLESS NOTED OTHERWISE.
2. REINFORCING SHALL EXTEND CONTINUOUS FOR THE DIMENSION SHOWN.
3. NO WELDING OF ANY REINFORCING IS PERMITTED, UNLESS SPECIFICALLY STATED ON THE PLANS. REINFORCEMENT TO BE WELDED TO MEET THE REQUIREMENTS OF ASTM A706.
4. LOCATE ALL REINFORCING AS SHOWN ON DRAWINGS AND FASTEN SECURELY.
5. ALL REINFORCING TO TERMINATE WITH STANDARD HOOKS AS SHOWN ON PLANS. ALL STIRRUPS AND TIES TO BE CLOSED WITH 135 DEGREE BENDS.

ANNOTATION

(1) KEYNOTE

(1) DEMOLITION NOTE

OFFICE 101 ROOM NAME AND NUMBER (SEE ARCHITECTURAL DRAWINGS)

DETAIL NUMBER 1 / S-501 — DETAIL INDICATOR — SHEET NUMBER ON WHICH DETAIL APPEARS

SECTION LETTER A / S-301 — SECTION INDICATOR — SHEET NUMBER ON WHICH SECTION APPEARS

SHEET GENERAL NOTES

1. ABBREVIATIONS ON THIS SHEET APPLY ONLY TO THE STRUCTURAL DRAWINGS, REFER TO OTHER DISCIPLINES FOR APPLICABLE SYMBOLS NOT PROVIDED HERE.
2. THIS IS A STANDARD ABBREVIATIONS SHEET, THEREFORE, SOME ABBREVIATIONS MAY APPEAR ON THIS SHEET AND MAY NOT BE UTILIZED ON THIS PROJECT.

PROFESSIONAL ENGINEER — CODY S. CRUZ — No. C75900 Exp. 6/30/12 — CIVIL — STATE OF CALIFORNIA

WINZLER & KELLY
2235 Mercury Way, Suite 150
Santa Rosa, CA 95407
Tel: 707 823 1010 | Fax: 707 527 8679
www.winzler.com

BY:	REMARKS	DATE	SYMBOL	REVISIONS

3 JULY 2011

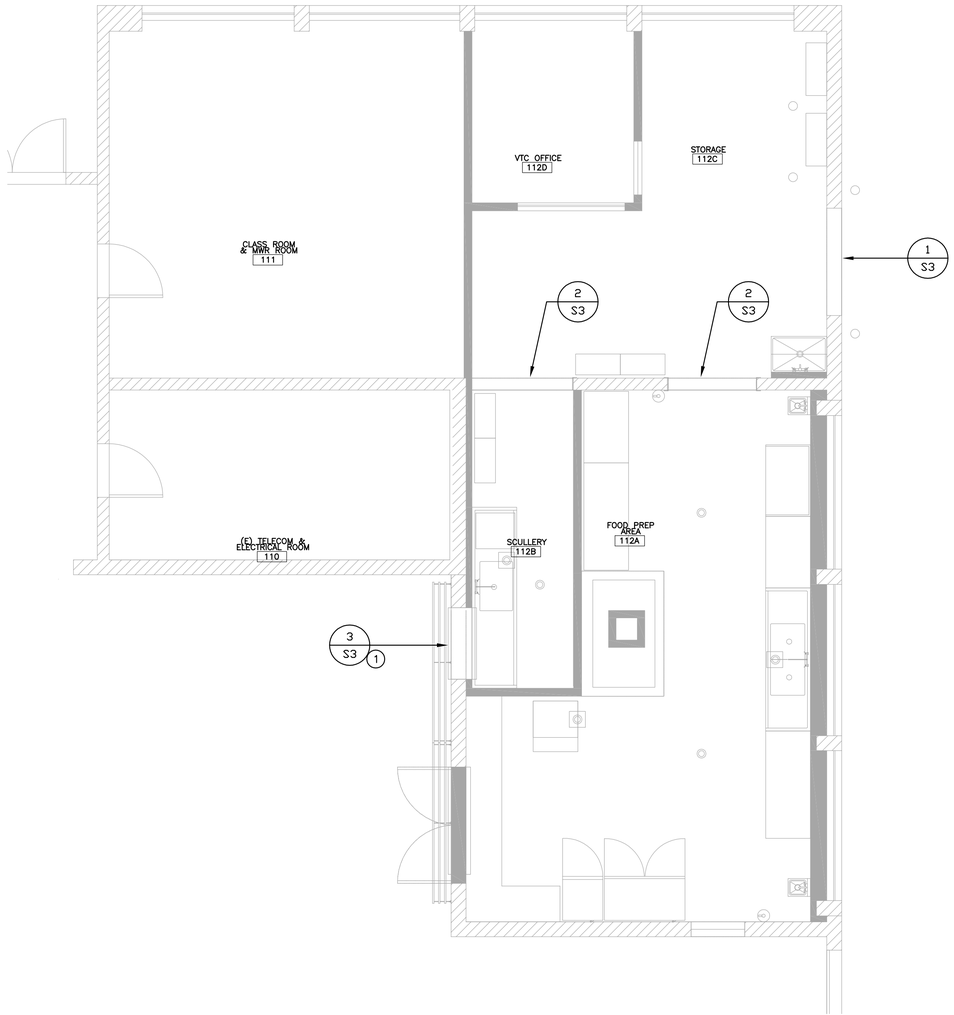
DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE:

SHEET TITLE: STRUCTURAL SYMBOLS, LEGEND AND NOTES

PROJECT: BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
PROJECT NUMBER: XXX
LOCATION: BURBANK, CALIFORNIA

MILITARY DEPARTMENT
STATE OF CALIFORNIA

SHEET NUMBER
S0



1 S1a DEMO PLAN – KITCHEN

1/4" = 1'–0"

0" 2' 4' 8'

2 S1a FLOOR PLAN – KITCHEN

1/4" = 1'–0"

0" 2' 4' 8'

SHEET GENERAL NOTES

1. REFER TO ARCHITECTURAL, MECHANICAL, PLUMBING, AND ELECTRICAL FOR INFORMATION NOT SHOWN.
2. COORDINATE OPENING SIZE(S) AND LOCATION(S) WITH ARCHITECTURAL DRAWINGS AND WINDOW/DOOR FRAME MANUFACTURER'S.
3. NEW FINISH SURFACES TO BE UNIFORM AND CONTINUOUS THROUGHOUT, AND SHALL EXTEND FROM FLOOR TO CEILING, AND FROM EDGE OF OPENING TO END OF WALL, OR AS APPROVED BY THE ARCHITECT. SEE STRENGTHENING OF CAST–IN–PLACE CONCRETE (03 01 30) FOR MORE INFORMATION.

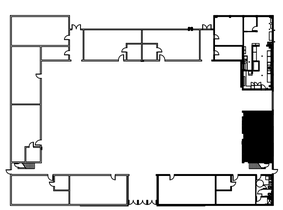
DEMO NOTES

1. MATERIAL TESTING REQUIRED FOR CONCRETE AND STEEL REINFORCEMENT AT THIS LOCATION, CONCRETE CORE AND CONCRETE REINFORCEMENT SAMPLE MUST BE OBTAINED AND TESTED IN ACCORDANCE WITH STRENGTHENING OF CAST–IN–PLACE CONCRETE (03 01 30). SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS AND DETAILS.

KEYNOTES

1.

PROFESSIONAL ENGINEER
CODY S. CRUZ
No. C75900
Exp. 6/30/12
CIVIL
STATE OF CALIFORNIA



KEY PLAN

WINZLER & KELLY
2235 Mercury Way, Suite 150
Santa Rosa, CA 95407
Tel: 707.823.1010 | Fax: 707.527.8879
www.w-k.com

BY:	REMARKS	DATE	SYMBOL	REVISIONS
		REVDATE		
		PXRL_NAME		

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE: 3 JULY 2011

PROJECT NUMBER: XXX

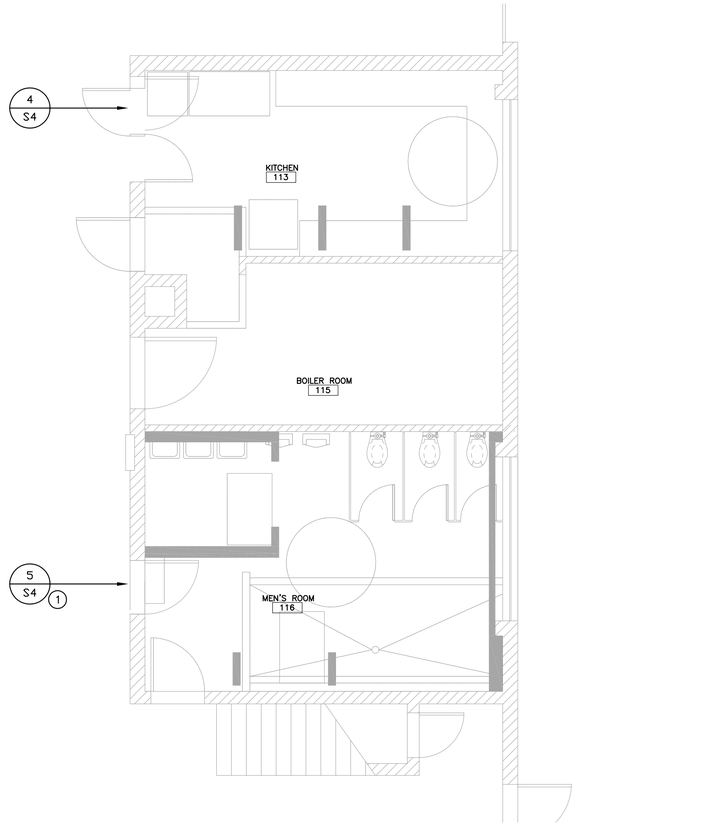
SHEET TITLE: STRUCTURAL DEMO/PLAN – KITCHEN

PROJECT: BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION

LOCATION: BURBANK, CALIFORNIA

MILITARY DEPARTMENT
STATE OF CALIFORNIA

SHEET NUMBER
S1a



1 S2a DEMO PLAN – SHOWER & MEN'S ROOM
1/4" = 1'-0"
0" 2' 4' 8'
N

2 S2a FLOOR PLAN – SHOWER & MEN'S ROOM
1/4" = 1'-0"
0" 2' 4' 8'
N

SHEET GENERAL NOTES

1. REFER TO ARCHITECTURAL, MECHANICAL, PLUMBING, AND ELECTRICAL FOR INFORMATION NOT SHOWN.
2. COORDINATE OPENING SIZE(S) AND LOCATION(S) WITH ARCHITECTURAL DRAWINGS AND WINDOW/DOOR FRAME MANUFACTURER'S.
3. NEW FINISH SURFACES TO BE UNIFORM AND CONTINUOUS THROUGHOUT, AND SHALL EXTEND FROM FLOOR TO CEILING, AND FROM EDGE OF OPENING TO END OF WALL, OR AS APPROVED BY THE ARCHITECT. SEE STRENGTHENING OF CAST–IN–PLACE CONCRETE (03 01 30) FOR MORE INFORMATION.

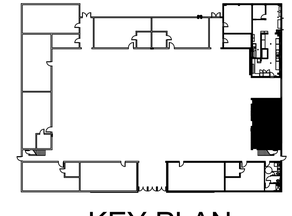
DEMO NOTES

1. MATERIAL TESTING REQUIRED FOR CONCRETE AND STEEL REINFORCEMENT AT THIS LOCATION, CONCRETE CORE AND CONCRETE REINFORCEMENT SAMPLE MUST BE OBTAINED AND TESTED IN ACCORDANCE WITH STRENGTHENING OF CAST–IN–PLACE CONCRETE (03 01 30). SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS AND DETAILS.

KEYNOTES

1.

PROFESSIONAL ENGINEER
CODY S. CRUZ
No. C75900
Exp. 6/30/12
CIVIL
STATE OF CALIFORNIA



KEY PLAN

WINZLER & KELLY
2235 Mercury Way, Suite 150
Santa Rosa, CA 95407
Tel: 707.523.1010 | Fax: 707.527.8879
www.winzler.com

REVISIONS	SYMBOL	DATE	REMARKS	BY:
		REVDATE	PATH_NAME	

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE: 3 JULY 2011

SHEET TITLE: STRUCTURAL DEMO/PLAN – SHOWER & MEN'S ROOM

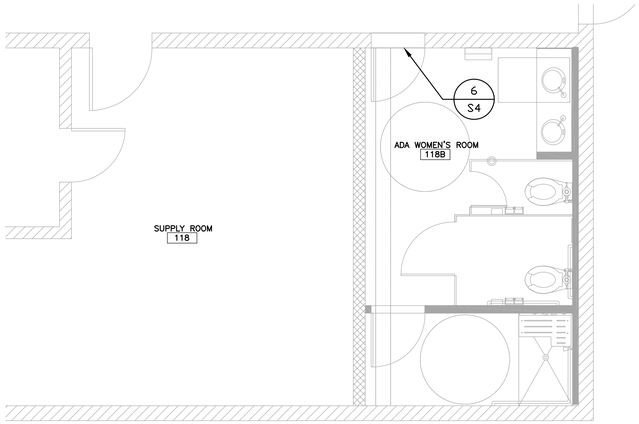
PROJECT: BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
PROJECT NUMBER: XXX

LOCATION: BURBANK, CALIFORNIA

MILITARY DEPARTMENT
STATE OF CALIFORNIA

SHEET NUMBER
S2a

OF 20 OF 43

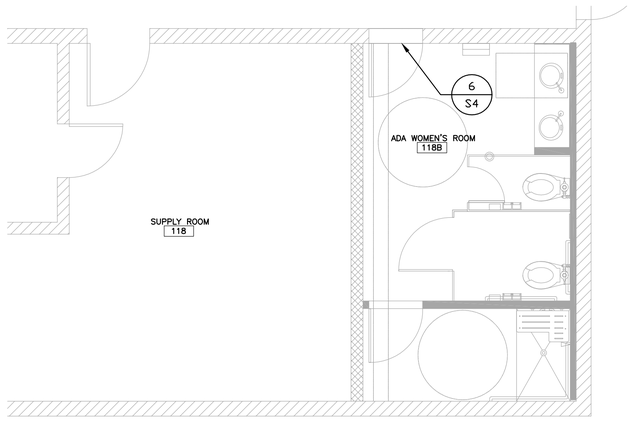


1 S2b DEMO PLAN – ADA WOMEN'S ROOM

1/4" = 1'–0"

0" 2' 4' 8'

N



2 S2b FLOOR PLAN – ADA WOMEN'S ROOM

1/4" = 1'–0"

0" 2' 4' 8'

N

SHEET GENERAL NOTES

1. REFER TO ARCHITECTURAL, MECHANICAL, PLUMBING, AND ELECTRICAL FOR INFORMATION NOT SHOWN.
2. COORDINATE OPENING SIZE(S) AND LOCATION(S) WITH ARCHITECTURAL DRAWINGS AND WINDOW/DOOR FRAME MANUFACTURER'S.
3. NEW FINISH SURFACES TO BE UNIFORM AND CONTINUOUS THROUGHOUT, AND SHALL EXTEND FROM FLOOR TO CEILING, AND FROM EDGE OF OPENING TO END OF WALL, OR AS APPROVED BY THE ARCHITECT. SEE STRENGTHENING OF CAST–IN–PLACE CONCRETE (03 01 30) FOR MORE INFORMATION.

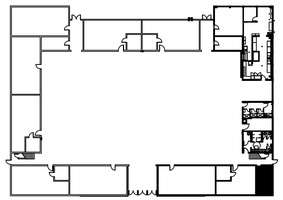
◯ DEMO NOTES

1.

⬡ KEYNOTES

1.

PROFESSIONAL ENGINEER
CODY S. CRUZ
No. C75900
Exp. 6/30/12
CIVIL
STATE OF CALIFORNIA



KEY PLAN

WINZLER & KELLY
2235 Mercury Way, Suite 150
Santa Rosa, CA 95407
Tel: 707.523.1010 | Fax: 707.527.8679
www.winzler.com

BY:	REMARKS	DATE	SYMBOL	REVISIONS

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE: 3 JULY 2011

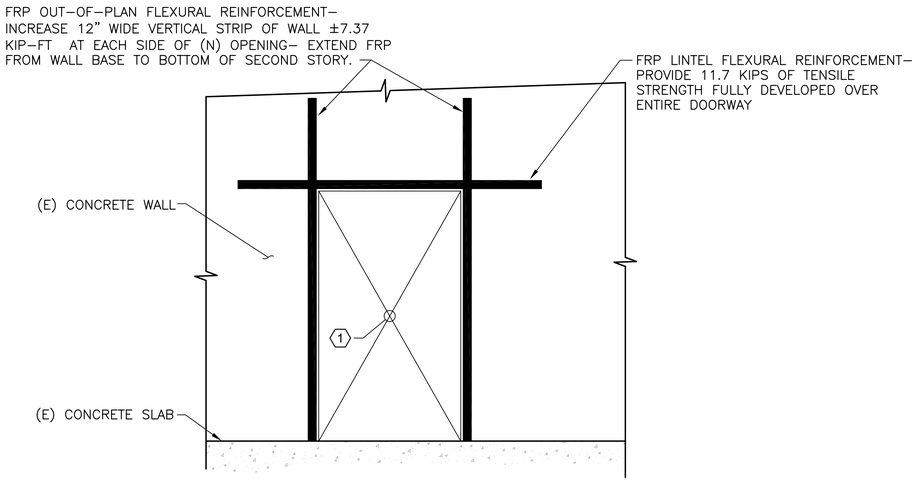
SHEET TITLE STRUCTURAL DEMO/PLAN – ADA WOMEN'S ROOM

PROJECT BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
PROJECT NUMBER XXX

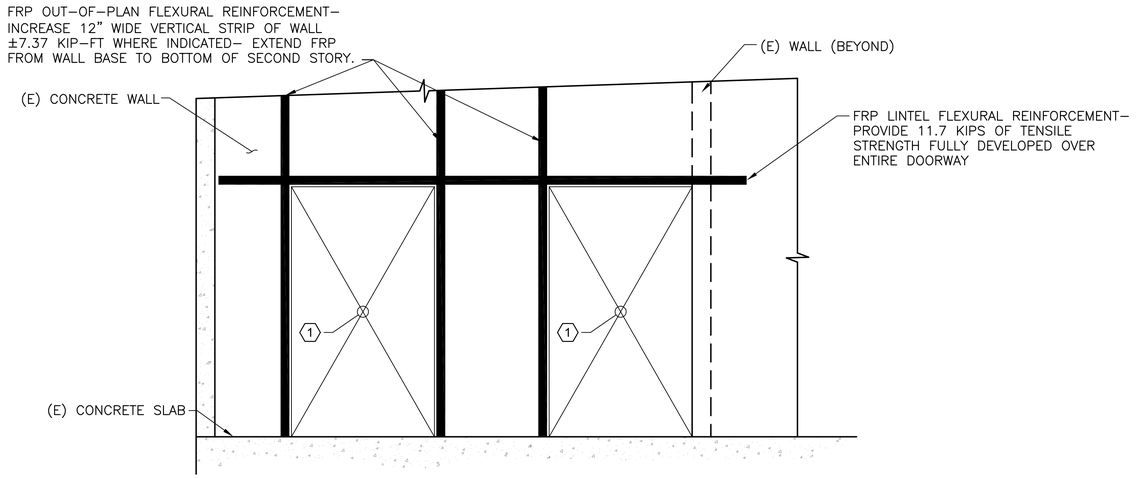
LOCATION BURBANK, CALIFORNIA

MILITARY DEPARTMENT
STATE OF CALIFORNIA

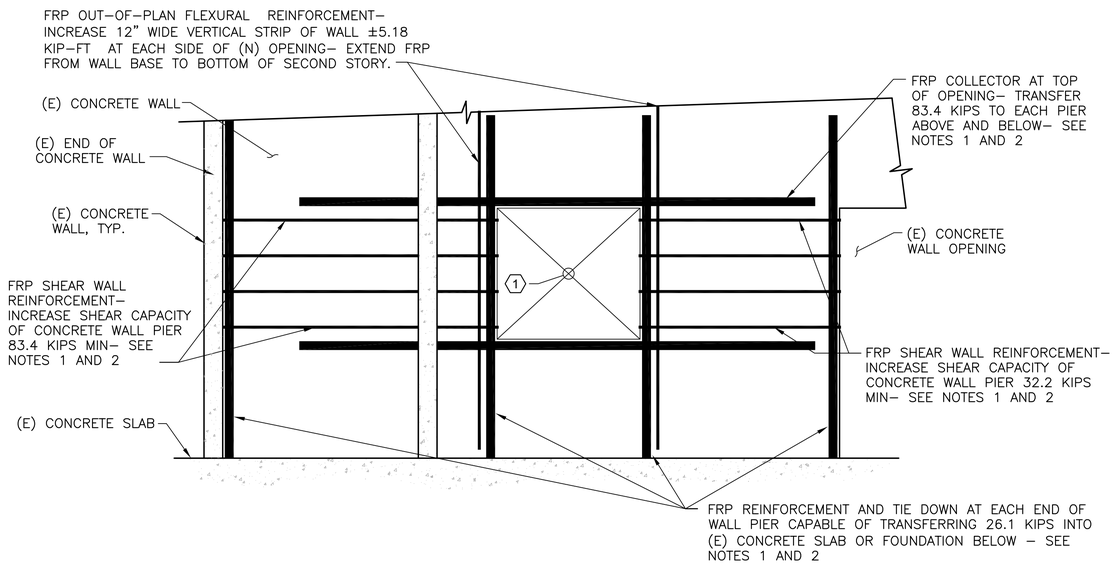
SHEET NUMBER
S2b



1 **DETAIL** NOT TO SCALE



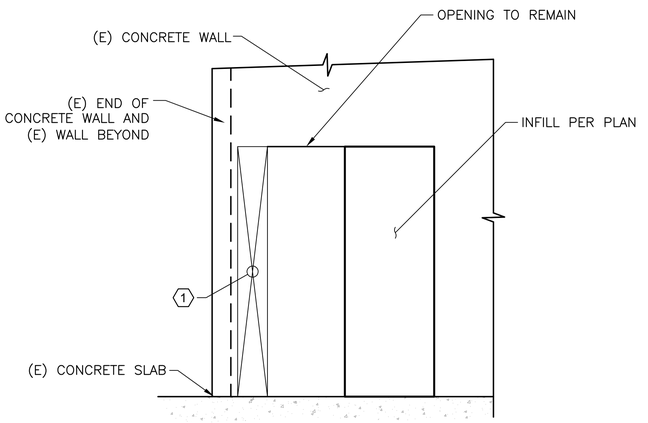
2 **DETAIL** NOT TO SCALE



NOTES:

1. VALUES SHOWN ARE BASED ON AN EXISTING SHEAR WALL STRENGTH ASSUMING COMPRESSIVE STRENGTH (F'c) = 4,000 psi WITH 2 LAYERS OF HORIZONTAL #4 (60ksi) REBAR SPACED AT 12" ON CENTER. DEMOLISHED CONCRETE AND REBAR SHALL BE RECORDED, SAMPLED, AND TESTED TO VERIFY ACTUAL F'c, REBAR SIZE, SPACING AND YIELD STRENGTH. SEE SPECIFICATIONS FOR CONCRETE AND REBAR SAMPLING AND TESTING PROCEDURES. TEST RESULTS SHALL BE PROVIDED TO DESIGN PROFESSIONAL OF RECORD PRIOR TO DESIGN AND CONSTRUCTION OF FRP RETROFITS. FRP DESIGN DRAWINGS AND CALCULATION MUST BE APPROVED BY DESIGN PROFESSIONAL OF RECORD PRIOR TO CONSTRUCTION OF FRP RETROFITS.
2. WHERE APPROPRIATE, AS DETERMINED BY FRP DESIGNER, REINFORCEMENT MAY BE APPLIED TO SINGLE FACE OF WALL. COORDINATE WITH ARCHITECT FOR LOCATIONS WHERE ADDITIONAL FINISH(ES) OCCUR, AND PREPARE STRENGTHENED SURFACES TO BE COMPATIBLE WITH THOSE SURFACES.

3 **DETAIL** NOT TO SCALE



4 **DETAIL** NOT TO SCALE

KEYNOTES

1. (N) OPENING PER PLAN. SAW CUT AS SHOWN. DO NOT OVERCUT. COAT SAWCUT EDGES W/CARBOMASTIC 15 AS MANUFACTURED BY THE CORBOLINE COMPANY, MIN 5 MILS DRY FILM THICKNESS.

PROFESSIONAL ENGINEER CODY S. CRUZ No. C75900 Exp. 6/30/12 CIVIL STATE OF CALIFORNIA

WINZLER & KELLY
2235 Mercury Way, Suite 150
Santa Rosa, CA 95407
Tel: 707.523.1010 | Fax: 707.527.8879
www.winzler.com

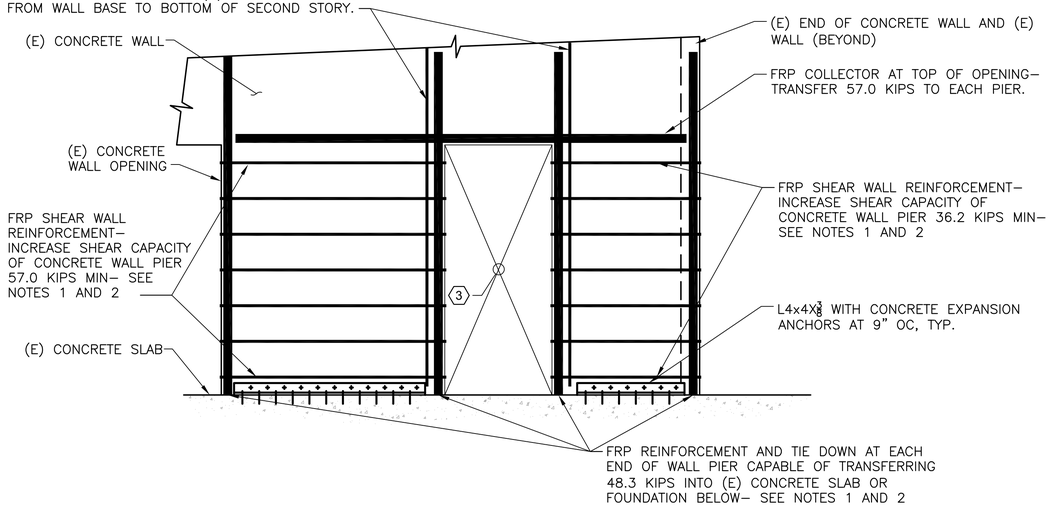
BY:	REMARKS	DATE	SYMBOL	REVISIONS
		REVDATE		
		PATH_NAME		

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE: 3 JULY 2011

SHEET TITLE: STRUCTURAL DETAILS
PROJECT: BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
PROJECT NUMBER: XXX
LOCATION: BURBANK, CALIFORNIA
MILITARY DEPARTMENT
STATE OF CALIFORNIA

SHEET NUMBER: S3

OF 22 OF 43

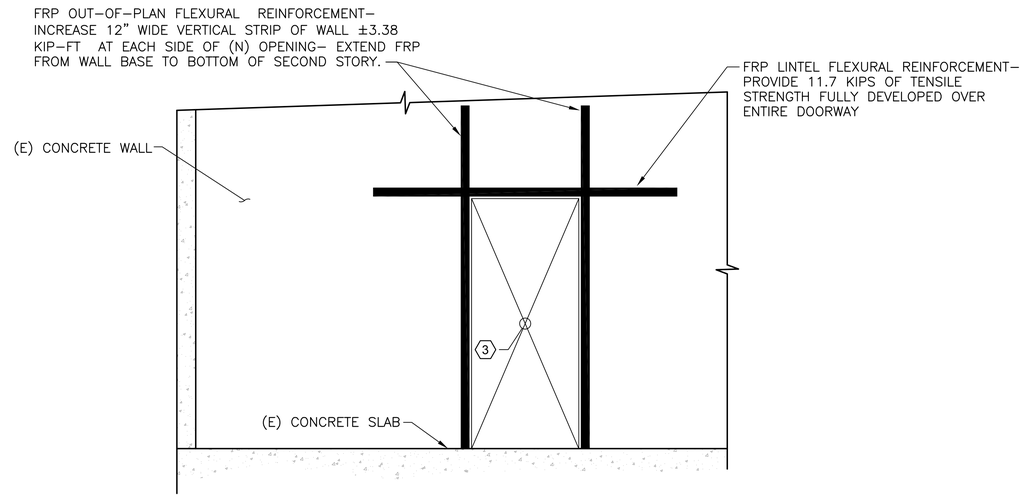


NOTES:

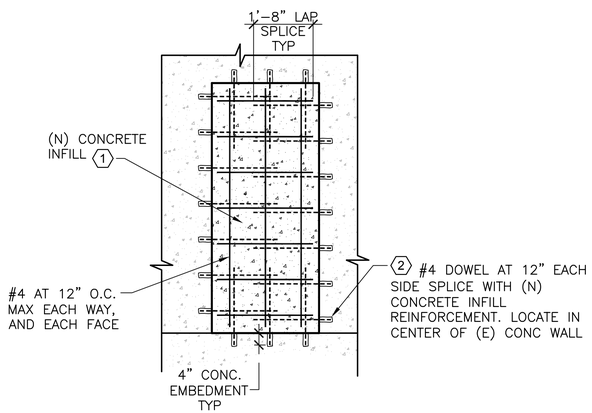
1. VALUES SHOWN ARE BASED ON AN EXISTING SHEAR WALL STRENGTH ASSUMING COMPRESSIVE STRENGTH (F'c) = 4,000 psi WITH 2 LAYERS OF HORIZONTAL #4 (60ksi) REBAR SPACED AT 12" ON CENTER. DEMOLISHED CONCRETE AND REBAR SHALL BE RECORDED, SAMPLED, AND TESTED TO VERIFY ACTUAL F'c, REBAR SIZE, SPACING AND YIELD STRENGTH. SEE SPECIFICATIONS FOR CONCRETE AND REBAR SAMPLING AND TESTING PROCEDURES. TEST RESULTS SHALL BE PROVIDED TO DESIGN PROFESSIONAL OF RECORD PRIOR TO DESIGN AND CONSTRUCTION OF FRP RETROFITS. FRP DESIGN DRAWINGS AND CALCULATION MUST BE APPROVED BY DESIGN PROFESSIONAL OF RECORD PRIOR TO CONSTRUCTION OF FRP RETROFITS.

2. WHERE APPROPRIATE, AS DETERMINED BY FRP DESIGNER, REINFORCEMENT MAY BE APPLIED TO SINGLE FACE OF WALL. COORDINATE WITH ARCHITECT FOR LOCATIONS WHERE ADDITIONAL FINISH(ES) OCCUR, AND PREPARE STRENGTHENED SURFACES TO BE COMPATIBLE WITH THOSE SURFACES.

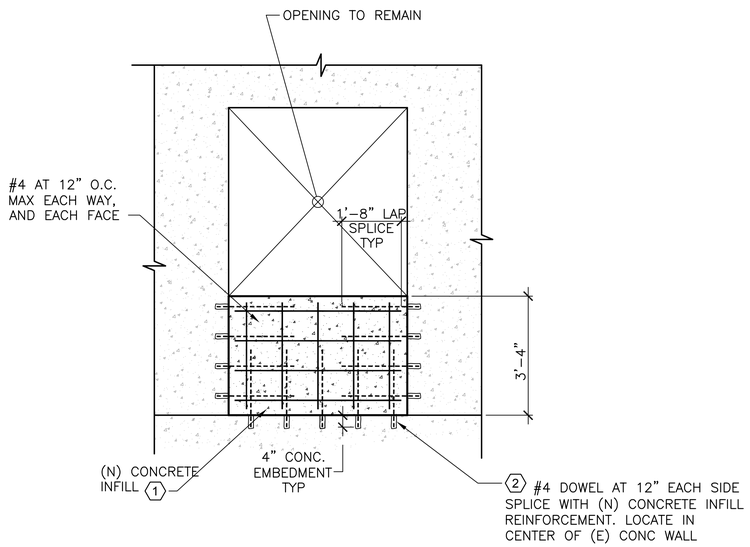
5 **DETAIL** NOT TO SCALE



6 **DETAIL** NOT TO SCALE



7 **DETAIL** NOT TO SCALE



8 **DETAIL** NOT TO SCALE

KEYNOTES

1. PROVIDE UNIFORM THICKNESS, TEXTURE, FINISH, AND COLOR TO MATCH ADJACENT WALL SURFACE(S) WHERE FINAL SURFACES ARE TO REMAIN EXPOSED TO VIEW.
2. INSTALL USING HIT–RE 500–SD, SIMPSON SET OR APPROVED EQUAL. INSTALL IN ACCORDANCE WITH MANUFACTURES RECOMMENDATIONS. POSITIVELY LOCATE WALL REINF PRIOR TO DRILLING. DO NOT DAMAGE (E) WALL REINF. MAINTAIN 2 INCHES CLEAR SPACE BETWEEN EDGE OF PENETRATIONS AND (E) WALL REINF. RELOCATE PENETRATIONS AS NECESSARY TO PRECLUDE DAMAGE TO REINF.
3. (N) OPENING PER PLAN. SAW CUT AS SHOWN. DO NOT OVERCUT. COAT SAWCUT EDGES W/CARBOMASTIC 15 AS MANUFACTURED BY THE CORBOLINE COMPANY, MIN 5 MILS DRY FILM THICKNESS. PREPARE SURFACE(S), AND APPLY PRIME AND FINISH COAT(S) IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

PROFESSIONAL ENGINEER CODY S. CRUZ No. C75900 Exp. 6/30/12 CIVIL STATE OF CALIFORNIA

WINZLER & KELLY
2235 Mercury Way, Suite 150
Santa Rosa, CA 95407
Tel: 707 823-1010 | Fax: 707 527-8879
www.w-and-k.com

BY:	REMARKS	DATE	SYMBOL	REVISIONS
		REVDATE		
		PATH_NAME		

DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE: 3 JULY 2011

SHEET TITLE: STRUCTURAL DETAILS
PROJECT: BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
PROJECT NUMBER: XXX
LOCATION: BURBANK, CALIFORNIA
MILITARY DEPARTMENT
STATE OF CALIFORNIA

SHEET NUMBER
S4
OF 23 OF 43

CHECKLIST OF FORMS
KITCHEN AND LATRINE MODERNIZATION
CALIFORNIA ARMY NATIONAL GUARD ARMORY
BURBANK, CALIFORNIA
PROJECT A0545

CHECKLIST OF FORMS TO BE RETURNED WITH BID PROPOSAL SUBMIT ONE SIGNED ORIGINAL PROPOSAL FORM		
FORM	DESCRIPTION	CHECK IF RETURNED WITH BID
PROPOSAL FORM	BID BOND, BID PROPOSAL, SMALL BUSINESS/DVBE PREFERENCE, STATEMENT OF COMPLIANCE (COMPLETED AND SIGNED) PAGES A-1 THROUGH A-5	
ATTACHMENT 1	PAYEE DATA RECORD	D-1
ATTACHMENT 4	NON-COLLUSION AFFIDAVIT	E-1
	SMALL BUSINESS/DVBE CERTIFICATION LETTER (If claiming Small Business/DVBE status)	
NOTE: ALL OF THE ABOVE DOCUMENTS REQUIRED MUST BE SUBMITTED WITH THE BID PROPOSAL. FAILURE TO DO SO MAY DEEM YOUR BID TO BE NON-RESPONSIVE AND MAY CAUSE THE REJECTION OF YOUR BID.		
FAILURE TO SIGN THE BID PROPOSAL SHALL RESULT IN THE REJECTION OF YOUR BID		

PROPOSAL FORM
BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION
AGREEMENT A0545

TO: THE MILITARY DEPARTMENT
STATE OF CALIFORNIA

The undersigned hereby proposes to furnish all labor, equipment, materials, permits and fees necessary for the **Kitchen and Latrine Modernization at the Burbank Armory**, located at 3800 Valhalla Drive, Burbank, California 91505-1128. All work shall be completed in accordance with state codes, federal codes and laws, the technical specifications, drawings and terms and conditions of this contract for the total amount not to exceed:

_____ ($_____) dollars.
The foregoing figure includes the cost of bonds, insurance, sales tax, and every other item of expense incident to the contract.

To be considered a responsive bidder all prime contractors with the exception of a certified DVBE must subcontract work to DVBEs a minimum of 10% of the total bid amount listed above to meet the DVBE participation goal. Failure to do so will render your bid non-responsive. As of July 28, 2009, The Good Faith Effort is no longer an option per Assembly Bill 21. The sub-contractible work must be directly related to the project. The Contracting Officer will make the final determination if a bidder has met this requirement.

STATUS OF FIRM must be given, whether an individual, partnership, or corporation. If partnership, list full names of partners, if firm is a corporation, identify the state in which incorporated and provide State of California Corporate Identification Number as issued by the Office of the Secretary of State for California. Firms bidding as corporations must be registered with and in good standing with the Secretary of State's Office at the time of the bid opening. Proposals must be signed by the bidder or representative of the bidder who has authority to sign contracts binding the bidder. Corporate Identification Numbers shall be verified.

STATUS OF FIRM:	**NAME OF COMPANY/FIRM:**	**DATE:**
FEDERAL ID NUMBER:	**COMPANY/FIRM COMPLETE ADDRESS:**	
LICENSE NUMBER:	**DATE LICENSE EXPIRES:**	**CLASS OF LICENSE:**
PRINTED SIGNATURE BLOCK:	**SIGNATURE OF COMPANY REPRESENTATIVE:**	**TELEPHONE NUMBER:**

STATEMENT OF COMPLIANCE APPLICABLE TO CONTRACTS OF $5,000 OR MORE: The prospective contractor's signature affixed here below and dated shall constitute a certification under the penalty of perjury under the laws of the State of California that the bidder has, unless exempted, complied with the nondiscrimination program requirements of Government Code Section 12990 and Title 2, California Code of Regulations, Section 8103.

The undersigned has checked carefully all the above figures and understands that the State of California will not be responsible for any errors or omissions on the part of the undersigned in preparing this bid.

The prospective contractor's signature affixed here below and dated shall constitute a certification under the penalty of perjury, under the laws of the State of California, that all information provided by the contractor/bidder is true and correct as written.

_____ _____

CONTRACTOR/OFFEROR SIGNATURE DATE

FAILURE TO SIGN THIS PROPOSAL FORM MAY BE CAUSE FOR THE REJECTION OF YOUR FIRM'S BID. ORIGINAL SIGNATURE REQUIRED.

Bidders claiming the State of California Small Business Preference must be certified by the Office of Small Business and DVBE Certification prior to bid opening. Without the State Office of Small Business and DVBE Certification's approval, your firm will not be considered a small business and will not be granted the 5% preference.

Small Business Reference Number: _____

Disabled Veteran Business Enterprise Participation: Preference will be granted to bidders properly approved as a "Disabled Veteran's Enterprise Businesses (DVBE)" in accordance with Government Code 14600, 14615, 14838, California Military and Veteran's Code 999 and California Code of Regulations 1896.98 ET SEQ. The rules and regulations of this law, and applications for preference, should be obtained from Department of General Services, Small Business and DVBE Services, telephone number (916) 375-4339. Bidders claiming the State of California DVBE Preference must be certified by the Office of Small Business and DVBE Certification prior to bid opening. Without the State Office of Small Business and DVBE Certification's approval, your firm will not be considered a small business and will not be granted the 5% preference.

Bidders certified as a "Disabled Veteran's Business Enterprise" in accordance with Government Code 14600, 14615, 14838, California Military and Veteran's Code 999 and California Code of Regulations 1896.98 et seq. shall be granted a five percent (5%) bid preference when a responsible non-Disabled Veteran's Enterprise Business has submitted the lowest-priced, responsive bid.

Disabled Veteran's Business Enterprise Reference Number: _____

A certified Small Business (SB) shall receive a 5% preference on a bid proposal when a responsible non-small business has submitted the lowest priced responsive bid.
A certified Disabled Veterans Business Enterprise (DVBE) shall receive a 5% preference on a bid proposal when a responsible non-DVBE has submitted the lowest priced responsive bid.

A firm that is certified as both a SB and DVBE shall receive a 10% preference on a bid proposal when a responsible non-small business and non-DVBE has submitted the lowest priced responsive bid.

If the low bidder is a SB then a 5% preference will be given to a firm that is certified as both a SB and DVBE.

Non-SB bidders claiming SB preference may be granted the 5% preference on a bid proposal when a responsible Non-SB/DVBE has submitted the lowest priced responsive bid (Please see 1-13 for SB preference requirements).

A non-SB/DVBE which qualifies for this preference may not take an award away from a certified SB or DVBE.

The value of these SB/DVBE preferences are limited to $100,000 when a contract award is based upon award to the lowest compliant bid.

PROPOSED LIST OF SUBCONTRACTORS

Listed hereinafter are the name, address, and license number of all subcontractors who will be employed and the segregation of the work which each will perform if the contract is awarded to this firm. In case more than one subcontractor is named for the same segregation, state the portion that each will perform. **Failure to list all required information may lead to rejection of bid.**

CONTRACTOR	ADDRESS	TYPE OF WORK	LICENSE NUMBER	DVBE CERTIFICATION NUMBER	$$ AMOUNT SUB – CONTRACTED TO DVBES

Contractor agrees to pay not less than the minimum rates of pay for laborers, workmen and mechanics employed by him on the work in accordance with the schedule set forth in the specifications herein, and further agrees that each subcontractor engaged by him shall similarly pay not less than said rates of pay to all laborers, workmen and mechanics employed by said subcontractor on the work.

RULES OF BIDDING

Bids shall be addressed to and filed in the State of California, Military Department, 9800 Goethe Road, Sacramento, California 95827-3563, ATTN: Purchasing and Contracting, on or before **March 15, 2012 at 2:00 PM.**

Bid must be marked **"PROJECT A0545," "BURBANK ARMORY KITCHEN AND LATRINE MODERNIZATION".**

Bids delivered by **courier service** must be marked as indicated above.

All courier pouches and envelopes are opened upon receipt by the Military Department.

Bidders are required to submit one original Signed Proposal.

FAILURE TO SIGN THIS PROPOSAL FORM MAY BE CAUSE FOR THE REJECTION OF YOUR FIRM'S BID. ORIGINAL SIGNATURE REQUIRED.

SPECIAL NOTICE

Bidders may withdraw bids up until the hour set for opening, and may submit new bids before the hour, Telegraphic/faxed bids or telegraphic/faxed modifications or withdrawal of bids will **NOT** be accepted. It is the responsibility of the bidder to insure that his bid reaches the Purchasing and Contracting Branch at the designated time.

The Military Department reserves the right to reject any and all bids, to waive any informality in any bids received, and accept only those individual items on the bid form which may be in the best interest of the State.

Note the following budget clauses are hereby included by reference as a contract terms:

In accordance with Government Code 927.4 the State Military Department shall make payment on all properly submitted and undisputed invoices within 45 calendar days. All invoices must be sent to the State Military Department Comptroller's office for processing.

This agreement is valid and enforceable only if sufficient funds are made available by the Budget Acts for those state fiscal years as represented under this contract. This contract is further subject to any additional restrictions, limitations, or conditions enacted by the Legislature and contained in the above Budget Bills or any statute enacted by the Legislature which may affect the provisions, terms, or funding of this or any subsidiary contract in any manner

ATTACHMENT 4

NONCOLLUSION AFFIDAVIT TO BE EXECUTED BY
BIDDER AND SUBMITTED WITH BID FOR PUBLIC WORKS

STATE OF CALIFORNIA)
)ss
COUNTY OF _____)

_____, being first duly sworn, deposes and
(name)

says that he or she is _____ of
(position title)

_____,
(the bidder)

the party making the foregoing bid that the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization or corporation; that the bid is genuine and not collusive or sham; that the bidder has not directly or indirectly induced or solicited any other bidder to put in a false sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit or cost element of the bid price, or of that of any other bidder, or to secure any advantage against the public body awarding the contract of anyone interested in proposed contract; that all statements contained in the bid are true; and further, that the bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or date relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid. I am fully aware that this certification, executed on the date and in county above, is made under penalty of perjury under the laws of the State of California.

DATED: _____ BY _____
(person signing for bidder)

ATTACHMENT 3

STATE OF CALIFORNIA–DEPARTMENT OF FINANCE

PAYEE DATA RECORD

(Required when receiving payment from the State of California in lieu of IRS W-9)

STD. 204 (Rev. 6-2003)

1 INSTRUCTIONS: Complete all information on this form. Sign, date, and return to the State agency (department/office) address shown at the bottom of this page. Prompt return of this fully completed form will prevent delays when processing payments. Information provided in this form will be used by State agencies to prepare Information Returns (1099). See reverse side for more information and Privacy Statement.
NOTE: Governmental entities, federal, State, and local (including school districts), are not required to submit this form.

2

PAYEE'S LEGAL BUSINESS NAME (Type or Print)

SOLE PROPRIETOR – ENTER NAME AS SHOWN ON SSN (Last, First, M.I.) | E-MAIL ADDRESS

MAILING ADDRESS | BUSINESS ADDRESS

CITY, STATE, ZIP CODE | CITY, STATE, ZIP CODE

3 PAYEE ENTITY TYPE

CHECK ONE BOX ONLY

ENTER FEDERAL EMPLOYER IDENTIFICATION NUMBER (FEIN): ☐☐ – ☐☐☐☐☐☐☐

☐ PARTNERSHIP

☐ ESTATE OR TRUST

CORPORATION:
- ☐ MEDICAL (e.g., dentistry, psychotherapy, chiropractic, etc.)
- ☐ LEGAL (e.g., attorney services)
- ☐ EXEMPT (nonprofit)
- ☐ ALL OTHERS

☐ INDIVIDUAL OR SOLE PROPRIETOR
ENTER SOCIAL SECURITY NUMBER: ☐☐☐ – ☐☐ – ☐☐☐☐
(SSN required by authority of California Revenue and Tax Code Section 18646)

NOTE: Payment will not be processed without an accompanying taxpayer I.D. number.

4 PAYEE RESIDENCY STATUS

☐ California resident - Qualified to do business in California or maintains a permanent place of business in California.

☐ California nonresident (see reverse side) - Payments to nonresidents for services may be subject to State income tax withholding.
- ☐ No services performed in California.
- ☐ Copy of Franchise Tax Board waiver of State withholding attached.

5

I hereby certify under penalty of perjury that the information provided on this document is true and correct. Should my residency status change, I will promptly notify the State agency below.

AUTHORIZED PAYEE REPRESENTATIVE'S NAME (Type or Print) | TITLE

SIGNATURE | DATE | TELEPHONE ( )

6 Please return completed form to:

Department/Office: State Military Department

Unit/Section: Accounts Payable

Mailing Address: P.O. Box 269101

City/State/Zip: Sacramento, CA 95826-9101

Telephone: (916) 854-3374 Fax: (916) 854-3793

E-mail Address: