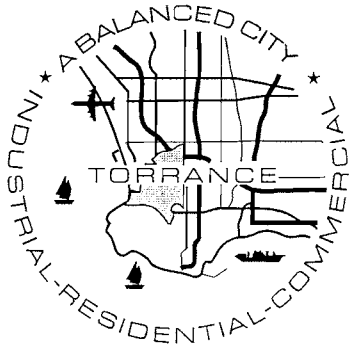
PROJECT MANUAL FOR RENOVATION OF THE POLICE DEPARTMENT FORENSIC LABORATORY

B 2012-39



June 15, 2012

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PART A

NOTICE INVITING BIDS

CITY OF TORRANCE
CALIFORNIA

NOTICE INVITING BIDS

Notice is hereby given that sealed proposals for performing the following described work will be received at the office of the City Clerk of the City of Torrance, California, until **2:00 p.m. on Thursday, November 8, 2012** after which time they will be publicly opened and read at 2:15 p.m. in the Council Chambers of said City:

Bid for Renovation of the Police Department Forensic Laboratory
B2012-39

Plans, Bid Proposal (for reference only) and Specifications are available for viewing and printing from the City's website at http://www.torranceca.gov/25079.htm.

An official Bid Proposal packet may be obtained at the Office of the City Clerk (310) 618-2870, City Hall, 3031 Torrance Boulevard, Torrance, California. There is no cost if picked up at City Hall. A payment of $5 if requested by mail. Both amounts include tax. Neither amount is refundable. A prospective firm must provide to the City Clerk's office, the firm's name, address, telephone and fax numbers, a contact person and a valid email address. This will ensure that your firm is listed as a "Plan Holder" and that you will be informed of any and all information issued subsequent to obtaining the official form of Proposal. **Addenda will be issued only by email and only to those attended the mandatory pre-bid conference *and* listed as Plan Holder.** All addenda must be attached to the proposal. Failure to attach any addendum may render the proposal non-responsive and cause it to be rejected.

There will be a mandatory pre-bid conference held on Wednesday, October 17, 2012 at 10:00 a.m. commencing at the Torrance Police Department located at 3300 Civic Center Drive, Torrance, CA 90503. The City of Torrance will consider the bidder as non-responsive if the bidder does not attend the mandatory pre-bid conference.

Full-size 24" x 36" set of Plans and a bound Specifications booklet may also be obtained at the Office of the City Clerk (310) 618-2870, City Hall, 3031 Torrance Boulevard, Torrance, California upon payment of $35 if picked up at City Hall, or payment of $45 if requested by mail. Both amounts include tax. Neither amount is refundable.

If requesting any item(s) by mail, please send check to the following:

CITY OF TORRANCE
OFFICE OF THE CITY CLERK
3031 TORRANCE BLVD
TORRANCE, CA 90503-2970
ATTN: B2012-39

The engineer's estimate is $605,000-625,000. The work shall be completed within one hundred eighty (180) calendar days of receipt of the Notice to Proceed (NTP). Bids are required for the entire work described herein.

The City has determined the bidder must have a valid "B" General Contracting License. Bidder must have at least five (5) years experience in public works projects of a similar size and scope. In addition within the last five (5) years the bidder must have completed successfully at least one (1) lab or hospital project.

The mechanical subcontractor must certify and list at least 3 lab projects in the past 5 years. The lab experience can be hospital or university or private sector but must have required precise pressurization requirements and included fume hoods.

Per Division 2, Chapter 2 of the Torrance Municipal Code, the Torrance City Council may reject any and all bids, waive any informality or irregularity in such bids, and determine the lowest responsible bidder.

No Facsimile Bids shall be accepted by the City.

Project is subject to state prevailing wage rates.

By order of the City Council of the City of Torrance, California.

Bidders with pre-bid inquiries should contact Diane Megerdichian, Business Manager, General Services Department at 310-781-7151 or email dmegerdichian@torranceca.gov. If emailing questions, please put project title in the subject line.

PART B

INSTRUCTIONS TO BIDDERS

CITY OF TORRANCE
CALIFORNIA

INSTRUCTIONS TO BIDDERS

A. QUALIFICATION OF BIDDERS

1. Competency of Bidders

The Bidder shall be thoroughly competent and capable of satisfactorily performing the Work covered by the Bid. As specified in the Bid Documents, the Bidder shall furnish statements of previous experience on similar work. When requested, the Bidder shall also furnish a plan of procedure proposed; organization, machinery, plant and other equipment available for the Work; evidence of financial condition and resources; and any other documentation as may be required by the City to determine if the Bidder is responsible.

2. Contractor's License

At the time of submitting the Bid, the Bidder shall be licensed as a contractor in accordance with the provisions of Chapter 9, Division 3, of the California Business and Professions Code. The required prime contractor license class for the Work is shown in the project Notice Inviting Bids. However, the City reserves the right to award the Contract to a contractor with another class if the City determines that the license is proper for the work.

B. BIDDER RESPONSIBILITY

A responsible Bidder is a Bidder who has demonstrated the attribute of trustworthiness, as well as ability, fitness, capacity and experience to satisfactorily perform the work.

Bidders are notified that, in accordance with Division 2, Chapter 2 of the Torrance Municipal Code, the City Council may determine whether the Bidder is responsible based on a review of the Bidder's performance on other contracts.

If, based on the provision and criteria in Division 2, Chapter 2 of the Torrance Municipal Code, the General Services Director proposes not to recommend the award of contract to the apparent low bidder, the Director shall notify the Bidder in writing of its intention to recommend to the City Council that the Council award the contract to the next lowest responsible bidder. If the Bidder presents evidence in rebuttal to the recommendation, the Director shall evaluate the merits of such evidence, and based on that evaluation, make a recommendation to the City Council.

C. ADDENDA TO THE CONTRACT DOCUMENTS

The City reserves the right to revise or amend these specifications prior to the date set for opening bids. Revisions and amendments, if any, will be announced by an addendum to this bid. If the revisions require additional time to enable Bidders to respond, the City may postpone the opening date accordingly. In such case, the addendum will include an announcement of the new opening date.

All addenda must be attached to the bid. Failure to attach any addendum may render the bid non-responsive and cause it to be rejected.

D. PREPARATION OF THE BID

1. Examination of Site, Plans and Specifications

Bidders shall examine the site of the work and acquaint themselves with all conditions affecting the work. By submitting a bid, the bidder shall be held to have personally examined the site and the drawings, to have carefully read the specifications, and to have satisfied itself as to its ability to meet all the difficulties attending the execution of the proposed contract before the delivery of this proposal, and agrees that if awarded the contract, will make no claim against the City based on ignorance or misunderstanding of the plans, specifications, site conditions and/or contract provisions.

The Contractor shall have included in the contract price a sufficient sum to cover all items, including labor, materials, tools, equipment and incidentals, that are implied or required for the complete improvements as contemplated by the drawings, specifications, and other contract documents.

2. Bid Instructions and Submissions

The Bid shall be submitted on the Bid Proposal forms included in the Specifications. All Bid Documents must be completed, executed and submitted with Bid by Bidder. Required eight (8) Bid Proposal Documents:

1. Bidder's Proposal
2. Addenda Acknowledgment
3. Contractor's Affidavit
4. Bid Bond (10% of Bid)
5. List of Subcontractors
6. Bidder's References/Experience (2 pages)
7. Mechanical Subcontractor Experience
8. Bidder's Information (2 pages)

All prices submitted will be considered as including any and all sales or use taxes.

E. BID FORM/BOND

The Bid must be accompanied by cash, a certified or cashier's check, or a surety bond (bid bond) payable to the City of Torrance. Bids must be submitted on the proposal forms furnished by the City Clerk's office. The Bid Guaranty shall be in an amount equivalent to at least 10% of the Total Contract Bid Price.

Within ten (l0) days after the award of the contract, the City Clerk will return the proposal guarantees accompanying those proposals, which are not to be considered in making the award. All other proposal guarantees will be held until the contract has been finally executed, after which they will be returned to the respective bidders whose proposals they accompany.

F. AFFIDAVIT.

An affidavit form is enclosed. It must be completed signifying that the bid is genuine and not collusive or made in the interest or on behalf of any person not named in the bid, that the bid has not directly or indirectly induced or solicited any other Bidder to put in a sham bid or any other person, firm, or corporation to refrain from bidding, and that the Bidder has not in any manner sought by collusion to secure for itself an advantage over any other Bidder. Any bid submitted without an affidavit or in violation of this requirement will be rejected.

G. NONRESPONSIVE BIDS AND BID REJECTION

1. A Bid in which any one (1) of the required eight (8) Bid proposal documents are not completed, executed and submitted may be considered non-responsive and be rejected.

2. A Bid in which the Contract Unit Prices are unbalanced, which is incomplete or which shows alteration of form or irregularities of any kind, or which contains any additions or conditional or alternate Bids that are not called for, may be considered non-responsive and be rejected.

H. AWARD OF CONTRACT

In accordance with Division 2, Chapter 2 of the Torrance Municipal Code, the City Council reserves the right to reject any and all bids received, to take all bids under advisement for a period not-to-exceed sixty (60) days after date of opening thereof, to waive any informality or irregularity in the Bid, and to be the sole judge of the merits of material included in the respective bids received. This bid does not commit the City to award a contract or to pay any cost incurred in the preparation of a bid. All responses to this bid become the property of the City of Torrance.

I. EXECUTION OF CONTRACT

After the Contract is awarded, the awarded bidder shall execute the following six (6) documents:

1. Performance Bond (100% of Bid)
2. Labor and Material Bond (100% of Bid)
3. Contract - Public Works Agreement
4. Verification of Insurance Coverage (Certificates and Endorsements)
5. Workers' Compensation Insurance Certificate
6. Business License Application Form

J. PERMITS, LICENSES AND PUBLIC WORKS AGREEMENT

The Contractor shall procure and execute all permits, licenses, pay all charges and fees, and give all notices necessary and incidental to completion of Work. The Contractor shall execute a Public Works Agreement. No fee is charged for a permits issued by the City of Torrance Building and Safety Department for a public works project. The Contractor shall obtain a City of Torrance Business License. To obtain a Torrance Business License please call 310-618-5923.

K. INSURANCE

The Contractor shall maintain Automobile Liability, General Liability and Workers' Compensation Insurance as specified in the Public Works Agreement included in the Project Specifications.

L. SUBCONTRACTS

Each Bidder shall comply with the Chapter of the Public Contract Code including sections 4100 through 4113. The Contractor shall perform, with its own organization, Contract work amounting to at least 50 percent of the Contract price. When a portion of an item is subcontracted, the value of the work subcontracted will be based on the estimated percentage of the Contract Unit Price, determined from information submitted by the Contractor, subject to approval by the City Manager.

M. TRAFFIC CONTROL PLAN

Not applicable

N. PRE-BID INQUIRIES

Bidders with pre-bid inquiries should contact Diane Megerdichian, Business Manager, General Services Department at 310-781-7151 or email dmegerdichian@torranceca.gov. If emailing, please put project title in the subject line.

DO NOT RETURN PLANS AND SPECIFICATIONS.

ALL BIDS MUST BE SEALED AND MARKED:

"BID FOR RENOVATION OF THE POLICE DEPARTMENT
FORENSIC LABORATORY BID B2012-39

O. EXECUTION OF CONTRACT

1. The contract shall be signed by the successful bidder and returned, together with the contract bonds and evidence of required insurance coverage, **within ten (10) working days**, not including Sundays, after the bidder has received notice that the contract has been awarded. Failure to execute the contract as specified above shall be just cause for annulment of the award and forfeiture of the proposal guarantee. The Contract shall not be considered binding upon the CITY until executed by the authorized CITY officials.

2. Bond amounts shall be as provided in Section 2-4 of the Standard Specifications for Public Works Construction. The Performance Bond shall be required to remain in effect for one (1) year following the date specified in the City's Notice of Completion, or, if no Notice of Completion is recorded for one (1) year following the date of final acceptance by the City Manager.

P. INSURANCE REQUIREMENTS FOR CONTRACTORS.

CONTRACTOR must maintain at its sole expense the following insurance, which will be full coverage not subject to self insurance provisions:

1. Automobile Liability, including owned, non-owned and hired vehicles, with at least the following limits of liability:

   a. Primary Bodily Injury with limits of at least $500,000 per person, $1,000,000 per occurrence; and

   b. Primary Property Damage of at least $250,000 per occurrence; or

   c. Combined single limits of $1,000,000 per occurrence.

2. General Liability including coverage for premises, products and completed operations, independent contractors, personal injury and contractual obligations with combined single limits of coverage of at least $ 2,000,000 per occurrence.

3. Workers' Compensation with limits as required by the State of California and Employers Liability with limits of at least $1,000,000.

Q. The insurance provided by CONTRACTOR will be primary and non-contributory.

R. The CITY ("City of Torrance"), the Redevelopment Agency of the City of Torrance, the City Council and each member thereof, members of boards and commissions, every officer, agent, official, employee and volunteer must be named as additional insured under the automobile and general liability policies.

S. CONTRACTOR must provide certificates of insurance and/or endorsements to the City Clerk of the City of Torrance before the commencement of work.

T. Each insurance policy required by this Paragraph must contain a provision that no termination, cancellation or change of coverage can be made without thirty days notice to the CITY.

U. CONTRACTOR must include all subcontractors as insured under its policies or must furnish separate certificates and endorsements for each subcontractor. All coverage for subcontractors will be subject to all of the requirements of this Paragraph 17.

4. Sufficiency of Insurers and Sureties:
Insurance required by this contract will be satisfactory only if issued by companies rated "B+" or better in the most recent edition of Best's Key Rating Guide, and only if they are of a financial category of a VII or better, unless these requirements are modified or waived by the City Risk Manager.

W. RESPONSIBILITY OF CITY.

The City of Torrance shall not be held responsible for the care or protection of any material or parts of the work prior to final acceptance, except as expressly provided in these specifications.

X. CONSTRUCTION SCHEDULE AND PRECONSTRUCTION CONFERENCE.

The office staff of the City is currently operating on a 9/80 work week; therefore, City Hall is closed every other Friday.

In accordance with the herein Special Provisions, after notification of award and prior to start of any work, **the Contractor shall submit to the City Manager for approval its proposed Construction Schedule within ten (10) working days from the date of Notice of Proceed.** At least two (2) days, exclusive of Saturdays, Sundays and holidays, prior to commencement of work, the Contractor shall attend a pre-construction conference.

The Contractor will provide all product and equipment submittals to the City of Torrance or designated consultant within ten (10) working days from the date of Notice to Proceed. The Contractor shall immediately order materials requiring a delivery delay upon receipt of a written notice from the City that the City Council has approved an Award of Contract. Contractor shall provide written proof(s) of timely material order(s) and shall include any delivery delays in the Construction Schedule.

Y. PROGRESS OF THE WORK AND TIME FOR COMPLETION

The Contractor shall begin work after the mailing, from the City Manager to the Contractor, by first class mail, postage prepaid, of a Notice to Proceed. **The Contractor shall diligently prosecute the same to completion within one hundred eighty (180) calendar days of the start date specified in said Notice.** The one hundred eighty calendar day schedule includes, completion of contractual paper work, equipment/ material submittal review, the lead time for materials and equipment, and on site work.

During periods when weather or other conditions are unfavorable for construction, the Contractor shall pursue only such portions of the work as shall not be damaged thereby. No portions of the work whose acceptable quality or efficiency will be affected by any unfavorable conditions shall be constructed while those conditions exist. It is expressly understood and agreed by and between the Contractor and the City that the Contract time for completion of the work described herein is a reasonable time taking into consideration the average climatic and economic conditions and other factors prevailing in the locality of the work.

Z. LIQUIDATED DAMAGES

The Contractor agrees that failure to complete work within the time allowed will result in damages being sustained by the City. Contractor and City agree that failure to complete the project will result in inconvenience to the citizens of Torrance and the City of Torrance and their customers using the affected areas. Such delay will also result in the necessity of several inspections each day to ensure that the project is properly progressing. The parties also agree that failure to complete the project on time will prevent the City from having the use of the facility. Therefore, the parties agree such damages among others are, and will continue to be, impracticable and extremely difficult to determine, but that Seven Hundred and Fifty Dollars ($750) a calendar day is the minimum value of such costs to the City and is a reasonable amount that the Contractor agrees to reimburse the City for each calendar day of delay in finishing the work in excess of the time specified for completion, plus any authorized time extensions.

Execution of the contract under these specifications shall constitute agreement by the Contractor and the City that Seven Hundred and Fifty Dollars ($750) per calendar day is the minimum value of the costs and actual damage caused by failure of the Contractor to complete the work within the allotted time, that such sum is liquidated damages and shall not be construed as a penalty, and that such sum may be deducted from payments due the Contractor if such delay occurs. Said amount may be reduced by the City if work is sufficiently completed within the allotted time so that the damages are minimized.

The Contractor will not be assessed liquidated damages for any delay in completion of the work when such delay was caused by the failure of the City or the owner of a utility to provide for removal or relocation of the existing utility facilities; provided, however, that the Contractor shall have given the City and the owner of a utility timely notice of the interference. "Timely notice" shall be defined as a verbal notice (to be followed up in writing) no later than one (1) hour after initial discovery of the interference unless the City Representative is present, in which case notice shall be given immediately in writing to the City Manager.

AA. GENERAL PREVAILING WAGE RATE

Pursuant to Section 1773 of the Labor Code, the general prevailing wage rates in the county in which the work is to be done have been determined by the Director of the California Department of Industrial Relations. These wages are set forth in the General Prevailing Wage Rates for this project, are attached and available from the California Department of Industrial Relations' internet site at http://www.dir.ca.gov. Future effective general prevailing wage rates which have been predetermined and are on file with the California Department of Industrial Relations are referenced but not printed in the general prevailing wage rates.

APPRENTICESHIP EMPLOYMENT STANDARDS. Attention is directed to the provisions in Sections 1776, 1777.5 and 1777.6 of the California Labor Code concerning the employment of apprentices by the Contractor or any subcontractor under them.

Information relative to apprenticeship standards, wage schedules, and other requirements may be obtained from the Director of Industrial Relations, ex officio the Administrator of Apprenticeship, San Francisco, California, or from the division of Apprenticeship Standards and its branch offices.

BB. PRELIMINARY NOTICES

Preliminary Notices should be mailed to the following address.

Diane Megerdichian
General Services Department
3350 Civic Center Drive
Torrance, CA 90503

CC. SECURITY CLEARANCE

The awarded contractor and the subcontractors **will be required** to submit a list of employees who will need to be fingerprinted; the list and the fingerprints will be provided to the Torrance Police Department for review prior to the start of the onsite work. The City of Torrance reserves the right to decide eligibility of an employee and to remove any employee it deems as a security risk at any time during the project. If required to meet the project's scheduled completion date, the contractor will be responsible to find a suitable replacement at no additional cost to the City.

The bidder will need to obtain the **live scan fingerprint service** which the prints will be taken digitally and sent to the Department of Justice (DOJ) for a background check with results sent to the Police Department for their review. All costs (fingerprinting and DOJ) and coordination of this requirement is the responsibility of the awarded bidder.

The City of Torrance Police Department uses the services of:

Safe and Secure
4172 Pacific Coast Hwy Ste. 103
Torrance , CA 90505
Phone: 310-373-3202
www.safeandsecureusa.com

The bidder may use another location to perform the services if approved by the City prior to obtaining the service.

PART B

GENERAL PROVISIONS

CITY OF TORRANCE, CALIFORNIA
B. General Provisions

Bid for Renovation of the Police Department Forensic Laboratory
B 2012-39

PAGE NO.

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DIVISION I. PROJECT SPECIFICATIONS

SECTION A. GENERAL

The Project Specifications for all work on this project are the specifications contained in the "**Project Manual for Renovation of the Police Department Forensic Laboratory**", prepared by Tetra-IBI Group and the City of Torrance.

These Specifications are intended to govern all aspects of the appurtenant construction including, but not limited to, materials, methods and details, except as modified herein or as inconsistent with the provisions hereof.

DEFINITIONS

Whenever the following terms are used, they shall be understood to mean and refer to the following:

Agency or City - City of Torrance.

Board- The City Council of the City of Torrance herein referred to as City Council.

City Manager - The City Manager of the City of Torrance, acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties entrusted to them.

Consulting Architect – Kirk Shimazu
Tetra-IBI Group
1055 Wilshire Boulevard, Suite 1885
Los Angeles CA 90017-5601
213-250-7440 Ext.234
213-481-0947 Fax
kirk.shimazu@tetra-ibigroup.com

Laboratory - The designated laboratory authorized by the City of Torrance to test materials and work involved in the contract.

SECTION B. REFERENCE TO STANDARDS OR PUBLICATIONS

Any reference made in the Contract Documents to any specification, standard, or publication of any organization shall, in the absence of a specific designation to the contrary, be understood to refer to the latest edition of the specification, standard, or publication in effect as of the date of advertising the work, except to the extent that said standard or publication may be in conflict with applicable laws, ordinances, or governing codes. Contractors should be aware of all new code requirements (such as Cal-Green) when dealing with HVAC and other general building work. No requirements of these specifications or the drawings shall be waived because of any provisions of, or omission from, said standards or publications.

DIVISION II. SPECIAL PROVISIONS

SECTION A. DESCRIPTION OF THE WORK

1. Scope of the Work. The work to be done consists of furnishing all labor, materials, tools, equipment and incidentals complete the renovation of the Police Department Forensic Laboratory as shown in the plans and specifications prepared by Tetra-IBI Group for the City of Torrance.

SECTION B. GENERAL PROCEDURES

1. Specifications and Drawings Complementary. The Specifications and Drawings are complementary, and what is called for in one shall be as binding as if called for in both.

2. Order of Precedence of Contract Documents. In resolving conflicts resulting from conflicts, errors, or discrepancies in any of the Contract Documents, the order of precedence shall be as follows:

   a. Change Orders (Including Plans and Specifications attached thereto).
   b. Public Works Agreement
   c. Addenda
   d. Special Provisions
   e. Plans
   f. Standard Plans
   g. Instructions to Bidders
   h. Standard Specifications

   Within the Specifications the order of precedence is as follows:

   a. Addenda/Change Orders
   b. Permits from other agencies/supplemental agreements
   c. Special Provisions
   d. Instructions to Bidders
   e. Referenced Standard Drawings
   f. Referenced Standard Specifications

   With reference to the Drawings the order of precedence is as follows:
   a. Change Orders drawings govern over Addenda and Contract Drawings
   b. Addenda drawings govern over Contract drawings
   c. Contract drawings govern over shop drawings and standard drawings
   d. Detail drawings govern over general drawings
   e. Figures govern over scaled dimensions

   If the Contractor, in the course of the Work, becomes aware of any claimed errors or omissions in the Contract Documents or in the CITY's fieldwork, the Contractor shall immediately inform the CITY. The CITY shall promptly review the matter, and if the CITY finds an error or omission has been made the CITY shall determine the corrective actions and advise the Contractor accordingly. If the corrective work associated with an error or omission increases or decreases the amount of work called for in the Contract, the CITY shall issue an appropriate Change Order in accordance with 3-3. After discovery of an error or omission by the Contractor, any related work performed by the Contractor shall be done at the Contractor's risk unless authorized by the CITY.

3. Discrepancies in the Contract Documents. Any discrepancies, conflicts, errors or omissions found in the Contract Documents shall be promptly reported in writing to the City Manager, who will issue a correction in writing. The Contractor shall not take advantage of any such discrepancies, conflicts, errors or omissions, but shall comply with any corrective measures regarding the same prescribed by the City Manager, and no additional payment or time shall be allowed therefor.

   If discrepancies are discovered between the drawings and the specifications, and no specific interpretation is issued prior to bidding, the decision regarding this interpretation shall rest with the City Manager. The Contractor shall be compelled to act on the City Manager's decision as directed. In the event the installation is not in compliance with the direction of the City Manager, the installation shall be corrected by and at the expense of the Contractor at no additional cost to the City.

   See Section C of these Special Provisions for "Claims".

4. Errors and Omissions. If the Contractor, in the course of the work, becomes aware of any claimed errors or omissions in the contract documents or in the City's field work, he shall immediately inform the City Manager. The City Manager shall promptly review the matter, and if the City Manager finds an error or omission has been made the City Manager shall determine the corrective actions and advise the Contractor accordingly. If the corrective work associated with an error or omission increases or decreases the amount of work called for in the Contract, the City shall issue an appropriate Change Order. After discovery of an error or omission by the Contractor, any related work performed by the Contractor shall be done at its risk unless authorized by the City Manager.

5. Changed Conditions. The plans for the work show conditions as they are believed by the City Manager to exist, but it is not intended or to be inferred that the conditions as shown thereon constitute a representation by the City that such conditions are actually existent, nor shall the City be liable for any loss sustained by the Contractor as a result of any variance of the conditions as shown on the plans and the actual conditions revealed during the progress of the work or otherwise. The word "conditions" as used in this paragraph includes, but is not limited to, site conditions, both surface and subsurface.

   The Contractor shall examine the site, compare it with the drawings and specifications and shall satisfy itself as to the conditions under which the work is to be performed. The Contractor shall ascertain and check the location of all existing structures, utilities and equipment, which may affect its work. The Contractor shall be responsible to re-examine the site, as necessary, for performance of change orders or other proposed changes, which may affect its work. No allowance shall subsequently be made on the Contractor's behalf for any extra expense or loss of time, which is incurred due to failure or negligence on its part to make such examination.

6. As-built Drawings. The Contractor shall maintain a control set of Plans and Specifications on the Work site at all times. All final locations determined in the field, and any deviations from the Plans and Specifications, shall be marked in red on this control set to show as-built conditions. Upon completion of the Work, the Contractor shall submit the control set to the Engineer for approval. Final payment will not be made until this requirement is met.

7. Construction Staking. The Contractor is responsible for all construction staking and shall be responsible for the cost of any restaking required due to disturbance caused by its operations, failure to protect the work site from vandalism or other causes of loss.

8. Notice to Proceed. Notwithstanding any other provisions of the Contract, the Contractor shall not be obligated to perform any work and the City shall not be obligated to accept or pay for any work performed by the Contractor prior to delivery of a Notice to Proceed. The City's knowledge of work being performed prior to delivery of the Notice to Proceed shall not obligate the City to accept or pay for such work. The Contractor shall provide all required contract bonds and evidences of insurance prior to commencing work at the site.

9. Delay in Obtaining Materials. No extension of time will be granted for a delay caused by the inability to obtain materials unless the Contractor either obtains advance written approval from the City Manager or obtains from the supplier and furnishes to the City Manager documentary proof that such materials could not be obtained due to war, government regulations, labor disputes, strikes, fires, floods, adverse weather necessitating the cessation of work, or other similar action of the elements. The Contractor is required to order materials in a timely manner as specified in the "Instruction to Bidders".

10. Inspection and Testing. The Work is subject to inspection and approval by the CITY. The Contractor shall notify the CITY a minimum of 48 hours in advance of the required inspection.

    The CITY will make, or have made, such inspections and tests, as he deems necessary to see that the Work is in conformance with the Contract Documents. In the event such inspections or tests reveal noncompliance with the Contract Documents, the Contractor shall bear the cost of such corrective measures as deemed necessary by the CITY, as well as the cost of subsequent re-inspection and re-testing.

    Work done in the absence of inspection by the CITY may be required to be removed and replaced under the inspection of the CITY, and the entire cost of removal and replacement, including the cost of all materials which may be furnished by the CITY and used in the work thus removed, shall be borne by the Contractor, regardless of whether the work removed is found to be defective or not. Work covered without the approval of the CITY shall, if so directed, be uncovered to the extent required by the CITY, and the Contractor shall similarly bear the entire cost of performing all the work and furnishing all the materials necessary for the removal of the covering and its subsequent replacement, including all costs for additional inspection.

    The CITY and any authorized representatives shall at all times have access to the Work during its construction at shops and yards as well as the Work site. The Contractor shall provide every reasonable facility for ascertaining that the materials and workmanship are in accordance with the Contract Documents.

    Inspection of the Work shall not relieve the Contractor of the obligation to fulfill all conditions of the Contract.

11. Project Schedule

12.1 The Contractor shall submit a Construction Schedule in accordance with the project manual to the City Manager prior to beginning construction. No work may be started until the Schedule has been approved in writing. The work shall be scheduled to assure that construction will be completed within the specified time. The Contractor shall be responsible for coordination of all phases of the operation so that the time schedule can be met.

12.2 If the Contractor desires to make a major change in its method or operations after commencing construction or if their Schedule fails to reflect the actual progress, the Contractor shall submit to the City Manager a revised Construction Schedule in advance of beginning revised operations.

12. Mobilization

13.1 Scope. Mobilization shall include the provision of the Construction Schedule; site review; obtaining all permits, insurance, and bonds; moving onto the site all plant and equipment; furnishing and erecting plants, temporary buildings, and other construction facilities, and removal of same at completion of the project; all as required for the proper performance and completion of the work.

Mobilization shall include, but not be limited to, the following principle items.

(a) Submittal and modification, as required, of the Construction Schedule.

(b) All associated documentation and submittals required by Exhibit A of the contract.

(c) Installing temporary construction power and wiring.

(d) Establishing fire protection system.

(e) Developing construction water supply.

(f) Providing on-site sanitary facilities and portable water facilities, as required.

(g) Arranging for and erection of Contractor's work and storage yard.

(h) Submittal of all required insurance certificates and bonds, including subcontractors.

(i) Obtaining all required permits.

(j) Posting all OSHA required notices and establishment of safety programs.

(k) Have the Contractor's superintendent at the job site full-time.

(l) Pot-holing and other research and review as necessary to verify site conditions and utility locations, including research and review as necessary for change orders.

(m) Demobilization.

13. Markup. The following percentages shall apply for additional work:

Profit	5% maximum
Overhead	5% maximum

The markups mentioned hereinafter shall include, but are not limited to, all costs for the services of superintendents, project managers, timekeepers and other personnel not working directly on the change order, and pickup or yard trucks used by the above personnel, and other vehicles and/or equipment present at the jobsite but not directly used in actual construction activities. Incidental movements of labor, materials, supplies or equipment shall not be considered as use in actual construction activities. These costs shall not be reported as labor or equipment elsewhere, except when actually performing work directly on the change order and then shall only be reported at the labor classification of the work performed.

The City shall not pay for the cost of foremen or a superintendent unless authorized in advance by the City Manager. To the sum of the costs and markups provided for in this subsection, one (1) percent shall be added as compensation for bonding.

14. Utilities

The Contractor shall provide coordination with all the utility companies involved and shall provide protection from damage to their facilities. The Contractor shall be responsible for repair or replacement to said facilities made necessary by its failure to provide required protection. The Contractor is required to include utility requirements in the Construction Schedule.

The Contractor shall be solely responsible to check all utility record maps, books, and/or other data in the possession of the CITY, other agencies, and/or all utility companies, and no allowance shall be made for any failure to have done so.

The Contractor shall utilize the services of "Underground Service Alert - Southern California" for utility locating in all public right-of-ways by calling 1-800-227-2600 at least 48 hours prior to any excavation.

15. Completion, Acceptance and Warranty

If, in the CITY's judgment, the Work has been completed and is ready for acceptance, the CITY will so certify and will determine the date when the Work was completed. This will be the date when the Contractor is relieved from responsibility to protect the Work. The CITY may cause a Notice of Completion to be filed and recorded with the Los Angeles County Recorder's Office. At the CITY's option, the CITY may certify acceptance to the City Council who may then cause a Notice of Completion to be filed and recorded with the Los Angeles County Recorder's Office.

Manufacturer's warranties and guaranties furnished for materials used in the Work and instruction sheets and parts listed supplied with materials shall be delivered to the CITY prior to acceptance of the Work. The duration of the warranty or guaranty shall be the standard of the industry with a minimum of 1 year from the date of Notice of Completion.

Manufacturer's warranties shall not relieve the Contractor of liability under these Specifications. Such warranties only shall supplement the Contractor's responsibility.

The CITY may require a manufacturer's warranty on any product offered for use.

16. Contractor's Representative

The Contractor's Representative shall be approved by the CITY prior to the start of the Work. If the designated representative is rejected, the Contractor shall immediately designate another representative in writing and submit to the City for consideration. The CITY shall have the authority to require the Contractor to remove its representative and/or alternate representative at any time and at no cost to the CITY.

17. Waste Reduction and Recycling Requirements for Construction and Demolition Projects

Section 43.8.1 Definitions.

For the purposes of this Article, the following definitions apply:
a) "Administrative penalty" means any penalty or fine assessed to an applicant.
b) "Applicant" means any individual, firm, limited liability company, association, partnership, political subdivision, government agency, municipality, industry, public or private corporation, or any other entity whatsoever that applies to the City for the applicable permits or approvals to undertake construction, demolition, or renovation projects within the City.
c) "Certified facility program" means a program wherein a recycling/reuse facility has been pre-approved by the City to provide a minimum of 50% diversion for all processed loads.
d) "Construction" means the building or improvement of any facility or structure or any portion thereof including any tenant improvements to an existing facility or structure.
e) "Construction and Demolition Debris" ("C&D Debris") means used or discarded materials removed from premises during construction or renovation of a structure resulting from construction, remodeling, repair or demolition operations on any pavement, residential or commercial building or other structure.
f) "Conversion factor" means the value set forth in the standardized volume-to-weight conversion table approved by the City for use in estimating the volume or weight of materials identified in a Waste Management Plan.
g) "Covered project" means:
1) All demolition projects; and
2) All construction and renovation projects in which the total costs are, or are projected to be, greater than or equal to one hundred thousand dollars ($100,000).
h) "Deconstruction" means the process of carefully dismantling a building or structure in order to salvage components for reuse or recycling.
i) "Demolitions" means the razing, ruining, tearing down or wrecking of any facility, structure, pavement or building, whether in whole or in part, whether interior or exterior.
j) "Divert" means to use material for any purpose other than disposal in a landfill or transformation facility.

k) "Diversion requirement" means redirection from the waste stream of at least 50 percent of the total C&D Debris generated by a project via reuse or recycling.
l) "Non-covered project" means a construction or renovation project in which the total costs are not projected to be greater than or equal to one hundred thousand dollars ($100,000).
m) "Project" means any activity that requires an application for a building permit, demolition permit, or any similar permit from the City.
n) "Recycling" means the process of collecting, sorting, cleansing, treating and reconstituting materials that would otherwise become solid waste, and returning them to the economic mainstream in the form of raw material for new, reused or reconstituted products which meet the quality standards necessary to be used in the marketplace.
o) "Renovation" means any change, addition or modification in an existing structure.
p) "Reuse" means further or repeated use of materials in their original form.
q) "Salvage" means the controlled removal of C&D Debris from a permitted building or demolition site for the purpose of recycling, reuse or storage for later recycling or reuse.
r) "Total costs" means the total construction value of the project using standard commercial and residential valuation formulas.
s) "Waste Management Plan" ("WMP") means a completed WMP form, approved by the City for the purpose of compliance with this Article, submitted by an applicant for any covered project.
t) "WMP Compliance Official" ("Official") means the designated City employee(s) authorized and responsible for implementing this Article.

Section 43.8.2. Threshold For Covered Projects.

a) Covered Projects. For the purposes of determining whether a project meets the threshold, all phases of a project and all related projects taking place on single or adjoining parcels, as determined by the Official, will be deemed a single project.
b) Non-covered Projects. Non-covered projects are not required to meet the waste diversion requirements of this Article. However, an applicant for a non-covered project will be encouraged to divert as much project-related C&D Debris as possible.

Section 43.8.3. Submittal Of A Waste Management Plan.

a) An applicant for a covered project must submit a WMP on a form approved by the City as part of the application requirements for a demolition, construction or remodeling permit. The completed WMP must include the following:
1) Estimated weight of project C&D Debris, by material type, that will be generated; and
2) Maximum weight of each material type that can be feasibly diverted through deconstruction, reuse or recycling; and
3) Facility or vendor that will be used to collect or receive that material; and
4) Estimated weight of C&D Debris that will be landfilled; and
5) Total square footage of the project.

Section 43.8.4. Review Of A Waste Management Plan..

a) Approval. Notwithstanding any other provision of this Code, no permits will be issued for any covered project, unless and until the Official has approved the WMP. If the Official determines that the required conditions have been met, the WMP will be marked "Approved" and a copy of the WMP returned to the applicant. A WMP will be approved only if the Official determines that the following conditions have been met:
1) The WMP provides all of the information set forth in Section 43.8.3; and
2) The WMP indicates that at least 50 percent of all C&D Debris generated by the project will be diverted through recycling, deconstruction or reuse.

b) Exception for Public Health or Safety. WMP approval will not be required when the City determines that an emergency demolition is required to protect public health or safety.
c) Non-approval. If the Official determines that the WMP does not meet the required conditions, the Official will either:
1) Return to the applicant the WMP marked "Denied", including a statement of reasons for non-approval; or
2) Return to the applicant the WMP marked "Further Explanation Required."

Section 43.8.5 Compliance With A Waste Management Plan.

a) Documentation. Prior to the issuance of a certificate of occupancy for any covered project, the applicant must submit documentation that it has met the diversion requirement for the project to the Official. This documentation must include the following:
1) A copy of the previously approved WMP for the project with the addition of the actual material volume or weight generated by the project; and
2) Receipts from both disposal and diversion facilities and/or vendors that received each material showing whether the material was landfilled or deconstructed, reused and/or recycled; and
3) Any additional information that the applicant believes is relevant to determining its efforts to comply with this Article; and
4) If the City creates a certified facility program, documentation that a certified facility was used for disposal/recycling for a project will achieve compliance with the requirements of this Article.
b) Weighing of C&D Debris. An applicant must make reasonable efforts to ensure that all C&D Debris diverted or landfilled is measured and recorded using the most accurate method of measurement available. To the extent practical, all C&D Debris must be weighed by measurement on scales. Scales must be in compliance with all regulatory requirements for accuracy and maintenance as set forth by the State of California Bureau of Weights and Measures. For C&D Debris for which weighing is not practical due to its small size or to other considerations as determined by the Official, a volumetric measurement will be used. For conversion of volumetric measurements to weight, the applicant must use the standardized conversion rates approved by the City for this purpose.
c) Determination of compliance. The Official will review the information submitted by the applicant and determine whether the applicant has complied with the diversion requirement as follows:
1) Full compliance: If the Official determines that the applicant has fully complied with the diversion requirement applicable to the project, such compliance will be indicated on the WMP.
2) Noncompliance: Administrative Penalty: If the Official determines that the applicant has not complied with this Article, or the applicant fails to submit the documentation required, then the applicant will be assessed an administrative penalty. The amount of the penalty assessed will be ten thousand dollars ($10,000) for demolition projects and five thousand dollars ($5,000) for construction and remodeling projects. A project that includes demolition in addition to construction or remodeling will be subject to the demolition penalty amount.

Section 43.8.6. Infeasibility Exemption.

a) Application. If an application for a covered project experiences unique circumstances that the applicant believes make it infeasible to comply with the diversion requirement, the applicant may apply for an exemption at the time that the

WMP is submitted. An applicant applying for an exemption must indicate on the WMP the minimum rate of diversion that is feasible for each material and the specific circumstances that make it infeasible to comply with the diversion requirement.
b) Meeting with the Official. The Official will review the information supplied by the applicant and may meet with the applicant to discuss possible ways of meeting the diversion requirement.
c) Granting of exemption. The Official will issue an infeasibility exemption if the following findings are made:
1) Circumstances exist which are unique to the project such that compliance with the provisions of this Article would create an unusual burden on the project which is different than that of similarly situated projects; or
2) For a specific project, compliance with the requirements of the ordinance codified in this Article would result in minimal or no increase in recycled materials or reduction in the waste stream; or
3) That diversion of one or more substances involved in the project presents unique and burdensome obstacles and would create an especially onerous economic burden on the project unless diversion of that substance is reduced or eliminated; or
4) A project is a re-roofing Project.
If the Official is able to make one or more of the above findings for a project, the Official may excuse the project from compliance with this Article, or determine the maximum feasible reduced diversion rate for each material and indicate this rate on the WMP submitted by the applicant.
d) Denial of exemption. If the Official determines that it is possible for the applicant to meet the diversion requirement, the Official will so inform the applicant in writing. The applicant will have thirty (30) days to resubmit a WMP. If the applicant fails to resubmit the WMP, or if the resubmitted WMP does not comply with Section 43.8.3, the Official will deny the WMP in accordance with Section 43.8.4.

Section 43.8.7. Appeal.

a) The determination of the Official may be appealed to the Public Works Director or his/her designee upon written request of any applicant. An applicant must file the appeal within fifteen (15) days after the rendering of the original decision. The date of the rendering of the original decision will be determined in accordance with Section 11.6.1 of this Code. The decision of the Public Works Director or his/her designee will be final.
b) The notice of appeal of the decision of the Official must contain the following information in addition to the information given by the applicant thereon or reasonably required by the City Clerk therefor:
1) The name, address, and telephone number of the applicant; and
2) The type of action requested; and
3) The date on which said decision was made and the name of the Official taking such action; and
4) The grounds on which the appeal is taken.
c) The fee for filing an appeal will be charged as provided by resolution of the City Council.

CITY OF TORRANCE

Construction & Demolition Waste Management Plan (WMP)

THE REQUIRED GOAL IS TO REUSE OR RECYCLE AT LEAST 50% OF PROJECT WASTE

1) As part of your application, you must complete the front and back of this page and the "estimate" or left side of the table on the backside of this page to the best of your ability, indicating that you will recycle at least 50% of the waste from the project.

2) As your project proceeds, collect and keep receipts of all waste disposed, recycled, reused or donated.

3) To final your project, you must then fill out the "actual" or right side of the table on the backside of this sheet, and submit it again with all the receipts to verify that at least 50% of the project's waste was diverted from the landfills.

If you have any questions about the City's C & D Recycling Ordinance or how to fill out this form, please call (310) 781-6900.

Use tons to quantify total estimated waste and percentages of materials. A conversion table is available. Ask your hauler, recycler or site cleanup vendor to assist you with this WMP.

Please note, if you are contracting with a different company to haul your waste or using a roll off box from another company, that company must have a business license to operate in the City of Torrance.

A COPY OF THIS WMP AND RECEIPTS (TICKETS) FOR ALL RECYCLING AND DISPOSAL SHALL BE SUBMITTED BEFORE THE PROJECT WILL RECEIVE FINAL BUILDING APPROVAL. (FOR DEMO PERMITS, THE RECEIPTS FOR THE DEMOLITION WASTE SHOULD BE PROVIDED BEFORE THE FIRST FOOTING INSPECTION AFTER THE BUILDING PERMIT HAS BEEN ISSUED.)

Project Name: _____

Location: _____

Requesting Infeasibility Exemption: ☐ Yes ☐ No

Contractor Name: _____ Contact Name: _____

Address: _____ Contact Phone: _____

Recycler: _____ Recycler Contact: _____

Recycler Address: _____ Recycler Contact Phone: _____

CITY USE ONLY

	Application (Date)	Final (Date)
Approved		
Further explanation needed (see attached)		
Denied		
Infeasibility Exemption Approved		
Reviewed By		

Submit this form and the attached Waste Management Plan Table to: WMP
Compliance Official

City of Torrance
20500 Madrona Avenue
Torrance, CA 90503

CITY OF TORRANCE
Construction & Demolition Waste Management Plan Table

Project Name: _____

Total Estimated Waste Generated by Project: _____ (in tons). (Ask your hauler, recycler or site cleanup vendor to assist you. Use receipts from your previous jobs for estimates)					
Complete and return with Building Permit Application			Complete and return with receipts prior to final building approval		
Material Type	Estimated Reused/ Recycled	Estimated Disposed/ Landfilled	Actual Reused/ Recycled	Actual Disposed/ Landfilled	Vendor or Facility Used (Destination)
Asphalt & Concrete					
Bricks/Masonry/Tiles					
Building Materials (doors, windows, fixtures, etc.)					
Cardboard					
Concrete Pavement and Grindings					
Drywall (new, unpainted)					
Asphalt Pavement Grindings					
Landscape Debris (Plant & Tree Trimmings)					
Scrap Metal					
Unpainted Wood & Pallets					
Other (painted wood & drywall, roofing, etc.)					
Mixed C&D*					
Trash/Garbage					
TOTAL					

If you are requesting an infeasibility exemption and the estimated amount reused/recycled is less than 50%, please explain why (attach additional sheets if necessary):

_____

If the actual amount reused/recycled is less than 50%, please explain why:

_____

Prepared by (please print): _____ Date: _____

Signature: _____ Phone Number: _____

* *Mixed C&D* is defined as a mixture of three or more materials (e.g. wood, drywall, roofing, etc.) from construction or demolition sites that will be taken to a facility capable of recycling those commingled materials.

SECTION C. PAYMENTS TO CONTRACTOR AND CLAIMS

1. Breakdown of Contract Prices. The Contractor shall, within ten (10) working days of receipt of a request from the City, submit a complete breakdown of lump sum bid prices showing the value assigned to each part of the work, including an allowance for profit and overhead. In submitting the breakdown, the Contractor certifies that it is not unbalanced and that the value assigned to each part of the work represents its estimate of the actual cost, including profit and overhead, of performing that part of the work. The breakdown shall be sufficiently detailed to permit its use by the City Manager as one of the bases for evaluating requests for payment. No extra costs shall be allowed for these breakdowns.

2. Payment for Labor and Materials. The Contractor shall pay and cause the subcontractors to pay any and all accounts for labor, including Worker's Compensation premiums, State Unemployment and Federal Social Security payments and all other wage and salary deductions required by law. The Contractor also shall pay and cause the subcontractors to pay any and all accounts for services, equipment and materials used by it and the subcontractors during the performance of work under this contract. All such accounts shall be paid as they become due and payable. If requested by the City Manager, the Contractor shall immediately furnish the City with proof of payment of such accounts. Please see Exhibit A of the Public Works Agreement for further contract requirements.

3. Additional Work. Payment for additional work and all expenditures in excess of the bid amount must be authorized in writing by the City Manager. Such authorization shall be obtained by the Contractor prior to engaging in additional work. It shall be the Contractor's sole responsibility to obtain written approval from the City Manager for any change(s) in material or in the work proposed by suppliers or subcontractors. No payment shall be made to the Contractor for additional work which has not been approved in writing, and the Contractor hereby agrees that it shall have no right to additional compensation for any work not so authorized.

4. Claims. The Contractor shall not be entitled to the payment of any additional compensation for any cause, including any act, or failure to act, by the City, or the happening of any event, thing or occurrence, unless he shall have given the City due written notice of potential claim as hereinafter specified.

The written notice of potential claim shall set forth the reasons for which the Contractor believes additional compensation will or may be due, the nature of the costs involved, and, insofar as possible, the amount of the potential claim. Said notice shall be submitted on a form approved by the City at least forty-eight (48) hours (two working days) in advance of performing said work, unless the work is of an emergency nature, in which case the Contractor shall notify and obtain approval from the Inspector prior to commencing the work. The City Manager may require the Contractor to delay construction involving the claim, but no other work shall be delayed, and the Contractor shall not be allowed additional costs for any said delay but may be allowed on extension of time if the City Manager agrees that the work delayed is a controlling element of the Construction Schedule. The Contractor shall be required to submit any supporting data (or a detailed written explanation justifying further delay) within five (5) Work Days of a request from the City Manager and shall be responsible for any delays resulting from late and/or incomplete submittals. By submitting a Bid, the Contractor hereby agrees that this Section shall supersede Sections 6-6.3 and 6-6.4 of the Standard Specifications.

The City shall be the sole authority to interpret all plans, specifications and contract documents, and no claim shall be accepted which is based on the Contractor's ignorance, misunderstanding or noncompliance with any provision or portion thereof.

The Contractor shall be responsible to provide all data and to obtain all approvals required by said Specifications. No claims or extras shall be approved by the City unless all work was done under the direction of and subject to the approval of the Inspector.

It is the intention of this Subsection that differences between the parties arising under and by virtue of the Contract be brought to the attention of the City Manager at the earliest possible time in order that such matters may be settled, if possible, or other appropriate action promptly taken. The Contractor hereby agrees that it shall have no right to additional compensation for any claim that may be based on any such act, failure to act, event, thing or occurrence for which no written notice of potential claim as herein required was filed.

5. Noncompliance with Plans and Specifications. Failure of the Contractor to comply with any requirement of the Plans and Specifications, and/or to immediately remedy any such noncompliance upon notice from the City Manager, may result in suspension of Contract Progress Payments. Any Progress Payments so suspended shall remain in suspension until the Contractor's operations and/or submittals are brought into compliance to the satisfaction of the City Manager. No additional compensation shall be allowed as a result of suspension of Progress Payments due to noncompliance with the plans or specifications. The Contractor shall not be permitted to stop work due to said suspension of Progress Payments.

6. Request for Payment. Contractor shall submit all requests for payment on AIA Document G702 – Application and Certificate for Payment and G703- Continuation Sheet. For each item provide a column for listing: Item Number; Description of Work; Scheduled Value, Previous Application; Authorized Change Orders; Total completed and Stored to Date of Application; Percentage of Completion; Balance to Finish; and Retainage.

   Prior to submittal of said form, all items for which payment is requested shall be checked and approved in writing by the City Manager. No payments will be made unless all back-up data is submitted with the payment request and the Progress Payment Invoice is signed by both Contractor and Manager.

   The City will retain 5 percent of the value of all work done and materials installed as part security for fulfillment of the contract by Contractor. The full 5 percent retention will be retained on all payments for 35 days after the filing of the Notice of Completion.

   There shall be no separate payment for any relocations, barriers or forms, grading or temporary construction required to construct the improvements herein. Payment for these items shall be absorbed in the Bid Prices for the applicable work to which they are appurtenant, and no extra costs shall be allowed.

The payment of amounts due to the Contractor shall be contingent upon the Contractor furnishing the City with a release of all claims against the City arising by virtue of the Contract related to said amounts. It is the contractor's responsibility to provide the correct releases in order to obtain payment by the City. The Contractor shall provide the City with Unconditional Lien Release on Final Payment with a zero balance is required from all material suppliers and subcontractors with the request for final payment.

PART D

BID DOCUMENTS

BIDDER'S PROPOSAL

BID FOR RENOVATION OF THE
POLICE DEPARTMENT FORENSIC LABORATORY
B2012-39

In accordance with the Notice Inviting Bids pertaining to the receiving of sealed proposals by the City Clerk of the City of Torrance for the above titled improvement, the undersigned hereby proposes to furnish all work to be performed in accordance with the Plans, Specifications and Contract Documents, prepared by Tetra-IBI Group, Inc. for the lump sum bid as set forth in the following schedules.

Assignment of Contractor's values:

Item	Description	Total Amount
Division 01	General Requirements:	
Division 02	Site Work:	
Division 03	Concrete:	
Division 04	Masonry:	
Division 05	Metals:	
Division 06	Wood and Plastics:	
Division 07	Thermal and Moisture Protection:	
Division 08	Doors and Windows:	
Division 09	Finishes:	
Division 10	Specialties:	
Division 11	Equipment:	
Division 12	Furnishings:	
Division 13	Special Construction:	

Item	Description	Total Amount
Division 14	Conveying Systems:	
Division 15	Mechanical:	
Division 16	Electrical:	
	B2012-39 -BID TOTAL- in figures*	

BID TOTAL: _____

(Words)*

***BID MAY BE REJECTED IF TOTAL IS NOT SHOWN IN FIGURES AND WORDS.**

The undersigned furthermore agrees to enter into and execute a contract, with necessary bonds, at the prices set forth herein and in case of default in executing such contract, with necessary bonds, the check or bond accompanying this bid and the money payable thereon shall be forfeited thereby to and remain the property of the City of Torrance.

The above prices include all work appurtenant to the various items as outlined in the specifications and all work or expense required for the satisfactory completion of said item.

The undersigned declares that it has carefully examined the Plans, Specifications, and Contract Documents, and has investigated the site of the work and is familiar with the conditions thereon.

_____ _____

Contractor Name Signer's Name and Title

Date:_____License No. & Classification _____

Address:

_____

ACKNOWLEDGMENT OF ADDENDA RECEIVED

B2012-39

The Bidder shall acknowledge the receipt of addenda by placing an "X" by each addendum received.

Addendum No. 1 _____

Addendum No. 2 _____

Addendum No. 3 _____

Addendum No. 4 _____

Addendum No. 5 _____

Addendum No. 6 _____

Addendum No. 7 _____

Addendum No. 8 _____

If an addendum or addenda have been issued by the City and not noted above as being received by the Bidder, the Bid Proposal may be rejected.

_____ _____

Bidder's Signature Date

STATE OF CALIFORNIA }
}
COUNTY OF _____ }

CONTRACTOR'S AFFIDAVIT
B2012-39

_____, being first duly sworn, deposes and says:

1. That he is the _____
Title

of _____
(Name of Partnership, Corporation, or Sole Proprietorship)

hereinafter called "Contractor," who has submitted to the City of Torrance a proposal for the BID FOR RENOVATION OF THE POLICE DEPARTMENT FORENSIC LABORATORY, B2012-39

2. That said proposal is genuine; that the same is not sham; that all statement of facts therein are true;

3. That such proposal was not made in the interest or behalf of any person, partnership, company, association, organization or corporation not named or disclosed;

4. That the Contractor did not directly or indirectly induce, solicit or agree with any-one else to submit a false or sham bid, refrain from bidding, or withdraw the bid, to raise or fix the bid price of the Contractor or anyone else, or to raise or fix any overhead, profit or cost element of the Contractor's price or the price of anyone else; and did not attempt to induce action prejudicial to the interest of the City of Torrance or any other bidder, or anyone else interested in the proposed contract;

5. That the Contractor has not in any manner sought by collusion to secure for itself an advantage over any other bidder or to induce action prejudicial to the interests of the City of Torrance, or of any other bidder or of anyone else interested in the proposed contract;

That the Contractor has not accepted any bid from any subcontractor or materialman through any bid depository, the bylaws, rules or regulations of which prohibit or prevent the Contractor from considering any bid from any subcontractor or materialman, which is not processed through said bid depository, or which prevent any subcontractor or materialman from bidding to any contractor who does not use the facilities of or accept bids from or through such bid depository;

CONTRACTOR'S AFFIDAVIT (CONTINUED)

7. That the Contractor did not, directly or indirectly, submit the Contractor's bid price or any breakdown thereof, or the contents thereof, or divulge information or data relative thereto, to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof, or to any individual or group of Individuals, except to the City of Torrance, or to any person or persons who have a partnership or other financial interest with said Contractor in its business.

Dated this _____ day of _____, 20_____.

Subscribed and Sworn to
before me this _____
of _____, 20_____

_____
(Contractor)

_____
(Title)

_____
Notary Public in and for said
County and State.
(Seal)

BID BOND

B2012-39

KNOW ALL MEN BY THESE PRESENTS: That we, _____
_____

as principal, and _____
as sureties, are held and firmly bound unto the City of Torrance, State of California, in the penal sum of _____ dollars ($_____), for the payment whereof we hereby bind ourselves, our successors, heirs, executors or administrators jointly and severally, firmly by these presents.

The condition of this obligation is such that, whereas the above bounded principal is about to file with and submit to the City of Torrance a bid or proposal for the performance of certain work as required in the City of Torrance, Project No. B2012-39, said work being: the Renovation of the Police Department Forensic Laboratory, in compliance with the Specifications therefore under an invitation of said City contained in a notice or advertisement for bids or proposals; now if the bid or proposal of said principal shall be accepted and if said work be thereupon awarded to the principal by said City and if the said principal shall enter into a contract with the said City in accordance with said bid or proposal, or if the bid or proposal of the said principal is rejected, then this bond shall be void and of no effect and otherwise in full force and effect.

WITNESS our hands this _____ day of _____, 20 _____.

_____
Principal

_____
Surety/Attorney-in-Fact

_____
Signature

Name: _____
Local Address: _____
_____
Phone No.: _____
Fax No.: _____

LIST OF SUBCONTRACTORS

The Bidder is required to fill in the following blanks in accordance with the provisions of the Subletting and Subcontracting Fair Practices Act (Chapter 2 of Division 5, Title 1 of the Government Code of the State of California) and should familiarize itself with Section 2-3 of the Standard Specifications.

Name under Which Subcontractor is Licensed:_____
_____
License Number: _____
Address of Office, Mill or Shop: _____

Specific Description of Sub-Contract: _____
_____

Name under Which Subcontractor is Licensed:_____
_____
License Number: _____
Address of Office, Mill or Shop: _____

Specific Description of Sub-Contract: _____
_____

Name under Which Subcontractor is Licensed:_____
_____
License Number: _____
Address of Office, Mill or Shop: _____

Specific Description of Sub-Contract: _____
_____

Name Under Which Subcontractor is Licensed: _____
_____
License Number: _____
Address of Office, Mill or Shop: _____

Specific Description of Sub-Contract: _____
_____

Subcontractors listed in accordance with the provisions of Section 2-3 must be properly licensed under the laws of the State of California for the type of work which they are to perform. Do not list alternate subcontractors for the same work.

REFERENCES

(Public Works projects similar in magnitude and degree of difficulty completed by Contractor within the past five (5) years and at least one (1) lab or hospital project).

1.Name (Firm/Agency): _____

Address:_____

Contact Person:_____ Telephone No.:_____

Title of Project:_____

Project Location: _____

Date of Completion_____Contract Amount:$_____

2.Name (Firm/Agency): _____

Address:_____

Contact Person:_____ Telephone No.:_____

Title of Project:_____

Project Location: _____

Date of Completion_____Contract Amount:$_____

3.Name (Firm/Agency): _____

Address:_____

Contact Person:_____ Telephone No.:_____

Title of Project:_____

Project Location: _____

Date of Completion_____Contract Amount:$_____

4.Name (Firm/Agency): _____

Address: _____

Contact Person:_____ Telephone No.:_____

Title of Project:_____

Project Location: _____

Date of Completion_____Contract Amount: $_____

Mechanical Subcontractor Certification and Laboratory References-B2012-39

1.Name (Firm/Agency): _____

Address:_____

Contact Person:_____ Telephone No.:_____

Title of Project:_____

Project Location: _____

Date of Completion_____Contract Amount:$_____

2.Name (Firm/Agency): _____

Address:_____

Contact Person:_____ Telephone No.:_____

Title of Project:_____

Project Location: _____

Date of Completion_____Contract Amount:$_____

3.Name (Firm/Agency): _____

Address:_____

Contact Person:_____ Telephone No.:_____

Title of Project:_____

Project Location: _____

Date of Completion_____Contract Amount:$_____

By signing this form I certify that I have experience in at least three (3) laboratory projects (hospital, university or private sector) in the past five (5) that required precise pressurization requirements and included fume hoods.

Print Name and Address of Mechanical Subcontractor :

_____

Print Name: _____ Print Title:_____

Signature: _____ Date: _____

Bidder's Information

The bidder must provide a detailed list of the trades and the description of the work they will perform with their own company for this project.

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

11. _____

12. _____

13. _____

14. _____

Contractor's License No.: _____ Class: _____

Date first obtained: _____

Has License ever been suspended or revoked? _____

If yes, describe when and why _____

Any current claims against License or Bond? _____

If yes, describe claims: _____

Type of entity (check one)

_____ Incorporated _____ Partnership _____ Sole Proprietorship

If incorporated, in what state _____

Federal Tax ID Number #_____

Principals in Company (List all - attach additional sheets if necessary):

NAME	**TITLE**	**LICENSE NO. (If Applicable)**

PART E.

DOCUMENTS TO BE COMPLETED AND DELIVERED TO CITY AS PART OF CONTRACT WITH THE CITY

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS:

That we, _____as Principal(s) and ___a corporation, incorporated, organized, and existing under the laws of the State of _____, and authorized to execute bonds and undertakings and to do a general surety business in the State of California, as Surety, are jointly and severally held and firmly bound unto the City of Torrance, a municipal corporation, located in the County of Los Angeles, State of California, in the full and just sum of: _____ Dollars ($_____), lawful money of the United States of America, for the payment of which sum, well and truly to be made, we bind ourselves and our respective heirs, executors, administrators, representative, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that: WHEREAS, said Principal(s) have/has entered into, or are/is about to enter into, a certain written contract or agreement, dated as of the _____ day of _____, 20____, with the said City of Torrance for the RENOVATION OF THE POLICE DEPARTMENT FORENSIC LABORATORY, B2012-39, all as is more specifically set forth in said contract or agreement, a full, true and correct copy of which is hereunto attached, and hereby referred to and by this reference incorporated herein and made a part hereof;

NOW, THEREFORE, if the said Principal(s) shall faithfully and well and truly do, perform and complete, or cause to be done, performed and complete, each and all of the covenants, terms, conditions, requirements, obligations, acts and things, to be met, done or performed by said Principal(s), including any guarantee period as set forth in, or required by, said contract or agreement, all at and within the time or times, and in the manner as therein specified and contemplated, then this bond and obligation shall be null and void; otherwise it shall be and remain in full force, virtue and effect.

The said Surety, for value received, hereby stipulates and agrees that no amendment, change, extension of time, alteration or addition to said contract or agreement, or of any feature or item or items of performance required therein or there under, shall in any manner affect its obligations on or under this bond; and said Surety does hereby waive notice of any such amendment, change, extension of time, alteration, or addition to said contract or agreement, and of any feature or item or items of performance required therein or there under.

PERFORMANCE BOND (CONTINUED)

In the event any suit, action or proceedings is instituted to recover on this bond or obligation, said Surety will pay, and does hereby agree to pay, as attorney's fees for said City, such sum as the Court in any such suit, action or proceeding may adjudge reasonable.

EXECUTED, SEALED AND DATED this _____ day of _____, 20____

CORPORATE SEAL

PRINCIPAL(S):

BY _____

BY _____

CORPORATE SEAL

SURETY:

BY _____

Name: _____
Local Address: _____
_____
Phone No.: _____
Fax No.: _____

LABOR AND MATERIAL BOND

KNOW ALL MEN BY THESE PRESENTS:

That we,_____
As Principal(s) and _____ a corporation, incorporated, organized, and existing under the laws of the State of _____, and authorized to execute bonds and undertakings and to do a general surety business in the State of California, as Surety, are jointly and severally held and firmly bound unto:

(a) The State of California for the use and benefit of the State Treasurer, as ex-officio Treasurer and custodian of the Unemployment Fund of said State; and

(b) The City of Torrance, California; and

(c) Any and all persons who do or perform or who did or performed work or labor upon or in connection with the work or improvement referred to in the contract or agreement hereinafter mentioned; and

(d) Any and all materialmen, persons, companies, firms, association, or corporations, supplying or furnishing any materials, provisions, provender, transportation, appliances or power, or other supplies used in, upon, for or about or in connection with the performance of the work or improvement contracted to be executed, done, made or performed under said contract or agreement; and

(e) Any and all persons, companies, firms, associations, or corporations furnishing, renting, or hiring teams, equipment, implements or machinery for, in connection with, or contributing to, said work to be done or improvement to be made under said contract or agreement; and

(f) Any and all persons, companies, firms, associations, or corporations who supply both work and materials;

and whose claim has not been paid by said Principal(s), in full and just sum of _____ Dollars ($_____), lawful money of the United States of America, for the payment of which will and truly to be made, said Principal(s) and said Surety do hereby bind themselves and their respective heirs, executors, administrators, representatives, successors and assigns, jointly and severally, firmly by these presents.

LABOR AND MATERIAL BOND (CONTINUED)

THE CONDITION OF THE FOREGOING OBLIGATION IS SUCH, THAT: WHEREAS, said Principal(s) have/has entered into or are/is about to enter into a certain written contract or agreement, dated as of the _____ day of _____20 ___, with the City of Torrance for the RENOVATION OF THE POLICE DEPARTMENT FORENSIC LABORATORY, B2012-39, all as is more specifically set forth in said contract or agreement, a full, true and correct copy of which is hereunto attached, and hereby referred to and by this reference incorporated herein and made a part hereof;

NOW, THEREFORE, if the said Principal(s) (or any of his/her, its, or their subcontractors) under said contract or agreement fails or fail to pay:

(1) For any materials, provisions, provender, transportation, appliances, or power, or other supplies; or

(2) For the hire of any teams, equipment, implements, or machinery; or

(3) For any work or labor; supplies, furnished, provided, used, done or performed in, upon, for or about or in connection with the said work or improvement; or

(4) For amounts due under the Unemployment Insurance Act of the State of California with respect to such work or improvement;

the Surety on this bond will pay the same in an amount not exceeding the sum hereinabove specified in this bond; and, also, in case suit is brought upon this bond, said Surety will (and does hereby agree to) pay a reasonable attorney's fee, to be fixed and taxed as costs, and included in the judgment therein rendered.

This bond shall (and it is hereby made to) insure to the benefit of any and all persons entitled to file claims under Section 1192.1 of the Code of Civil Procedure of the State of California, so as to give a right of action to them or their assigns in any suit brought upon this bond, all as contemplated under the provisions of Section 4205 of the Government Code, and of Chapter 1 of Title 4 of Part 3 of the Code of Civil Procedure, of the State of California.

This bond is executed and filed in connection with said contract or agreement hereunto attached to comply with each and all of the provisions of the laws of the State of California above mentioned or referred to, and of all amendments thereto, and the obligors so intend and do hereby bind themselves accordingly.

LABOR AND MATERIAL BOND (CONTINUED)

The said Surety, for value received, hereby stipulates and agrees that no amendment, change, extension of time, alteration, or addition to said contract or agreement, or of any feature or item or items of performance required therein or thereunder, shall in any manner affect its obligations on or under this bond; and said Surety does hereby waive notice of any such amendment, change, extension of time, alteration, or addition to said contract or agreement, and of any feature or item or items of performance required therein or thereunder.

EXECUTED, SEALED AND DATED this _____ day of _____, 20 _____

CORPORATE SEAL

PRINCIPAL:

BY _____

CORPORATE SEAL

SURETY:

BY _____

Name: _____
Local Address: _____
_____
Phone No.: _____
Fax No.: _____

WORKERS' COMPENSATION INSURANCE CERTIFICATION

In compliance with Section 7-4 of the Standard Specifications, the Contractor shall complete and submit the following certification with a Certificate of Insurance before execution of the contract.

I am aware of, and will comply with, Section 3700 of the Labor Code, requiring every employer to be insured against liability for Workers' Compensation or to undertake self-insurance before commencing any of the work.

_____
CONTRACTOR

By: _____

Title: _____

PUBLIC WORKS AGREEMENT

This PUBLIC WORKS AGREEMENT ("Agreement") is made and entered into as of Effective Date, by and between the CITY OF TORRANCE, a municipal corporation ("CITY"), and Company Name, type of Entity.

RECITALS:

A. The CITY wishes to retain the services of an experienced and qualified CONTRACTOR to furnish all labor, materials, tools, equipment and incidentals in accordance with the plans and specifications prepared for the City of Torrance by Tetra-IBI Group;

B. In order to obtain the desired services, The CITY has circulated a Notice Inviting Bids for Renovation of the Police Department Forensic Laboratory, Notice Inviting Bids No. **B2012-39** (the "NIB"); and

C. CONTRACTOR has submitted a Bid (the "Bid") in response to the NIB. CONTRACTOR represents that it is qualified to perform those services requested in the Plans and Specifications. Based upon its review of all Bids submitted in response to the NIB, The CITY is willing to award the contract to CONTRACTOR.

AGREEMENT:

1. SERVICES TO BE PERFORMED BY CONTRACTOR

CONTRACTOR will provide the services and install those materials listed in the Plans and Specifications, which are on file in the General Services Department. The NIB and the Plans and Specifications are made a part of this Agreement. A copy of the Bid is attached as Exhibit A.

2. TERM

Unless earlier terminated in accordance with Paragraph 4 below, this Agreement will continue in full force and effect for one year from Effective Date.

3. COMPENSATION

A. CONTRACTOR's Fee.

For services rendered pursuant to this Agreement, CONTRACTOR will be paid in accordance with CONTRACTOR's Bid; provided, however, that in no event will the total amount of money paid the CONTRACTOR, for services initially contemplated by this Agreement, exceed the sum of $ unless otherwise first approved in writing by the CITY.

B. Schedule of Payment.

Provided that the CONTRACTOR is not in default under the terms of this Agreement, upon presentation of an invoice, CONTRACTOR will be paid monthly, within 30 days after the date of the monthly invoice.

4. TERMINATION OF AGREEMENT

A. Termination by CITY for Convenience.

1. CITY may, at any time, terminate the Agreement for CITY's convenience and without cause.
2. Upon receipt of written notice from CITY of such termination for CITY's convenience, CONTRACTOR will:
   a. cease operations as directed by CITY in the notice;
   b. take actions necessary, or that CITY may direct, for the protection and preservation of the work; and
   c. except for work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.
3. In case of such termination for CITY's convenience, CONTRACTOR will be entitled to receive payment for work executed; and costs incurred by reason of such termination, along with reasonable overhead and profit on the work not executed.

B. Termination for Cause.

1. If either party fails to perform any term, covenant or condition in this Agreement and that failure continues for 15 calendar days after the nondefaulting party gives the defaulting party written notice of the failure to perform, this Agreement may be terminated for cause; provided, however, that if during the notice period the defaulting party has promptly commenced and continues diligent efforts to remedy the default, the defaulting party will have such additional time as is reasonably necessary to remedy the default.
2. In the event this Agreement is terminated for cause by the default of the CONTRACTOR, the CITY may, at the expense of the CONTRACTOR and its surety, complete this Agreement or cause it to be completed. Any check or bond delivered to the CITY in connection with this Agreement, and the money payable thereon, will be forfeited to and remain the property of the CITY. All moneys due the CONTRACTOR under the terms of this Agreement will be retained by the CITY, but the retention will not release the CONTRACTOR and its surety from liability for the default. Under these circumstances, however, the CONTRACTOR and its surety will be credited with the amount of money retained, toward any amount by which the cost of completion exceeds the Agreement Sum and any amount authorized for extra services.

3. Termination for cause will not affect or terminate any of the rights of the CITY as against the CONTRACTOR or its surety then existing, or which may thereafter accrue because of the default; this provision is in addition to all other rights and remedies available to the CITY under law.

C. Termination for Breach of Law.

In the event the CONTRACTOR or any of its officers, directors, shareholders, employees, agents, subsidiaries or affiliates is convicted (i) of a criminal offense as an incident to obtaining or attempting to obtain a public or private contract or subcontract, or in the performance of a contract or subcontract; (ii) under state or federal statutes of embezzlement, theft, forgery, bribery, falsification or destruction of records, receiving stolen property, or any other offense indicating a lack of business integrity or business honesty which currently, seriously, and directly affects responsibility as a public consultant or contractor; (iii) under state or federal antitrust statutes arising out of the submission of bids or proposals; or (iv) of violation of Paragraph 19 of this Agreement; or for any other cause the CITY determines to be so serious and compelling as to affect CONTRACTOR's responsibility as a public consultant or contractor, including but not limited to, debarment by another governmental agency, then the CITY reserves the unilateral right to terminate this Agreement or to impose such other sanctions (which may include financial sanctions, temporary suspensions or any other condition deemed appropriate short of termination) as it deems proper. The CITY will not take action until CONTRACTOR has been given notice and an opportunity to present evidence in mitigation.

5. FORCE MAJEURE

If any party fails to perform its obligations because of strikes, lockouts, labor disputes, embargoes, acts of God, inability to obtain labor or materials or reasonable substitutes for labor or materials, governmental restrictions, governmental regulations, governmental controls, judicial orders, enemy or hostile governmental action, civil commotion, fire or other casualty, or other causes beyond the reasonable control of the party obligated to perform, then that party's performance shall be excused for a period equal to the period of such cause for failure to perform.

6. RETENTION OF FUNDS

CONTRACTOR authorizes the CITY to deduct from any amount payable to CONTRACTOR (whether or not arising out of this Agreement) any amounts the payment of which may be in dispute or that are necessary to compensate the CITY for any losses, costs, liabilities, or damages suffered by the CITY, and all amounts for which the CITY may be liable to third parties, by reason of CONTRACTOR's negligent acts or omissions or willful misconduct in performing or failing to perform CONTRACTOR's obligations under this Agreement. In the event that any claim is made by a third party, the amount or validity of which is disputed by CONTRACTOR, or any indebtedness exists that appears to be the basis for a claim of lien, the CITY may withhold from any payment due, without liability for interest because of the withholding, an amount sufficient to cover the claim. The failure of the CITY to exercise the right to deduct or to withhold will not, however, affect the obligations of CONTRACTOR to insure, indemnify, and protect the CITY as elsewhere provided in this Agreement.

7. THE CITY'S REPRESENTATIVE

Tom Kelly, Facility Services Coordinator is designated as the "City Representative," authorized to act in its behalf with respect to the work and services specified in this Agreement and to make all decisions in connection with this Agreement. Whenever approval, directions, or other actions are required by the CITY under this Agreement, those actions will be taken by the City Representative, unless otherwise stated. The City Manager has the right to designate another City Representative at any time, by providing notice to CONTRACTOR.

8. CONTRACTOR REPRESENTATIVE(S)

The following principal(s) of CONTRACTOR are designated as being the principal(s) and representative(s) of CONTRACTOR authorized to act in its behalf with respect to the work specified in this Agreement and make all decisions in connection with this Agreement:

Company Representative

9. INDEPENDENT CONTRACTOR

The CONTRACTOR is, and at all times will remain as to the CITY, a wholly independent contractor. Neither the CITY nor any of its agents will have control over the conduct of the CONTRACTOR or any of the CONTRACTOR's employees, except as otherwise set forth in this Agreement. The CONTRACTOR may not, at any time or in any manner, represent that it or any of its agents or employees are in any manner agents or employees of the CITY.

10. BUSINESS LICENSE

The CONTRACTOR must obtain a City business license prior to the start of work under this Agreement, unless CONTRACTOR is qualified for an exemption.

11. OTHER LICENSES AND PERMITS

CONTRACTOR warrants that it has all professional, contracting and other permits and licenses required to undertake the work contemplated by this Agreement.

12. FAMILIARITY WITH WORK

By executing this Agreement, CONTRACTOR warrants that CONTRACTOR (a) has thoroughly investigated and considered the scope of services to be performed, (b) has carefully considered how the services should be performed, and (c) fully understands the facilities, difficulties and restrictions attending performance of the services under this Agreement. If the services involve work upon any site, CONTRACTOR warrants that CONTRACTOR has or will investigate the site and is or will be fully acquainted with the conditions there existing, prior to commencement of services set forth in this Agreement. Should CONTRACTOR discover any latent or unknown conditions that will materially affect the performance of the services set forth in this Agreement, CONTRACTOR must immediately inform the CITY of that fact and may not proceed except at CONTRACTOR's risk until written instructions are received from the CITY.

13. CARE OF WORK

CONTRACTOR must adopt reasonable methods during the life of the Agreement to furnish continuous protection to the work, and the equipment, materials, papers, documents, plans, studies and other components to prevent losses or damages, and will be responsible for all damages, to persons or property, until acceptance of the work by the CITY, except those losses or damages as may be caused by the CITY's own negligence.

14. CONTRACTOR'S ACCOUNTING RECORDS; OTHER PROJECT RECORDS

Records of the CONTRACTOR's time pertaining to the project, and records of accounts between the CITY and the CONTRACTOR, will be kept on a generally recognized accounting basis. CONTRACTOR will also maintain all other records, including without limitation specifications, drawings, progress reports and the like, relating to the project. All records will be available to the CITY during normal working hours. CONTRACTOR will maintain these records for three years after final payment.

15. INDEMNIFICATION

CONTRACTOR will indemnify, defend, and hold harmless CITY, the City Council, each member thereof, present and future, its officers, agents and employees from and against any and all liability, expenses, including defense costs and legal fees, and claims for damages whatsoever, including, but not limited to, those arising from breach of contract, bodily injury, death, personal injury, property damage, loss of use, or property loss however the same may be caused and regardless of the responsibility for negligence. The obligation to indemnify, defend and hold harmless includes, but is not limited to, any liability or expense, including defense costs and legal fees, arising from the negligent acts or omissions, or willful misconduct of CONTRACTOR, its officers, employees, agents, subcontractors or vendors. It is further agreed, CONTRACTOR's obligations to indemnify, defend and hold harmless will apply even in the event of concurrent negligence on the part of CITY, the City Council, each member thereof, present and future, or its officers, agents and employees, except for liability resulting solely from the negligence or willful misconduct of CITY, its officers, employees or agents. Payment by CITY is not a condition precedent to enforcement of this indemnity. In the event of any dispute between CONTRACTOR and CITY, as to whether liability arises from the sole negligence of the CITY or its officers, employees, agents, subcontractors or vendors, CONTRACTOR will be obligated to pay for CITY's defense until such time as a final judgment has been entered adjudicating the CITY as solely negligent. CONTRACTOR will not be entitled in the event of such a determination to any reimbursement of defense costs including but not limited to attorney's fees, expert fees and costs of litigation.

16. NON-LIABILITY OF THE CITY'S OFFICERS AND EMPLOYEES

No officer or employee of the CITY will be personally liable to CONTRACTOR, in the event of any default or breach by the CITY, or for any amount that may become due to CONTRACTOR.

17. INSURANCE

A. CONTRACTOR must maintain at its sole expense the following insurance, which will be full coverage not subject to self insurance provisions:

(1) Automobile Liability, including owned, non-owned and hired vehicles, with at least the following limits of liability:

(a) Primary Bodily Injury with limits of at least $500,000 per person, $1,000,000 per occurrence; and

(b) Primary Property Damage of at least $250,000 per occurrence; or

(c) Combined single limits of $1,000,000 per occurrence.

(2) General Liability including coverage for premises, products and completed operations, independent contractors, personal injury and contractual obligations with combined single limits of coverage of at least $2,000,000 per occurrence.

(3) Workers' Compensation with limits as required by the State of California and Employers Liability with limits of at least $1,000,000.

B. The insurance provided by CONTRACTOR will be primary and non-contributory.

C. The CITY of Torrance, the City Council and each member thereof, members of boards and commissions, every officer, agent, official, employee and volunteer must be named as additional insureds under the automobile and general liability policies.

D. CONTRACTOR must provide certificates of insurance and/or endorsements to the City Clerk of the City of Torrance before the commencement of work.

E. Each insurance policy required by this Paragraph must contain a provision that no termination, cancellation or change of coverage can be made without thirty days notice to the CITY.

F. CONTRACTOR must include all subcontractors as insureds under its policies or must furnish separate certificates and endorsements for each subcontractor. All coverage for subcontractors will be subject to all of the requirements of this Paragraph 17.

18. SUFFICIENCY OF INSURERS

Insurance required by this Agreement will be satisfactory only if issued by companies admitted to do business in California, rated "B+" or better in the most recent edition of Best's Key Rating Guide, and only if they are of a financial category Class VII or better, unless these requirements are waived by the Risk Manager of the CITY ("Risk Manager") due to unique circumstances. In the event the Risk Manager determines that the work or services to be performed under this Agreement creates an increased or decreased risk of loss to the CITY, the CONTRACTOR agrees that the minimum limits of

any insurance policies and/or the performance bond required by this Agreement may be changed accordingly upon receipt of written notice from the Risk Manager; provided that CONTRACTOR will have the right to appeal a determination of increased coverage by the Risk Manager to the City Council of the CITY within 10 days of receipt of notice from the Risk Manager.

19. CONFLICT OF INTEREST

A. No officer or employee of the CITY may have any financial interest, direct or indirect, in this Agreement, nor may any officer or employee participate in any decision relating to the Agreement that effects the officer or employee's financial interest or the financial interest of any corporation, partnership or association in which the officer or employee is, directly or indirectly interested, in violation of any law, rule or regulation.

B. No person may offer, give, or agree to give any officer or employee or former officer or employee, nor may any officer or employee solicit, demand, accept, or agree to accept from another person, a gratuity or an offer of employment in connection with any decision, approval, disapproval, recommendation, preparation or any part of a program requirement or a purchase request, influencing the content of any specification or procurement standard, rendering of advice, investigation, auditing, or in any other advisory capacity in any way pertaining to any program requirement, contract or subcontract, or to any solicitation or proposal.

20. NOTICE

A. All notices, requests, demands, or other communications under this Agreement will be in writing. Notice will be sufficiently given for all purposes as follows:

(1) Personal delivery. When personally delivered to the recipient: notice is effective on delivery.

(2) First Class mail. When mailed first class to the last address of the recipient known to the party giving notice: notice is effective three mail delivery days after deposit in an United States Postal Service office or mailbox.

(3) Certified mail. When mailed certified mail, return receipt requested: notice is effective on receipt, if delivery is confirmed by a return receipt.

(4) Overnight delivery. When delivered by an overnight delivery service, charges prepaid or charged to the sender's account: notice is effective on delivery, if delivery is confirmed by the delivery service.

(5) Facsimile transmission. When sent by fax to the last fax number of the recipient known to the party giving notice: notice is effective on receipt. Any notice given by fax will be deemed received on the next business day if it is received after 5:00 p.m. (recipient's time) or on a non-business day.

Addresses for purpose of giving notice are as follows:

CONTRACTOR:	Company Name Address Address Fax
CITY:	City Clerk City of Torrance 3031 Torrance Boulevard Torrance, CA 90509-2970 Fax: (310) 618-2931

B. Any correctly addressed notice that is refused, unclaimed, or undeliverable because of an act or omission of the party to be notified, will be deemed effective as of the first date the notice was refused, unclaimed or deemed undeliverable by the postal authorities, messenger or overnight delivery service.

C. Either party may change its address or fax number by giving the other party notice of the change in any manner permitted by this Agreement.

21. PROHIBITION AGAINST ASSIGNMENT AND SUBCONTRACTING

This Agreement and all exhibits are binding on the heirs, successors, and assigns of the parties. The Agreement may not be assigned or subcontracted by either the CITY or CONTRACTOR without the prior written consent of the other.

22. INTEGRATION; AMENDMENT

This Agreement represents the entire understanding of the CITY and CONTRACTOR as to those matters contained in it. No prior oral or written understanding will be of any force or effect with respect to the terms of this Agreement. The Agreement may not be modified or altered except in writing signed by both parties.

23. INTERPRETATION

The terms of this Agreement should be construed in accordance with the meaning of the language used and should not be construed for or against either party by reason of the authorship of this Agreement or any other rule of construction that might otherwise apply.

24. SEVERABILITY

If any part of this Agreement is found to be in conflict with applicable laws, that part will be inoperative, null and void insofar as it is in conflict with any applicable laws, but the remainder of the Agreement will remain in full force and effect.

25. TIME OF ESSENCE

Time is of the essence in the performance of this Agreement.

26. GOVERNING LAW; JURISDICTION

This Agreement will be administered and interpreted under the laws of the State of California. Jurisdiction of any litigation arising from the Agreement will be in Los Angeles County, California.

27. COMPLIANCE WITH STATUTES AND REGULATIONS

CONTRACTOR will be knowledgeable of and will comply with all applicable federal, state, county and city statutes, rules, regulations, ordinances and orders.

28. WAIVER OF BREACH

No delay or omission in the exercise of any right or remedy by a nondefaulting party on any default will impair the right or remedy or be construed as a waiver. A party's consent or approval of any act by the other party requiring the party's consent or approval will not be deemed to waive or render unnecessary the other party's consent to or approval of any subsequent act. Any waiver by either party of any default must be in writing and will not be a waiver of any other default concerning the same or any other provision of this Agreement.

29. ATTORNEY'S FEES

Except as provided for in Paragraph 15, in any dispute, litigation, arbitration, or other proceeding by which one party either seeks to enforce its rights under this Agreement (whether in contract, tort or both) or seeks a declaration of any rights or obligations under this Agreement, the prevailing party will be awarded reasonable attorney's fees, together with any costs and expenses, to resolve the dispute and to enforce any judgment.

30. EXHIBITS

All exhibits identified in this Agreement are incorporated into the Agreement by this reference.

31. CONTRACTOR'S AUTHORITY TO EXECUTE

The persons executing this Agreement on behalf of the CONTRACTOR warrant that (i) the CONTRACTOR is duly organized and existing; (ii) they are duly authorized to execute this Agreement on behalf of the CONTRACTOR; (iii) by so executing this Agreement, the CONTRACTOR is formally bound to the provisions of this Agreement; and (iv) the entering into this Agreement does not violate any provision of any other Agreement to which the CONTRACTOR is bound.

CITY OF TORRANCE,
a Municipal Corporation

_____
Frank Scotto, Mayor

Company Name
Type of Entity

By: _____
Name
Title

ATTEST:

_____
Sue Herbers, City Clerk

APPROVED AS TO FORM:

JOHN L. FELLOWS III
City Attorney

By: _____

Attachments: Exhibit A: Bid

EXHIBIT A

Bid

[To be attached]

PART F

WAGE DETERMINATIONS

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1
FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

CRAFT: # CARPENTER AND RELATED TRADES

DETERMINATION: SC-23-31-2-2012-1
ISSUE DATE: August 22, 2012
EXPIRATION DATE OF DETERMINATION: June 30, 2013** The rate to be paid for work performed after this date has been determined. If work will extend past this date, the new rate must be paid and should be incorporated in contracts entered into now. Contact the Office of the Director – Research Unit for specific rates at (415) 703-4774.

LOCALITY: All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura counties.

Classification (Journeyperson)	Basic Hourly Rate	Employer Payments: Health and Welfare	Pension	Vacation/ Holiday	Training	Other	Straight-Time: Hours	Total Hourly Rate	Overtime Hourly Rate: Daily [g] 1 1/2X	Saturday [h] 1 1/2X	Sunday and Holiday
[a] **AREA 1**											
Carpenter[c], Cabinet Installer, Insulation Installer, Hardwood Floor Worker, Acoustical Installer	$37.35	$5.45	$3.66	$3.30[f]	$0.42	$0.31	8	$50.49	$69.165	$69.165	$87.84
Pile Driverman[c], Derrick Bargeman, Rockslinger, Bridge or Dock Carpenter, Cable Splicer	37.48	5.45	3.66	3.30[f]	0.42	0.31	8	50.62	69.36	69.36	88.10
Bridge Carpenter[c]	37.48	5.45	3.66	3.30[f]	0.42	0.31	8	50.62	69.36	69.36	88.10
Shingler[c]	37.48	5.45	3.66	3.30[f]	0.42	0.31	8	50.62	69.36	69.36	88.10
Saw Filer	37.44	5.45	3.66	3.30[f]	0.42	0.31	8	50.58	69.30	69.30	88.02
Table Power Saw Operator	37.45	5.45	3.66	3.30[f]	0.42	0.31	8	50.59	69.315	69.315	88.04
Pneumatic Nailer or Power Stapler	37.60	5.45	3.66	3.30[f]	0.42	0.31	8	50.74	69.54	69.54	88.34
Roof Loader of Shingles	26.24	5.45	3.66	3.30[f]	0.42	0.31	8	39.38	52.50	52.50	65.62
Scaffold Builder	28.55	5.45	3.66	3.30[f]	0.42	0.31	8	41.69	55.965	55.965	70.24
Millwright[c]	37.85	5.45	3.66	3.30[f]	0.42	0.31	8	50.99	69.915	69.915	88.84
Head Rockslinger	37.58	5.45	3.66	3.30[f]	0.42	0.31	8	50.72	69.51	69.51	88.30
Rock Bargeman or Scowman	37.38	5.45	3.66	3.30[f]	0.42	0.31	8	50.52	69.21	69.21	87.90
Diver, Wet (Up To 50 Ft. Depth) [d]	[e]82.96	5.45	3.66	3.30[f]	0.42	0.31	8	96.10	137.58	137.58	179.06
Diver, (Stand-By) [d]	[e]41.48	5.45	3.66	3.30[f]	0.42	0.31	8	54.62	75.36	75.36	96.10
Diver's Tender [d]	40.48	5.45	3.66	3.30[f]	0.42	0.31	8	53.62	73.86	73.86	94.10
Assistant Tender (Diver's) [d]	37.48	5.45	3.66	3.30[f]	0.42	0.31	8	50.62	69.36	69.36	88.10
[a] **AREA 2**											
Carpenter[c], Cabinet Installer, Insulation Installer, Hardwood Floor Worker, Acoustical Installer	36.78	5.45	3.66	3.30[f]	0.42	0.31	8	49.92	68.31	68.31	86.70
Shingler[c]	36.91	5.45	3.66	3.30[f]	0.42	0.31	8	50.05	68.505	68.505	86.96
Saw Filer	36.87	5.45	3.66	3.30[f]	0.42	0.31	8	50.01	68.445	68.445	86.88
Table Power Saw Operator	36.88	5.45	3.66	3.30[f]	0.42	0.31	8	50.02	68.46	68.46	86.90
Pneumatic Nailer or Power Stapler	37.03	5.45	3.66	3.30[f]	0.42	0.31	8	50.17	68.685	68.685	87.20
Roof Loader of Shingles	25.84	5.45	3.66	3.30[f]	0.42	0.31	8	38.98	51.90	51.90	64.82

DETERMINATION: SC-31-741-1-2012-1
ISSUE DATE: February 22, 2012
EXPIRATION DATE OF DETERMINATION: May 31, 2012* Effective until superseded by a new determination issued by the Director of Industrial Relations. Contact the Office of the Director – Research Unit at (415) 703-4774 for the new rates after ten days after the expiration date if no subsequent determination is issued.
LOCALITY: All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura counties.

Classification (Journeyperson)	Basic Hourly Rate	Employer Payments: Health and Welfare	Pension	Vacation/ and Holiday	Training	Straight-Time: Hours	Total Hourly Rate	Overtime Hourly Rate: Daily 1 1/2X	Saturday/ [h] Sunday 1 1/2X	Holiday 2X
Terrazzo Installer	$34.70	4.70	3.41	3.30[f]	0.30	8	46.41	63.76	63.76	81.11
Terrazzo Finisher	28.20	4.70	3.41	3.30[f]	0.30	8	39.91	54.01	54.01	68.11

# Indicates an apprenticeable craft. The current apprentice wage rates are available on the Internet @ http://www.dir.ca.gov/OPRL/PWAppWage/PWAppWageStart.asp. To obtain any apprentice wage rates as of July 1, 2008 and prior to September 1, 2012, please contact the Division of Apprenticeship Standards or refer to the Division of Apprenticeship Standards' website at http://www.dir.ca.gov/das/das.html.

a **AREA 1** - Imperial, Los Angeles, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara and Ventura counties.
AREA 2 - Inyo, Kern, and Mono counties. For Bridge Carpenter, Scaffold Builder, Pile Driverman, Derrick Bargeman, Rockslinger, Bridge or Dock Carpenter, Cable Splicer, Millwright, Head Rockslinger, Rock Bargeman or Scowman, Diver, Wet (Up to 50 Ft. Depth), Diver (Stand-By), Diver's Tender, and Assistant Tender (Diver's) rates, please see **Area 1** as this rate applies to **Area 2** as well. Basic Hourly Rates for **Area 2** include an additional amount deducted for vacation/holiday.
b First eight (8) hours worked paid at 1 1/2 times the straight time rate, all hours after that paid at double (2x) the straight time rate. Saturdays in the same work week may be worked at straight-time rates if a job is shut down during the normal work week due to inclement weather, major mechanical breakdown or lack of materials beyond the control of the Employer.
c When performing welding work requiring certification, classification will receive an additional $1.00 per hour.
d Shall receive a minimum of 8 hours pay for any day or part thereof.
e For specific rates over 50 ft depth, contact the Office of the Director – Research Unit. Rates for Technicians, Manifold Operators, Pressurized Submersible Operators, Remote Control Vehicle Operators, and Remote Operated Vehicle Operators, as well as rates for Pressurized Bell Diving and Saturation Diving are available upon request.
f Includes an amount for supplemental dues.
g All overtime worked Mon - Fri shall be paid at 1 1/2 times the straight time rate for the first four (4) hours and double (2x) the straight time for work performed after twelve (12) hours.
h. Saturdays in the same work week may be worked at straight-time rates if a job is shut down during the normal work week due to inclement weather, major mechanical breakdown or lack of materials beyond the control of the Employer. Work on Sunday, if it is the 7th consecutive workday, shall be paid at double (2x) the straight-time rate.

RECOGNIZED HOLIDAYS: Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/PWD. Holiday provisions for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

TRAVEL AND/OR SUBSISTENCE PAYMENT: In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the travel and/or subsistence provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/PWD. Travel and/or subsistence requirements for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

STATE OF CALIFORNIA Arnold Schwarzenegger, *Governor*

DEPARTMENT OF INDUSTRIAL RELATIONS
Office of the Director – Research Unit
455 Golden Gate Avenue, 9th Floor
San Francisco, CA 94102

MAILING ADDRESS:
P. O. Box 420603
San Francisco, CA 94142-0603

PREDETERMINED INCREASE FOR

CARPENTER AND RELATED TRADES
(SC-23-31-2-2012-1)

IN ALL LOCALITIES WITHIN IMPERIAL, INYO, KERN, LOS ANGELES, MONO, ORANGE, RIVERSIDE, SAN BERNARDINO, SAN LUIS OBISPO, SANTA BARBARA, AND VENTURA COUNTIES

This predetermined increase for the above named craft applies only to the current determination for work being performed on public works projects with bid advertisement dates on or after **September 1, 2012**, until this determination is superseded by a new determination or a predetermined increase modification notice becomes effective.

When referencing our prevailing wage determinations, please note that if the prevailing wage rate determination which was in effect on the bid advertisement date of a project has a single asterisk (*) after the expiration date, the rate will be good for the life of the project. However, if a prevailing wage rate determination has double asterisks (**) after the expiration date, the rate must be updated on the following date to reflect the predetermined rate change(s).

CARPENTER: All classifications:
Determination SC-23-31-2-2012-1 is currently in effect and expires on June 30, 2013**.

Effective on July 1, 2013, there will be an increase of $1.50 to be allocated to wages and/or fringe benefits.

Effective on July 1, 2014, there will be an increase of $1.75 to be allocated to wages and/or fringe benefits.

Effective on July 1, 2015, there will be an increase of $2.00 to be allocated to wages and/or fringe benefits.

There will be no further increases applicable to this determination.

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1

FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

CRAFT: #DRYWALL INSTALLER/LATHER (CARPENTER)

DETERMINATION: SC-31-X-41-2012-1
ISSUE DATE: August 22, 2012
EXPIRATION DATE OF DETERMINATION: June 30, 2013** The rate to be paid for work performed after this date has been determined. If work will extend past this date, the new rate must be paid and should be incorporated in contracts entered into now. Contact the Office of the Director – Research Unit for specific rates at (415) 703-4774.
LOCALITY: All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara and Ventura counties.

		Employer Payments					Straight-Time		Overtime Hourly Rates		
Classification (Journeyperson)	Basic Hourly Rate	Health and Welfare	Pension	Vacation/ Holiday[a]	Training	Other	Hours	Total Hourly Rate	Daily 1 1/2X[b]	Saturday 1 1/2X[b]	Sunday and Holiday 2X
Drywall Installer/ Lather	$37.35	$5.45	$3.66	$3.30	$0.42	$0.52	8	$50.70	$69.375	$69.375	$88.05

DETERMINATION: SC-31-X-41-2012-1A
ISSUE DATE: August 22, 2012
EXPIRATION DATE OF DETERMINATION: June 30, 2016* Effective until superseded by a new determination issued by the Director of Industrial Relations. Contact the Division of Labor Statistics and Research (415) 703-4774 for the new rates after 10 days from the expiration date, if no subsequent determination is issued.

Stocker, Scrapper	$10.00	$5.45	-	$2.30	$0.42	-	8	$18.17	$23.17	$23.17	$28.17

# Indicates an apprenticeable craft. The current apprentice wage rates are available on the Internet @ http://www.dir.ca.gov/OPRL/PWAppWage/PWAppWageStart.asp. To obtain any apprentice wage rates as of July 1, 2008 and prior to September 1, 2012, please contact the Division of Apprenticeship Standards or refer to the Division of Apprenticeship Standards' website at http://www.dir.ca.gov/das/das.html..

[a] Includes an amount per hour worked for supplemental dues.

[b] Rate applies to the first 4 daily overtime hours and to the first 8 hours on Saturday. All other overtime will be paid the Sunday and Holiday double time rate. Saturdays in the same workweek may be worked at straight-time if job is shut down during the normal work week due to inclement weather.

RECOGNIZED HOLIDAYS: Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/PWD. Holiday provisions for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

TRAVEL AND/OR SUBSISTENCE PAYMENT: In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the travel and/or subsistence provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/PWD. Travel and/or subsistence requirements for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

STATE OF CALIFORNIA EDMUND G. BROWN JR., *Governor*

DEPARTMENT OF INDUSTRIAL RELATIONS
Office of the Director - Research Unit
455 Golden Gate Avenue, 9th Floor
San Francisco, CA 94102

MAILING ADDRESS:
P. O. Box 420603
San Francisco, CA 94142-0603

PREDETERMINED INCREASE FOR

DRYWALL INSTALLER/LATHER (CARPENTER) (SC-31-X-41-2012-1)

ALL LOCALITIES WITHIN IMPERIAL, INYO, KERN, LOS ANGELES, MONO, ORANGE, RIVERSIDE, SAN BERNARDINO, SAN LUIS OBISPO, SANTA BARBARA, AND VENTURA COUNTIES

This predetermined increase for the above named craft applies only to the current determination for work being performed on public works projects with bid advertisement dates on or after September 1, 2012, until this determination is superseded by a new determination or a predetermined increase modification notice becomes effective.

When referencing our prevailing wage determinations, please note that if the prevailing wage rate determination, which was in effect on the bid advertisement date of a project, has a single asterisk (*) after the expiration date, the rate will be good for the life of the project. However, if a prevailing wage rate determination has double asterisks (**) after the expiration date, the rate must be updated on the following date to reflect the predetermined rate change(s).

DRYWALL INSTALLER/LATHER (CARPENTER)
Determination SC-31-X-41-2012-1 is currently in effect and expires on June 30, 2013**.

Effective July 1, 2013, there will be a $1.50 increase to be allocated to wages/and or fringes.

Effective July 1, 2014, there will be a $1.75 increase to be allocated to wages/and or fringes.

Effective July 1, 2015, there will be a $2.00 increase to be allocated to wages/and or fringes.

There will be no further increases for this determination.

Issued 8/22/2012, Effective 9/1/2012 until superseded.

This page will be updated when wage rate breakdown becomes available
Last Updated: September 1, 2012

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1

FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

CRAFT: FENCE BUILDER (CARPENTER)

DETERMINATION: SC-23-31-20-2012-1
ISSUE DATE: February 22, 2012
EXPIRATION DATE OF DETERMINATION: June 30, 2012* Effective until superseded by a new determination issued by the Department of Industrial Relations. Contact the Division of Labor Statistics & Research at (415) 703-4774 for new rates after 10 days from the expiration date, if no subsequent determination is issued.

LOCALITY: All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, and Ventura counties.

		Employer Payments					Straight-Time		Overtime Hourly Rate		
Classification (Journeyperson)	Basic Hourly Rate	Health and Welfare	Pension	Vacation and Holiday	Training	Other	Hours	Total Hourly Rate	Daily 1 1/2X[a]	Saturday[b] 1 1/2X	Sunday and Holiday
Fence Builder	$32.33	$4.70	$3.41	$3.30	$0.42	$0.21	8	$44.37	$60.535	$60.535	$76.70

[a]Rate applies to the first 4 overtime hours. All other time is paid at the Sunday and Holiday overtime hourly rate.
[b]Saturdays in the same work week may be worked for which the employee shall receive eight (8) hours' pay at the straight-time rate of pay if the job is shut down during the normal work week due to inclement weather, or reasons beyond the control of the employer.

RECOGNIZED HOLIDAYS: Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/DLSR/PWD. Holiday provisions for current or superseded determinations may be obtained by contacting the Prevailing Wage Unit at (415) 703-4774.

TRAVEL AND/OR SUBSISTENCE PAYMENT: In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the travel and/or subsistence provisions for the current determinations on the Internet at http://www.dir.ca.gov/DLSR/PWD. Travel and/or subsistence requirements for each craft, classification or type of worker may be obtained from the Prevailing Wage Unit at (415) 703-4774.

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1

FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

CRAFT: FIRE SAFETY AND MISCELLANEOUS SEALING

DETERMINATION: SC-3-5-4-2012-2
ISSUE DATE: August 22, 2012
EXPIRATION DATE OF DETERMINATION: June 30, 2013** The rate to be paid for work performed after this date has been determined. If work will extend past this date, the new rate must be paid and should be incorporated in contracts entered into now. Contact the Office of the Director – Research Unit for specific rates at (415) 703-4774.

LOCALITY: All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, and Ventura counties.

CLASSIFICATION (JOURNEYPERSON)	Basic Hourly Rate[d]	Employer Payments: Health and Welfare[b]	Pension	Vacation/ Holiday	Other Payment	Straight-Time Hours	Total Hourly Rate	Overtime Hourly Rate: Daily and Saturday 1 1/2X	Sunday and Holiday 2X	Sunday and Holiday 3X[e]
ASBESTOS WORKER										
Fire Safety Technician - Class I [c] (0-2000 hrs)	$16.06	$6.67	-	$0.90	$0.05	8	$23.68	$31.71[a]	$39.74	$55.80
Fire Safety Technician - Class II [c] (2001-4000 hrs)	$20.31	$6.67	-	$1.26	$0.05	8	$28.29	$38.45[a]	$48.60	$68.91
Fire Safety Technician - Class III[c] (4001-6000 hrs)	$19.97	$6.67	$7.86	$1.33	$0.05	8	$35.88	$45.87[a]	$55.85	$75.82
Fire Safety Technician - Class IV[c] (6001 or more hrs)	$23.24	$6.67	$7.86	$1.53	$0.05	8	$39.35	$50.97[a]	$62.59	$85.83

DETERMINATION: SC-204-X-18-2012-1
ISSUE DATE: August 22, 2012
EXPIRATION DATE OF DETERMINATION: June 30, 2013** The rate to be paid for work performed after this date has been determined. If work will extend past this date, the new rate must be paid and should be incorporated in contracts entered into now. Contact the Office of the Director – Research Unit for specific rates at (415) 703-4774.

LOCALITY: All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, and Ventura counties.

PLUMBER										
Fire Safety Technician - Class I [c] (0 -2000 hrs)	$16.03	$7.16	-	-	$0.50	8	$23.69	$31.71[f]	$39.72	$55.75
Fire Safety Technician - Class II [c] (2001-4000 hrs)	$19.63	$7.16	-	$1.00	$0.50	8	$28.29	$38.11[f]	$47.92	$67.55
Fire Safety Technician - Class III[c] (4001-6000 hrs)	$21.66	$7.16	$4.64	$1.50	$0.50	8	$35.46	$46.29[f]	$57.12	$78.78
Fire Safety Technician - Class IV[c] (6001 or more hrs)	$24.13	$7.16	$4.64	$2.50	$0.50	8	$38.93	$51.00[f]	$63.06	$87.19

[a] Rate applies to the first 4 daily overtime hours and the first 12 hours worked on Saturday. All other overtime is at the Sunday & Holiday rate.
[b] Includes an amount for Occupational Health and Research (Applies to Asbestos Worker classifications only).
[c] The 1st man on a job site shall be a Class IV Fire Safety Technician. A Class IV must be on a job site at all times.
[d] Includes an amount per hour worked for Administrative Dues.
[e] No work shall be performed on Labor Day, except in special cases of extreme emergency and then only when triple (3) times is paid.
[f] Rate applies to the first 2 daily overtime hours and the first 10 hours worked on Saturday. All other overtime is at the Sunday & Holiday rate.

RECOGNIZED HOLIDAYS: Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/PWD. Holiday provisions for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

TRAVEL AND/OR SUBSISTENCE PAYMENT: In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the travel and/or subsistence provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/PWD. Travel and/or subsistence requirements for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1

FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

CRAFT: FIRE SAFETY AND MISCELLANEOUS SEALING (SHIFT)

INTERIM DETERMINATION: SC-3-5-4-2012-2
ISSUE DATE: August 22, 2012
EXPIRATION DATE OF DETERMINATION: June 30, 2013** The rate to be paid for work performed after this date has been determined. If work will extend past this date, the new rate must be paid and should be incorporated in contracts entered into now. Contact the Office of the Director – Research Unit for specific rates at (415) 703-4774.

LOCALITY: All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, and Ventura counties.

CLASSIFICATION (JOURNEYPERSON)	Basic Hourly Rate[d]	Employer Payments: Health and Welfare[b]	Pension	Vacation/ Holiday	Other	Straight-Time: Hours	Total Hourly Rate	Overtime Hourly Rate: Daily and Saturday 1 1/2X	Sunday and Holiday 2X	3X[e]
ASBESTOS WORKER										
Fire Safety Technician - Class I [c] (0-2000 hrs)	$16.86	$6.67	-	$0.90	$0.05	8	$24.48	$32.91[a]	$41.34	$58.20
Fire Safety Technician - Class II [c] (2001-4000 hrs)	$21.33	$6.67	-	$1.26	$0.05	8	$29.31	$39.98[a]	$50.64	$71.97
Fire Safety Technician - Class III[c] (4001-6000 hrs)	$20.97	$6.67	$7.86	$1.33	$0.05	8	$36.88	$47.37[a]	$57.85	$78.82
Fire Safety Technician - Class IV[c] (6001 or more hrs)	$24.40	$6.67	$7.86	$1.53	$0.05	8	$40.51	$52.71[a]	$64.91	$89.31

DETERMINATION: SC-204-X-18-2012-1
ISSUE DATE: August 22, 2012
EXPIRATION DATE OF DETERMINATION: June 30, 2013** The rate to be paid for work performed after this date has been determined. If work will extend past this date, the new rate must be paid and should be incorporated in contracts entered into now. Contact the Office of the Director – Research Unit for specific rates at (415) 703-4774.

LOCALITY: All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, and Ventura counties.

PLUMBER										
Fire Safety Technician - Class I [c] (0 -2000 hrs)	$16.83	$7.16	-	-	$0.50	8	$24.49	$32.91[f]	$41.32	$58.15
Fire Safety Technician - Class II [c] (2001-4000 hrs)	$20.61	$7.16	-	$1.00	$0.50	8	$29.27	$39.58[f]	$49.88	$70.49
Fire Safety Technician - Class III[c] (4001-6000 hrs)	$22.74	$7.16	$4.64	$1.50	$0.50	8	$36.54	$47.91[f]	$59.28	$82.02
Fire Safety Technician - Class IV[c] (6001 or more hrs)	$25.34	$7.16	$4.64	$2.50	$0.50	8	$40.14	$52.81[f]	$65.48	$90.82

[a] Rate applies to the first 4 daily overtime hours and the first 12 hours worked on Saturday. All other overtime is at the Sunday & Holiday rate.
[b] Includes an amount for Occupational Health and Research (Applies to Asbestos Worker classifications only).
[c] The 1st man on a job site shall be a Class IV Fire Safety Technician. A Class IV must be on a job site at all times.
[d] Includes an amount per hour worked for Administrative Dues.
[e] No work shall be performed on Labor Day, except in special cases of extreme emergency and then only when triple (3) times is paid.
[f] Rate applies to the first 2 daily overtime hours and the first 10 hours worked on Saturday. All other overtime is at the Sunday & Holiday rate.

RECOGNIZED HOLIDAYS: Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/PWD. Holiday provisions for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

TRAVEL AND/OR SUBSISTENCE PAYMENT: In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the travel and/or subsistence provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/PWD. Travel and/or subsistence requirements for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

STATE OF CALIFORNIA
DEPARTMENT OF INDUSTRIAL RELATIONS
Office of the Director – Research Unit
455 Golden Gate Avenue, 9th Floor
San Francisco, CA 94102

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San Francisco CA 94142-0603

PREDETERMINED INCREASE FOR

FIRE SAFETY AND MISCELLANEOUS SEALING

ASBESTOS WORKER
(Determination: SC-3-5-4-2012-2)

PLUMBER
(Determination: SC-204-X-18-2012-1)

IN ALL LOCALITIES WITHIN IMPERIAL, INYO, KERN, LOS ANGELES, MONO, ORANGE, RIVERSIDE, SAN BERNARDINO, SAN DIEGO, SAN LUIS OBISPO, SANTA BARBARA, AND VENTURA COUNTIES

This predetermined increase for the above named craft applies only for work being performed on public works projects with bid advertisement dates on or after **September 1, 2012**, until this determination is superseded by a new determination or a predetermined increase modification notice becomes effective.

When referencing our prevailing wage determinations, please note that if the prevailing wage rate determination that was in effect on the bid advertisement date of a project has a single asterisk (*) after the expiration date, the rate will be good for the life of the project. However, if a prevailing wage rate determination has double asterisks (**) after the expiration date, the rate must be updated on the following date to reflect the predetermined rate change(s).

ASBESTOS WORKER (All Shifts):
Determination SC-3-5-4-2012-2 is currently in effect and expires on June 30, 2013**.

Effective July 1, 2013, there will be the following increases:

Class I -the increase of $0.75 is allocated to wages and/or fringes.
Class II -the increase of $0.90 is allocated to wages and/or fringes.
Class III -the increase of $1.14 is allocated to wages and/or fringes.
Class IV -the increase of $1.25 is allocated to wages and/or fringes.

PLUMBER (All Shifts):
Determination SC-204-X-18-2012-1 is currently in effect and expires on June 30, 2013**.

Effective July 1, 2013, there will be the following increases:

Class I -the increase of $0.75 is allocated to wages and/or fringes.
Class II -the increase of $0.90 is allocated to wages and/or fringes.
Class III -the increase of $1.14 is allocated to wages and/or fringes.
Class IV -the increase of $1.25 is allocated to wages and/or fringes.

There were no further increases applicable to this determination.

Issued 8/22/2012, Effective 9/1/2012.

This page will be updated when wage rate breakdown information becomes available.
Last Updated: September 1, 2012

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1

FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

CRAFT: #LABORER AND RELATED CLASSIFICATIONS

DETERMINATION: SC-23-102-2-2012-1
ISSUE DATE: August 22, 2012
EXPIRATION DATE OF DETERMINATION: June 30, 2013** The rate to be paid for work performed after this date has been determined. If work will extend past this date, the new rate must be paid and should be incorporated in contracts entered into now. Contact the Office of the Director – Research Unit for specific rates at (415) 703-4774.

LOCALITY: All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura counties.

		Employer Payments					Straight-Time		Overtime Hourly Rates		
Classification [a] (Journeyperson)	Basic Hourly Rate	Health and Welfare	Pension	Vacation/ and Holiday[d]	Training	Other Payment	Hours	Total Hourly Rate	Daily[b] 1 1/2X	Saturday[bc] 1 1/2X	Sunday and Holiday
CLASSIFICATION GROUPS											
Group 1	$28.09	6.81	6.00	3.90	0.64	0.49	8	45.93	59.975	59.975	74.02
Group 2	28.64	6.81	6.00	3.90	0.64	0.49	8	46.48	60.80	60.80	75.12
Group 3	29.19	6.81	6.00	3.90	0.64	0.49	8	47.03	61.625	61.625	76.22
Group 4	30.74	6.81	6.00	3.90	0.64	0.49	8	48.58	63.95	63.95	79.32
Group 5	31.09	6.81	6.00	3.90	0.64	0.49	8	48.93	64.475	64.475	80.02

# Indicates an apprenticeable craft. The current apprentice wage rates are available on the Internet @ http://www.dir.ca.gov/OPRL/PWAppWage/PWAppWageStart.asp. To obtain any apprentice wage rates as of July 1, 2008 and prior to September 1, 2012, please contact the Division of Apprenticeship Standards or refer to the Division of Apprenticeship Standards' website at http://www.dir.ca.gov/das/das.html.

[a] For classification within each group, see page 14.

[b] Any hours worked over 12 hours in a single workday are double (2) time.

[c] Saturdays in the same work week may be worked at straight-time if job is shut down during work week due to inclement weather or similar Act of God, or a situation beyond the employers control.

[d] Includes an amount per hour worked for supplemental dues

RECOGNIZED HOLIDAYS: Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/PWD. Holiday provisions for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

TRAVEL AND/OR SUBSISTENCE PAYMENT: In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the travel and/or subsistence provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/PWD. Travel and/or subsistence requirements for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

CLASSIFICATION GROUPS

GROUP 1

Boring Machine Helper (Outside)
Certified Confined Space Laborer
Cleaning and Handling of Panel Forms
Concrete Screeding for Rough Strike-Off
Concrete, Water Curing
Demolition Laborer, the cleaning of brick if performed by an employee performing any other phase of demolition work, and the cleaning of lumber
Fiberoptic Installation, Blowing, Splicing, and Testing Technician on public right-of- way only
Fire Watcher, Limbers, Brush Loaders, Pilers and Debris Handlers
Flagman
Gas, Oil and/or Water Pipeline Laborer
Laborer, Asphalt-Rubber Material Loader
Laborer, General or Construction
Laborer, General Cleanup
Laborer, Jetting
Laborer, Temporary Water and Air Lines
Plugging, Filling of Shee-Bolt Holes; Dry Packing of Concrete and Patching
Post Hole Digger (Manual)
Railroad Maintenance, Repair Trackman and Road Beds; Streetcar and Railroad Construction Track Laborers
Rigging and Signaling
Scaler
Slip Form Raisers
Tarman and Mortar Man
Tool Crib or Tool House Laborer
Traffic Control by any method
Water Well Driller Helper
Window Cleaner
Wire Mesh Pulling - All Concrete Pouring Operations

GROUP 2

Asphalt Shoveler
Cement Dumper (on 1 yard or larger mixer and handling bulk cement)
Cesspool Digger and Installer
Chucktender
Chute Man, pouring concrete, the handling of the chute from readymix trucks, such as walls, slabs, decks, floors, foundations, footings, curbs, gutters and sidewalks
Concrete Curer-Impervious Membrane and Form Oiler
Cutting Torch Operator (Demolition)
Fine Grader, Highways and Street Paving, Airport, Runways, and similar type heavy construction
Gas, Oil and/or Water Pipeline Wrapper-Pot Tender and Form Man
Guinea Chaser
Headerboard Man-Asphalt
Installation of all Asphalt Overlay Fabric and Materials used for Reinforcing Asphalt
Laborer, Packing Rod Steel and Pans
Membrane Vapor Barrier Installer
Power Broom Sweepers (small)
Riprap, Stonepaver, placing stone or wet sacked concrete
Roto Scraper and Tiller
Sandblaster (Pot Tender)
Septic Tank Digger and Installer (leadman)

GROUP 2 (continued)

Tank Scaler and Cleaner
Tree Climber, Faller, Chain Saw Operator, Pittsburgh Chipper and similar type Brush Shredders
Underground Laborer, including Caisson Bellower

GROUP 3

Asphalt Installation of all fabrics
Buggymobile Man
Compactor (all types including Tampers, Barko, Wacker)
Concrete Cutting Torch
Concrete Pile Cutter
Driller, Jackhammer, 2 1/2 ft. drill steel or longer
Dri Pak-it Machine
Gas, Oil and/or Water Pipeline Wrapper - 6-inch pipe and over by any method, inside and out
High Scaler (including drilling of same)
Impact Wrench, Multi-Plate
Kettlemen, Potmen and Men applying asphalt, lay-kold, creosote, lime caustic and similar type materials
Laborer, Fence Erector
Material Hoseman (Walls, Slabs, Floors and Decks)
Operators of Pneumatic, Gas, Electric Tools, Vibrating Machines, Pavement Breakers, Air Blasting, Come-Alongs, and similar mechanical tools not separately classified herein; operation of remote controlled robotic tools in connection with Laborers work
Pipelayer's backup man, coating, grouting, making of joints, sealing, caulking, diapering and including rubber gasket joints, pointing and any and all other services
Power Post Hole Digger
Rock Slinger
Rotary Scarifier or Multiple Head Concrete Chipping Scarifier
Steel Headerboard Man and Guideline Setter
Trenching Machine, Hand Propelled

GROUP 4

Any Worker Exposed to Raw Sewage
Asphalt Raker, Luteman, Ironer, Asphalt Dumpman, and Asphalt Spreader Boxes (all types)
Concrete Core Cutter (walls, floors or ceilings), Grinder or Sander
Concrete Saw Man, Cutting Walls or Flat Work, Scoring old or new concrete
Cribber, Shorer, Lagging, Sheeting and Trench Bracing, Hand-Guided Lagging Hammer
Head Rock Slinger
Laborer, Asphalt-Rubber Distributor Bootman
Laser Beam in connection with Laborer's work
Oversize Concrete Vibrator Operator, 70 pounds and over
Pipelayer
Prefabricated Manhole Installer
Sandblaster (Nozzleman), Water Blasting, Porta Shot-Blast
Traffic Lane Closure, certified

GROUP 5

Blasters Powderman
Driller
Toxic Waste Removal
Welding, certified or otherwise in connection with Laborers' work

STATE OF CALIFORNIA
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PREDETERMINED INCREASES FOR

LABORER AND RELATED CLASSIFICATIONS (SC-23-102-2-2012-1)

ALL LOCALITIES WITHIN IMPERIAL, INYO, KERN, LOS ANGELES, MONO, ORANGE, RIVERSIDE, SAN BERNARDINO, SAN LUIS OBISPO, SANTA BARBARA, AND VENTURA COUNTIES

These predetermined increases for the above named craft applies only to the current determination for work being performed on public works projects with bid advertisement dates on or after **September 1, 2012**, until this determination is superseded by a new determination or a predetermined increase modification notice becomes effective.

When referencing our prevailing wage determinations, please note that if the prevailing wage rate determination which was in effect on the bid advertisement date of a project has a single asterisk (*) after the expiration date, the rate will be good for the life of the project. However, if a prevailing wage rate determination has double asterisks (**) after the expiration date, the rate must be updated on the following date to reflect the predetermined rate change(s).

LABORER

Determination SC-23-102-2-2012-1 is currently in effect and expires on June 30, 2013**.

Effective July 1, 2013, there will be an increase of $1.50 to be allocated to wages and/or employer payments.

Effective July 1, 2014, there will be an increase of $1.75: $0.25 to pension and $1.50 to be allocated to wages and/or employer payments.

There will be no further increases applicable to this determination.

Issued 8/22/2012, Effective 9/1/2012.

This page will be updated when wage rate breakdown information becomes available.
Last Updated: September 1, 2012

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1

FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

CRAFT: #OPERATING ENGINEER

DETERMINATION: SC-23-63-2-2012-1
ISSUE DATE: August 22, 2012
EXPIRATION DATE OF DETERMINATION: June 30, 2013* Effective until superseded by a new determination issued by the Director of Industrial Relations. Contact the Office of the Director – Research Unit at (415) 703-4774 for the new rates after ten days after the expiration date if no subsequent determination is issued.

LOCALITY: All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura counties.

		Employer Payments					Straight – Time		Overtime Hourly Rate		
CLASSIFICATION (Journeyperson)	Basic Hourly Rate	Health and Welfare	Pension	Vacation/ Holiday (a)	Training	Other Payments	Hours	Total Hourly Rate	Daily (c)	Saturday (d)	Sunday/ Holiday
									1 1/2X	1 1/2X	2X
Classification Groups (b)											
Group 1	$37.40	$11.20	$6.35	$2.85	$0.80	$0.29	8	$58.89	$77.590	$77.590	$96.29
Group 2	$38.18	$11.20	$6.35	$2.85	$0.80	$0.29	8	$59.67	$78.760	$78.760	$97.85
Group 3	$38.47	$11.20	$6.35	$2.85	$0.80	$0.29	8	$59.96	$79.195	$79.195	$98.43
Group 4	$39.96	$11.20	$6.35	$2.85	$0.80	$0.29	8	$61.45	$81.430	$81.430	$101.41
Group 6	$40.18	$11.20	$6.35	$2.85	$0.80	$0.29	8	$61.67	$81.760	$81.760	$101.85
Group 8	$40.29	$11.20	$6.35	$2.85	$0.80	$0.29	8	$61.78	$81.925	$81.925	$102.07
Group 10	$40.41	$11.20	$6.35	$2.85	$0.80	$0.29	8	$61.90	$82.105	$82.105	$102.31
Group 12	$40.58	$11.20	$6.35	$2.85	$0.80	$0.29	8	$62.07	$82.360	$82.360	$102.65
Group 13	$40.68	$11.20	$6.35	$2.85	$0.80	$0.29	8	$62.17	$82.510	$82.510	$102.85
Group 14	$40.71	$11.20	$6.35	$2.85	$0.80	$0.29	8	$62.20	$82.555	$82.555	$102.91
Group 15	$40.79	$11.20	$6.35	$2.85	$0.80	$0.29	8	$62.28	$82.675	$82.675	$103.07
Group 16	$40.91	$11.20	$6.35	$2.85	$0.80	$0.29	8	$62.40	$82.855	$82.855	$103.31
Group 17	$41.08	$11.20	$6.35	$2.85	$0.80	$0.29	8	$62.57	$83.110	$83.110	$103.65
Group 18	$41.18	$11.20	$6.35	$2.85	$0.80	$0.29	8	$62.67	$83.260	$83.260	$103.85
Group 19	$41.29	$11.20	$6.35	$2.85	$0.80	$0.29	8	$62.78	$83.425	$83.425	$104.07
Group 20	$41.41	$11.20	$6.35	$2.85	$0.80	$0.29	8	$62.90	$83.605	$83.605	$104.31
Group 21	$41.58	$11.20	$6.35	$2.85	$0.80	$0.29	8	$63.07	$83.860	$83.860	$104.65
Group 22	$41.68	$11.20	$6.35	$2.85	$0.80	$0.29	8	$63.17	$84.010	$84.010	$104.85
Group 23	$41.79	$11.20	$6.35	$2.85	$0.80	$0.29	8	$63.28	$84.175	$84.175	$105.07
Group 24	$41.91	$11.20	$6.35	$2.85	$0.80	$0.29	8	$63.40	$84.355	$84.355	$105.31
Group 25	$42.08	$11.20	$6.35	$2.85	$0.80	$0.29	8	$63.57	$84.610	$84.610	$105.65

# Indicates an apprenticeable craft. The current apprentice wage rates are available on the Internet @ http://www.dir.ca.gov/OPRL/PWAppWage/PWAppWageStart.asp. To obtain any apprentice wage rates as of July 1, 2008 and prior to September 1, 2012, please contact the Division of Apprenticeship Standards or refer to the Division of Apprenticeship Standards' website at http://www.dir.ca.gov/das/das.html.

[a] Includes an amount withheld for supplemental dues.

[b] For classifications within each group, see pages 8 and 9.

[c] Rate applies to the first 4 overtime hours. All other daily overtime is paid at the Sunday rate.

[d] Rate applies to the first 12 hours worked. All other time is paid at the Sunday rate.

NOTE: For Special Shift and Multi-Shift, see pages 9A and 9B.

RECOGNIZED HOLIDAYS: Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/PWD. Holiday provisions for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

TRAVEL AND/OR SUBSISTENCE PAYMENT: In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the travel and/or subsistence provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/PWD. Travel and/or subsistence requirements for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

DETERMINATION: SC-23-63-2-2012-1

CLASSIFICATIONS:

GROUP 1

Bargeman
Brakeman
Compressor Operator
Ditchwitch, with seat or similar type equipment
Elevator Operator - Inside
Engineer Oiler
Forklift Operator (includes loed, lull or similar types – under 5 tons)
Generator Operator
Generator, Pump or Compressor Plant Operator
Heavy Duty Repairman Helper
Pump Operator
Signalman
Switchman

GROUP 2

Asphalt-Rubber Plant Operator (Nurse Tank Operator)
Concrete Mixer Operator - Skip Type
Conveyor Operator
Fireman
Forklift Operator (includes loed, lull or similar types – over 5 tons)
Hydrostatic Pump Operator
Oiler Crusher (Asphalt or Concrete Plant)
Petromat Laydown Machine
RJU Side Dump Jack
Rotary Drill Helper (Oilfield)
Screening and Conveyor Machine Operator (or similar types)
Skiploader (Wheel type up to 3/4 yd. without attachment)
Tar Pot Fireman
Temporary Heating Plant Operator
Trenching Machine Oiler

GROUP 3

Asphalt Rubber Blend Operator
Bobcat or similar type (Skid Steer)
Equipment Greaser (rack)
Ford Ferguson (with dragtype attachments)
Helicopter Radioman (ground)
Stationary Pipe Wrapping and Cleaning Machine Operator

GROUP 4

Asphalt Plant Fireman
Backhoe Operator (mini-max or similar type)
Boring Machine Operator
Boring System Electronic Tracking Locator
Boxman or Mixerman (asphalt or concrete)
Chip Spreading Machine Operator
Concrete Cleaning Decontamination Machine Operator
Concrete Pump Operator (small portable)
Drilling Machine Operator, Small Auger types (Texoma Super Economatic, or similar types - Hughes 100 or 200, or similar types - drilling depth of 30 maximum)
Equipment Greaser (grease truck)
Excavator Track/Rubber-Tired (Operating weight under 21,000 lbs)
Guard Rail Post Driver Operator
Highline Cableway Signalman
Hydra-Hammer-Aero Stomper
Micro Tunneling Operator (above ground tunnel)
Power Concrete Curing Machine Operator
Power Concrete Saw Operator
Power - Driver Jumbo Form Setter Operator
Power Sweeper Operator
Rock Wheel Saw/Trencher
Roller Operator (compacting)
Screed Operator (asphalt or concrete)
Trenching Machine Operator (up to 6ft.)
Vacuum or Muck Truck

GROUP 5 (for multi-shift rate, see page 9B)

Equipment Greaser (Grease Truck/Multi-Shift)

GROUP 6

Articulating Material Hauler
Asphalt Plant Engineer
Batch Plant Operator
Bit Sharpener
Concrete Joint Machine Operator (canal and similar type)
Concrete Planer Operator
Dandy Digger
Deck Engine Operator
Deck Engineer
Derrickman (oilfield type)

Drilling Machine Operator, Bucket or Auger types (Calweld 100 bucket or similar types - Watson 1000 auger or similar types - Texoma 330, 500 or 600 auger or similar types - drilling depth of 45' maximum)
Drilling Machine Operator (including water wells)
Hydrographic Seeder Machine Operator (straw, pulp or seed)
Jackson Track Maintainer, or similar type
Kalamazoo Switch Tamper, or similar type
Machine Tool Operator
Maginnis Internal Full Slab Vibrator
Mechanical Berm, Curb or Gutter (concrete or asphalt)
Mechanical Finisher Operator (concrete, Clary-Johnson-Bidwell or similar)
Micro Tunnel System Operator (below ground)
Pavement Breaker Operator
Road Oil Mixing Machine Operator
Roller Operator (asphalt or finish)
Rubber-Tired Earthmoving Equipment (single engine, up to and including 25 yds. struck)
Self-Propelled Tar Pipelining Machine Operator
Skiploader Operator (crawler and wheel type, over 3/4 yds. and up to and including 1 1/2 yds.
Slip Form Pump Operator (power driven hydraulic lifting device for concrete forms)
Tractor Operator - Bulldozer, Tamper-Scraper (single engine, up to 100 H.P. flyweel and similar types, up to and including D-5 and similar types)
Tugger Hoist Operator (1 drum)
Ultra High Pressure Waterjet Cutting Tool System Operator
Vacuum Blasting Machine Operator
Volume Mixer Operator
Welder – General

GROUP 7 (for multi-shift rate, see page 9B)

Welder – General (Multi-Shift)

GROUP 8

Asphalt or Concrete Spreading Operator (tamping or finishing)
Asphalt Paving Machine Operator (barber greene or similar type)
Asphalt-Rubber Distributor Operator
Backhoe Operator (up to and including 3/4 yds.) small ford, case or similar
Backhoe Operator (over 3/4 yd. and up to 5 cu. yds. M.R.C.)
Cast in Place Pipe Laying Machine Operator
Combination Mixer and Compressor Operator (gunite work)
Compactor Operator - Self Propelled
Concrete Mixer Operator - Paving
Crushing Plant Operator
Drill Doctor
Drilling Machine Operator, Bucket or Auger types (Calweld 150 bucket or similar types - Watson 1500, 2000, 2500 auger or similar types - Texoma 700, 800 auger or similar types - drilling depth of 60' maximum)
Elevating Grader Operator
Excavator Track/Rubber-Tired (Operating Weight 21,000 lbs - 100,000 lbs)
Global Positioning System/GPS (or Technician)
Grade Checker
Gradall Operator
Grouting Machine Operator
Heavy Duty Repairman/Pump Installer
Heavy Equipment Robotics Operator
Kalamazoo Balliste Regulator or similar type
Kolman Belt Loader and similar type
Le Tourneau Blob Compactor or similar type
Loader Operator (Athey, Euclid, Sierra and similar types)
Master Environmental Maintenance Mechanic
Mobark Chipper or similiar types
Ozzie Padder or similar types
P.C. 490 Slot Saw
Pneumatic Concrete Placing Machine Operator (Hackley-Presswell or similar type)
Pumpcrete Gun Operator
Rock Drill or Similiar Types (see Miscellaneous Provision #4 for additional information regarding this classification)
Rotary Drill Operator (excluding caison type)
Rubber-Tired Earth Moving Equipment Operator (single engine, caterpillar, euclid, athey wagon, and similar types with any and all attachments over 25 yds. and up to and including 50 cu. yds. struck)
Rubber-Tired Earth Moving Equipment Operator (multiple engine - up to and including 25 yds. struck)
Rubber-Tired Scraper Operator (self-loading paddle wheel type - John Deere, 1040 and similar single unit)
Self-Propelled Curb and Gutter Machine Operator
Shuttle Buggy
Skiploader Operator (crawler and wheel type over 1 1/2 yds. up to and including 6 1/2 yds.)
Soil Remediation Plant Operator (CMI, Envirotech or Similar)
Soil Stabilizer and Reclaimer (WR-2400)
Somero SXP Laser Screed
Surface Heaters and Planer Operator
Tractor Compressor Drill Combination Operator
Tractor Operator (any type larger than D-5 - 100 flyweel H.P. and over, or similar – bulldozer, tamper, scraper and push tractor, single engine)
Tractor Operator (boom attachments)
Traveling Pipe Wrapping, Cleaning and Bending Machine Operator
Trenching Machine Operator (over 6 ft. depth capacity, manufacturer's rating)
Trenching Machine with Road Miner Attachment (over 6ft. depth capacity, manufacturer's rating - Oiler or Journeyman Trainee required)
Ultra High Pressure Waterjet Cutting Tool System Mechanic
Water Pull (compaction)

DETERMINATION: SC-23-63-2-2012-1

GROUP 9 (for multi-shift rate, see page 9B)
Heavy Duty Repairman (Multi-Shift)

GROUP 10
Backhoe Operator (over 5 cu. yds. M.R.C.)

Drilling Machine Operator, Bucket or Auger types (Calweld 200 B bucket or similar types - Watson 3000 or 5000 auger or similar types - Texoma 900 auger or similar types - drilling depth of 105' maximum)
Dual Drum Mixer
Dynamic Compactor LDC350 or similar types
Heavy Duty Repairman-Welder combination
Monorail Locomotive Operator (diesel, gas or electric)
Motor Patrol - Blade Operator (single engine)
Multiple Engine Tractor Operator (euclid and similar type - except quad 9 cat.)
Pneumatic Pipe Ramming Tool and similar types
Pre-stressed Wrapping Machine Operator (2 Operators required)
Rubber - Tired Earth Moving Equipment Operator (single engine, over 50 yds. struck)
Rubber - Tired Earth Moving Equipment Operator (multiple engine, euclid caterpillar and similar - over 25 yds. and up to 50 yds. struck)
Tower Crane Repairman
Tractor Loader Operator (crawler and wheel-type over 6 1/2 yds.)
Welder - Certified
Woods Mixer Operator (and similar pugmill equipment)

GROUP 11 (for multi-shift rate, see page 9B)
Heavy Duty Repairman – Welder Combination (Multi-Shift)
Welder – Certified (Multi-Shift)

GROUP 12
Auto Grader Operator
Automatic Slip Form Operator
Backhoe Operator (over 7 cu. yds. M.R.C.)
Drilling Machine Operator, Bucket or Auger types (Calweld, auger 200 CA or similar types - watson, auger 6000 or similar types - hughes super duty, auger 200 or similar types - drilling depth of 175' maximum)
Excavator Track/Rubber Tired (Operating Weight 100,000 lbs. - 200,000 lbs)
Hoe Ram or similar with compressor
Mass Excavator Operator - less than 750 cu. yds.
Mechanical Finishing Machine Operator
Mobile Form Traveler Operator
Motor Patrol Operator (multi-engine)
Pipe Mobile Machine Operator
Rubber-Tired Earth Moving Equipment Operator (multiple engine, euclid, caterpillar and similar type, over 50 cu. yds. struck)
Rubber-Tired Self-Loading Scraper Operator (paddle-wheel-auger type self-loading - (two (2) or more units)

GROUP 13
Rubber-Tired Earth Moving Equipment Operator, Operating Equipment with the Push-Pull System (single engine, up to and including 25 yds. struck)

GROUP 14
Canal Liner Operator
Canal Trimmer Operator
Remote Controlled Earth Moving Operator ($1.00 per hour additional to base rate)
Wheel Excavator Operator (over 750 cu. yds. per hour)

GROUP 15
Rubber-Tired Earth Moving Equipment Operator, Operating Equipment with the Push-Pull System (single engine, caterpillar, euclid, athey wagon, and similar types with any and all attachments over 25 yds. and up to and including 50 cu. yds. struck)
Rubber-Tired Earth Moving Equipment Operator, Operating Equipment with the Push-Pull System (multiple engine - up to and including 25 yds. struck)

GROUP 16
Excavator Track/Rubber Tired (Operating Weight exceeding 200,000 lbs.)
Rubber-Tired Earth Moving Equipment Operator, Operating Equipment with the Push-Pull System (single engine, over 50 yds. struck)
Rubber-Tired Earth Moving Equipment Operator, Operating Equipment with the Push-Pull System (multiple engine, euclid, caterpillar, and similar, over 25 yds. and up to 50 yds. struck)

GROUP 17
Rubber-Tired Earth Moving Equipment Operator, Operating Equipment with the Push-Pull System (multiple engine, euclid, caterpillar, and similar type, over 50 cu. yds. struck)
Tandem Tractor Operator (operating crawler type tractors in tandem - Quad 9 and similar type)

GROUP 18
Rubber-Tired Earth Moving Equipment Operator, Operating in Tandem (scrapers, belly dumps, and similar types in any combination, excluding compaction units - single engine, up to and including 25 yds. struck)

GROUP 19
Rotex Concrete Belt Operator
Rubber-Tired Earth Moving Equipment Operator, Operating in Tandem (scrapers, belly dumps, and similar types in any combination, excluding compaction units - single engine, caterpillar, euclid, athey wagon, and similar types with any and all attachments over 25 yds. and up to and including 50 cu. yds. struck)
Rubber-Tired Earth Moving Equipment Operator, Operating in Tandem (scrapers, belly dumps, and similar types in any combination, excluding compaction units - multiple engines, up to and including 25 yds. struck)

GROUP 20
Rubber-Tired Earth Moving Equipment Operator, Operating in Tandem (scrapers, belly dumps, and similar types in any combination, excluding compaction units - single engine, over 50 yds. struck)

Rubber-Tired Earth Moving Equipment Operator, Operating in Tandem (scrapers, belly dumps, and similar types in any combination, excluding compaction units - multiple engine, euclid, caterpillar and similar, over 25 yds. and up to 50 yds. struck)
Drilling Machine Operator, Bucket or Auger types (Calweld, auger 200 CA or similar types -

GROUP 21

Rubber-Tired Earth Moving Equipment Operator, Operating in Tandem (scrapers, belly dumps, and similar types in any combination, excluding compaction units - multiple engine, euclid, caterpillar and similar type, over 50 cu. yds. struck)

GROUP 22
Rubber-Tired Earth Moving Equipment Operator, Operating Equipment with the Tandem Push-Pull System (single engine, up to and including 25 yds. struck)

GROUP 23

Rubber-Tired Earth Moving Equipment Operator, Operating Equipment with the Tandem Push-Pull System (single engine, caterpillar, euclid, athey wagon, and similar types with any and all attachments over 25 yds. and up to and including 50 cu. yds. struck)
Rubber-Tired Earth Moving Equipment Operator, Operating Equipment with the Tandem Push-Pull System (multiple engine, up to and including 25 yds. struck)

GROUP 24
Rubber-Tired Earth Moving Equipment Operator, Operating Equipment with the Tandem Push-Pull System (single engine, over 50 yds. Struck)
Rubber-Tired Earth Moving Equipment Operator, Operating Equipment with the Tandem Push-Pull System (multiple engine, euclid, caterpillar and similar, over 25 yds. and up to 50 yds. struck)

GROUP 25
Concrete Pump Operator-Truck Mounted
Pedestal Concrete Pump Operator

Rubber-Tired Earth Moving Equipment Operator, Operating Equipment with the Tandem Push-Pull System (multiple engine, euclid, caterpillar and similar over 50 cu. yds struck)

MISCELLANEOUS PROVISIONS:

1. Operators on hoists with three drums shall receive fifteen cents (15¢) per hour additional pay to the regular rate of pay. The additional pay shall be added to the regular rate and become the base rate for the entire shift.
2. All heavy duty repairman and heavy duty combination shall receive fifty cents (50¢) per hour tool allowance in addition to their regular rate of pay and this shall become their base rate of pay.
3. Employees required to suit up and work in a hazardous material environment, shall receive Two Dollars ($2.00) per hour in addition to their regular rate of pay, and that rate shall become the basic hourly rate of pay.
4. A review of rock drilling is currently pending. The minimum acceptable rate of pay for this classification or type of work on public works projects is Laborer and Related Classifications/Group 5 (Driller) as published on pages 13 and 14 of the Director's General Prevailing Wage Determinations. However, the published rate for the craft/classification of Operating Engineer/Group 8 (Rock Drill or Similar Types) may be used by contractors to perform rock drilling on public works projects.

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1
FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

LOCALITY: LOS ANGELES COUNTY
DETERMINATION: LOS-2012-2

	CRAFT (JOURNEY LEVEL)	ISSUE DATE	EXPIRATION DATE	EMPLOYER PAYMENTS: BASIC HOURLY RATE	HEALTH AND WELFARE	PENSION	VACATION/ HOLIDAY	TRAINING	OTHER PAYMENTS	STRAIGHT-TIME: HOURS	TOTAL HOURLY RATE	OVERTIME HOURLY RATE: DAILY	SATURDAY	SUNDAY AND HOLIDAY
#	**BRICKLAYER, STONEMASON,**													
	MARBLE MASON, CEMENT BLOCKLAYER, POINTER, CAULKER, CLEANER	08/22/2012	04/30/2013*	A 36.710	5.700	6.750	-	0.400	0.900	B 8.0	50.460	C 68.820	C 68.820	87.170
#	**BRICKLAYER:**													
	MASON FINISHER	08/22/2012	04/30/2013*	A 25.700	5.650	6.750	-	0.400	0.900	B 8.0	39.400	C 52.250	C 52.250	65.100
#	**BRICK TENDER**	08/22/2012	06/30/2013*	27.170	6.810	6.000 D	3.900	0.650	0.420	B 8.0	44.950	58.530	58.530	72.120
#	**BRICK TENDER:**													
	FORKLIFT OPERATOR	08/22/2012	06/30/2013*	27.620	6.810	6.000 D	3.900	0.650	0.420	B 8.0	45.400	59.210	59.210	73.020
#	**CARPET, LINOLEUM,**													
	RESILIENT TILE LAYER	08/22/2012	04/29/2013**	A 30.850	4.980	2.700	2.050	0.830	0.200	8.0	41.610	57.040 E	57.040	72.460
F	MATERIAL HANDLER	08/22/2012	04/29/2013**	A 9.250	4.980	0.950	0.550	0.830	0.100	8.0	16.660	21.280 E	21.280	25.910
# G	**DRYWALL FINISHER**	02/22/2012	09/30/2012*	H 29.190	5.950	4.120	3.070	0.670	0.470	8.0	43.470	58.060 I	58.060	72.660
	DRYWALL FINISHER	02/22/2012	09/30/2012*	A 33.220	5.950	4.120	3.070	0.670	0.470	8.0	47.500	64.110 I	64.110	80.720
#	**ELECTRICIAN:**													
	COMM & SYSTEM INSTALLER	08/22/2012	11/25/2012**	27.250	7.310	J 2.970	-	0.650	K 0.210	8.0	39.210	L 53.240	L 53.240	67.270
	COMM & SYSTEM TECH.	08/22/2012	11/25/2012**	29.050	7.310	J 2.970	-	0.650	K 0.210	8.0	41.060	L 56.020	L 56.020	70.980
	SOUND ELECTRICIAN	08/22/2012	11/25/2012**	30.050	7.310	J 2.970	-	0.650	K 0.210	8.0	42.090	L 57.570	L 57.570	73.040
	INSIDE WIREMAN, RADIO MONITOR TECHNICIAN	08/22/2012	01/27/2013**	37.950	10.640	J 11.620 M	-	0.560	0.400	8.0	62.310	L 81.850	L 81.850	101.400
	CABLE SPLICER-WELDER	08/22/2012	01/27/2013**	39.850	10.640	J 11.620 M	-	0.560	0.400	8.0	64.270	L 84.790	L 84.790	105.310
	TUNNEL WIREMAN	08/22/2012	01/27/2013**	41.750	10.640	J 11.620 M	-	0.560	0.400	8.0	66.220	L 87.720	L 87.720	109.220
	TUNNEL CABLE SPLICER	08/22/2012	01/27/2013**	43.840	10.640	J 11.620 M	-	0.560	0.400	8.0	68.380	L 90.950	L 90.950	113.530
	TRANSPORTATION SYSTEMS ELECTRICIAN	08/22/2012	01/27/2013**	37.900	10.640	J 11.670 M	-	0.560	0.400	8.0	62.310	L 81.830	L 81.830	101.340
	TRANSPORTATION SYSTEMS ELECTRICIAN (CABLE SPLICING, WELDING, AND NETA TESTING)	08/22/2012	01/27/2013**	39.800	10.640	J 11.670 M	-	0.560	0.400	8.0	64.260	L 84.760	L 84.760	105.260
N	TRANSPORTATION SYSTEMS TECHNICIAN	08/22/2012	01/27/2013**	28.430	10.640	J 11.670 M	-	0.560	0.400	8.0	52.550	L 67.190	L 67.190	81.840
#	**FIELD SURVEYOR:**													
O	CHIEF OF PARTY (018.167-010)	02/22/2012	09/30/2012**	40.940	11.200	5.950 D	4.020	0.900	0.150	8.0	63.160	L 83.630	L 83.630	P 104.100
O	INSTRUMENTMAN (018.167-034)	02/22/2012	09/30/2012**	38.440	11.200	5.950 D	4.020	0.900	0.150	8.0	60.660	L 79.880	L 79.880	P 99.100
O	CHAINMAN/RODMAN (869.567-010)	02/22/2012	09/30/2012**	37.860	11.200	5.950 D	4.020	0.900	0.150	8.0	60.080	L 79.010	L 79.010	P 97.940
#	**GLAZIER**	08/22/2012	05/31/2013*	Q 38.950 R	6.250	12.890 S	-	0.770	0.530	8.0	59.390	T 77.870	T 77.870	96.340
	MARBLE FINISHER	08/22/2012	05/31/2013**	U 27.040	7.560	2.710	-	0.530	0.330	V 8.0	38.170	W 51.690	X 51.690	Y 65.210
#	**PAINTER:**													
Z	PAINTER, LEAD ABATEMENT	08/22/2012	06/30/2013*	H 29.320	5.700	3.040	1.050	0.590	0.820	8.0	40.520	AA 55.180	AA 55.180	AA 55.180
Z	REPAINT PAINTER, LEAD ABATEMENT	08/22/2012	06/30/2013*	H 26.050	5.700	3.040	1.050	0.590	0.820	8.0	37.250	AB 50.270	AB 50.270	AB 50.270
AC	PAINTER, LEAD ABATEMENT	08/22/2012	06/30/2013*	H 25.200	5.700	3.040	1.050	0.590	0.820	8.0	36.400	AA 49.000	AA 49.000	AA 49.000
AC	REPAINT PAINTER, LEAD ABATEMENT	08/22/2012	06/30/2013*	H 23.100	5.700	3.040	1.050	0.590	0.820	8.0	34.300	AB 45.850	AB 45.850	AB 45.850
Z	INDUSTRIAL PAINTER	08/22/2012	06/30/2013*	H 29.320	5.700	3.040	1.050	0.590	0.820	8.0	40.520	AA 55.180	AA 55.180	AA 55.180

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
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FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

LOCALITY: LOS ANGELES COUNTY
DETERMINATION: LOS-2012-2

		CRAFT (JOURNEY LEVEL)	ISSUE DATE	EXPIRATION DATE	EMPLOYER PAYMENTS						STRAIGHT-TIME		OVERTIME HOURLY RATE					
					BASIC HOURLY RATE	HEALTH AND WELFARE	PENSION	VACATION/ HOLIDAY	TRAINING	OTHER PAYMENTS	HOURS	TOTAL HOURLY RATE	DAILY	SATURDAY	SUNDAY AND HOLIDAY
	Z	INDUSTRIAL REPAINT PAINTER	08/22/2012	06/30/2013*	H 26.050	5.700	3.040	1.050	0.590	0.820	8.0	37.250	AB 50.270	AB 50.270	AB 50.270
#		**PLASTERER**	08/22/2012	08/06/2013**	AD 32.650	7.880	4.210	3.010	0.500	0.950	AE 8.0	49.200	64.460	AF 64.460	79.710
#	AG	**PLASTER TENDER**	08/22/2012	08/06/2013**	30.000	6.810	5.400	AH 4.500	0.900	0.840	8.0	48.450	63.450	AI 63.450	78.450
		PLASTER CLEAN-UP LABORER	08/22/2012	08/06/2013**	27.450	6.810	5.400	AH 4.500	0.900	0.840	8.0	45.900	59.630	AI 59.630	73.350
#		**PLUMBER:**													
		PLUMBER, INDUSTRIAL AND GENERAL PIPEFITTER	08/22/2012	06/30/2013**	U 38.570	7.660	AJ 10.520	AK 3.030	1.500	AL 0.620	8.0	61.900	AM 81.900	AM 81.900	100.390
		SEWER AND STORM DRAIN PIPELAYER	08/22/2012	06/30/2013**	U 30.000	7.160	AJ 7.620	AK 1.000	1.230	AL 0.620	8.0	47.630	62.330	V 62.330	76.530
	AN	SEWER AND STORM DRAIN PIPE TRADESMAN	08/22/2012	06/30/2013**	U 16.020	7.160	0.380	-	0.660	AL 0.470	8.0	24.690	31.900	V 31.900	39.110
		LANDSCAPE/IRRIGATION FITTER	08/22/2012	12/31/2012**	U 24.860	7.660	AJ 8.630	AK 2.490	0.800	AL 0.370	V 8.0	44.810	58.480	58.480	70.910
		LANDSCAPE/IRRIGATION TRADESMAN	08/22/2012	12/31/2012*	U 12.430	2.000	AJ 0.880	-	0.100	AL 0.370	V 8.0	15.780	22.000	22.000	28.210
		REFRIGERATION SERVICE AND REPAIR (HVACR)	08/22/2012	09/30/2012*	A 39.940	6.520	AO 8.690	M -	1.300	AP 0.510	8.0	56.960	76.930	AQ 76.930	Y 95.750
		REFRIGERATION SERVICE AND REPAIR TRADESMAN (HVACR)	08/22/2012	09/30/2012*	A 10.900	6.520	1.260	M -	0.500	AP 0.390	8.0	19.570	25.020	AQ 25.020	Y 30.020
	AR	FIRE SPRINKLER FITTER (PROTECTION AND CONTROL SYSTEMS, OVERHEAD AND UNDERGROUND)	08/22/2012	12/31/2012**	33.030	8.420	AS 10.350	-	0.450	0.250	8.0	52.500	69.010	69.010	85.530
	AT	FIRE SPRINKLER FITTER (PROTECTION AND CONTROL SYSTEMS, OVERHEAD AND UNDERGROUND)	02/22/2012	12/31/2013**	40.560	8.670	13.600	M -	1.350	AU 0.500	8.0	64.680	84.960	AV 84.960	105.240
#		**ROOFER**	08/22/2011	07/31/2012*	AW 34.650	5.860	AX 4.410	S -	0.300	0.350	8.0	45.570	AM 61.110	AM 61.110	76.640
		PITCH WORK	08/22/2011	07/31/2012*	AW 36.400	5.860	AX 4.410	S -	0.300	0.350	8.0	47.320	AM 63.730	AM 63.730	80.140
		PREPARER	08/22/2011	07/31/2012*	AW 35.650	5.860	AX 4.410	S -	0.300	0.350	8.0	46.570	AM 62.600	AM 62.600	78.640
#	AY	**SHEET METAL WORKER**	08/22/2012	12/31/2012**	H 41.450	8.370	10.850	-	1.120	0.470	8.0	62.260	AZ 82.990	AZ 82.990	103.710
#	BA	**SHEET METAL WORKER**	02/22/2012	06/30/2012*	32.950	7.870	BB 9.290	-	1.720	0.300	V 8.0	52.130	BC 68.610	BC 68.610	Y 85.080
	BA	LIGHT COMMERCIAL SHEET METAL WORKER UP TO AND INCLUDING 10,000 SQUARE FEET.	02/22/2012	06/30/2012*	26.360	7.870	BB 9.290	-	1.720	0.300	V 8.0	45.540	58.720	58.720	58.720
#		**TERRAZZO WORKER**	08/22/2008	08/30/2009*	A 33.630	6.860	3.150	M -	0.570	0.120	V 8.0	44.330	W 61.150	X 61.150	Y 77.960
		TERRAZZO FINISHER	08/22/2008	08/30/2009*	A 26.590	6.200	3.150	M -	0.360	0.120	V 8.0	36.420	W 49.720	X 49.720	Y 63.010
#		**TILE FINISHER**	08/22/2012	05/31/2013**	U 22.370	7.000	1.800	-	0.520	0.330	V 8.0	32.020	W 43.210	X 43.210	Y 54.390
#		**TILE LAYER**	08/22/2012	05/31/2013**	U 33.550	7.660	5.500	-	0.680	0.330	V 8.0	47.720	W 64.490	X 64.490	Y 81.270

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS

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FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

LOCALITY: LOS ANGELES COUNTY

DETERMINATION: LOS-2012-2

	CRAFT (JOURNEY LEVEL)	ISSUE DATE	EXPIRATION DATE	INCREASE 1			INCREASE 2			INCREASE 3			INCREASE 4		INCREASE 5		INCREASE 6		INCREASE 7	
				DATE OF NEXT CHANGE	AMOUNT OF INCREASE		DATE OF NEXT CHANGE	AMOUNT OF INCREASE		DATE OF NEXT CHANGE	AMOUNT OF INCREASE		DATE OF NEXT CHANGE	AMOUNT OF INCREASE	DATE OF NEXT CHANGE	AMOUNT OF INCREASE	DATE OF NEXT CHANGE	AMOUNT OF INCREASE	DATE OF NEXT CHANGE	AMOUNT OF INCREASE
	CARPET, LINOLEUM,																			
	RESILIENT TILE LAYER	08/22/2012	04/29/2013**	04/30/2013		A														
B	MATERIAL HANDLER	08/22/2012	04/29/2013**	04/30/2013		A														
	ELECTRICIAN:																			
	COMM & SYSTEM INSTALLER	08/22/2012	11/25/2012**	11/26/2012	$0.50	C	11/25/2013	$0.60	C	05/26/2014	$0.60	C								
	COMM & SYSTEM TECH.	08/22/2012	11/25/2012**	11/26/2012	$0.50	C	11/25/2013	$0.60	C	05/26/2014	$0.60	C								
	SOUND ELECTRICIAN	08/22/2012	11/25/2012**	11/26/2012	$0.50	C	11/25/2013	$0.60	C	05/26/2014	$0.60	C								
	INSIDE WIREMAN, RADIO MONITOR TECHNICIAN	08/22/2012	01/27/2013**	01/28/2013	$0.50	C	07/29/2013	$0.90	C	01/27/2014	$0.90	C								
	CABLE SPLICER-WELDER	08/22/2012	01/27/2013**	01/28/2013	$0.50	C	07/29/2013	$0.90	C	01/27/2014	$0.90	C								
	TUNNEL WIREMAN	08/22/2012	01/27/2013**	01/28/2013	$0.50	C	07/29/2013	$0.90	C	01/27/2014	$0.90	C								
	TUNNEL CABLE SPLICER	08/22/2012	01/27/2013**	01/28/2013	$0.50	C	07/29/2013	$0.90	C	01/27/2014	$0.90	C								
	TRANSPORTATION SYSTEMS ELECTRICIAN	08/22/2012	01/27/2013**	01/28/2013	$0.50	C	07/29/2013	$0.90	C	01/27/2014	$0.90	C								
	TRANSPORTATION SYSTEMS ELECTRICIAN (CABLE SPLICING, WELDING, AND NETA TESTING)	08/22/2012	01/27/2013**	01/28/2013	$0.50	C	07/29/2013	$0.90	C	01/27/2014	$0.90	C								
D	TRANSPORTATION SYSTEMS TECHNICIAN	08/22/2012	01/27/2013**	01/28/2013	$0.50	C	07/29/2013	$0.90	C	01/27/2014	$0.90	C								
	FIELD SURVEYOR:																			
E	CHIEF OF PARTY (018.167-010)	02/22/2012	09/30/2012**	10/01/2012	$1.70	C														
E	INSTRUMENTMAN (018.167-034)	02/22/2012	09/30/2012**	10/01/2012	$1.70	C														
E	CHAINMAN/RODMAN (869.567-010)	02/22/2012	09/30/2012**	10/01/2012	$1.70	C														
	MARBLE FINISHER	08/22/2012	05/31/2013**	06/01/2012	$1.00	C	06/01/2013	$1.50	C											
	PLASTERER	08/22/2012	08/06/2013**	08/07/2013	$1.00	C														
F	**PLASTER TENDER**	08/22/2012	08/06/2013**	08/07/2013	$0.75	C														
	PLASTER CLEAN-UP LABORER	08/22/2012	08/06/2013**	08/07/2013	$0.75	C														
	PLUMBER:																			
	PLUMBER, INDUSTRIAL AND GENERAL PIPEFITTER	08/22/2012	06/30/2013**	07/01/2013	$2.51	C														
	SEWER AND STORM DRAIN PIPELAYER	08/22/2012	06/30/2013**	07/01/2013	$1.93	C														
G	SEWER AND STORM DRAIN PIPE TRADESMAN	08/22/2012	06/30/2013**	07/01/2013	$1.03	C														
	LANDSCAPE/IRRIGATION FITTER	08/22/2012	12/31/2012**	01/01/2013	$1.00	C	07/01/2013	$1.25	C	01/01/2014	$1.50	C								
H	FIRE SPRINKLER FITTER (PROTECTION AND CONTROL SYSTEMS, OVERHEAD AND UNDERGROUND)	08/22/2012	12/31/2012**	01/01/2013	$0.15	I														
J	FIRE SPRINKLER FITTER (PROTECTION AND CONTROL SYSTEMS, OVERHEAD AND UNDERGROUND)	02/22/2012	12/31/2013**	01/01/2014	$0.50	C														
K	**SHEET METAL WORKER**	08/22/2012	12/31/2012**	01/01/2013	$0.70	L	07/01/2013	$0.50	M	01/01/2014	$0.70	N								

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS

PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1

FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

LOCALITY: LOS ANGELES COUNTY

DETERMINATION: LOS-2012-2

CRAFT (JOURNEY LEVEL)	ISSUE DATE	EXPIRATION DATE	INCREASE 1		INCREASE 2		INCREASE 3		INCREASE 4		INCREASE 5		INCREASE 6		INCREASE 7	
			DATE OF NEXT CHANGE	AMOUNT OF INCREASE	DATE OF NEXT CHANGE	AMOUNT OF INCREASE	DATE OF NEXT CHANGE	AMOUNT OF INCREASE	DATE OF NEXT CHANGE	AMOUNT OF INCREASE	DATE OF NEXT CHANGE	AMOUNT OF INCREASE	DATE OF NEXT CHANGE	AMOUNT OF INCREASE	DATE OF NEXT CHANGE	AMOUNT OF INCREASE
TILE FINISHER	08/22/2012	05/31/2013**	06/01/2012	$1.00 C	06/01/2013	$1.50 C										
TILE LAYER	08/22/2012	05/31/2013**	06/01/2012	$1.00 C	06/01/2013	$1.50 C										

Notification of Change in Regulation 230.1
Regarding Employment of Apprentices on Public Works.

Regulation 230.1 has been amended. The change will affect projects bid after June 30, 2009. Projects bid on or before June 30, 2009 will still be controlled by the prior version of 230.1.

The change requires all contractors (who are not already employing sufficient apprentices) to request dispatch (either consecutively or simultaneously) from all approved apprenticeship programs in the geographical area of the project.

The change also requires that contractors who employ apprentices but are not meeting the required ratio for their craft must request dispatch from any other programs in their craft that exist in the geographical area of the project

The change also requires contractors to give the approved apprenticeship programs written notice of the request for dispatch at least 72 hours in advance. Previously 48 hours advance notice was required.

Effective on projects bid July 1, 2009

Reg. 230.1. Employment of Apprentices on Public Works.
(a) Contractors, as defined in Section 228 to include general, prime, specialty or subcontractor, shall employ registered apprentice(s), as defined by Labor Code Section 3077, during the performance of a public work project in accordance with the required one hour of work performed by an apprentice for every five hours of labor performed by a journeyman, unless covered by one of the exemptions enumerated in Labor Code Section 1777.5 or this subchapter. Unless an exemption has been granted, the contractor shall employ apprentices for the number of hours computed above before the end of the contract. Contractors who are not already employing sufficient registered apprentices (as defined by Labor Code Section 3077) to comply with the one-to-five ratio must request the dispatch of required apprentices from the apprenticeship committees providing training in the applicable craft or trade and whose geographic area of operation includes the site of the public work by giving the committee written notice of at least 72 hours (excluding Saturdays, Sundays and holidays) before the date on which one or more apprentices are required. If the apprenticeship committee from which apprentice dispatch (es) are requested does not dispatch apprentices as requested, the contractor must request apprentice dispatch(es) from another committee providing training in the applicable craft or trade in the geographic area of the site of the public work, and must request apprentice dispatch(es) from each such committee, either consecutively or simultaneously, until the contractor has requested apprentice dispatches from each such committee in the geographic area. All requests for dispatch of apprentices shall be in writing, sent by first class mail, facsimile or email. If a non-signatory contractor declines to abide by and comply with the terms of a local committee's standards, the apprenticeship committee shall not be required to dispatch apprentices to such contractor. Conversely, if in response to a written request no apprenticeship committee dispatches, or agrees to dispatch during the period of the public works project any apprentice to a contractor who has agreed to employ and train apprentices in accordance with either the apprenticeship committee's standards or these regulations within 72 hours of such request (excluding Saturdays, Sundays and holidays) the contractor shall not be considered in violation of this section as a result of failure to employ apprentices for the remainder of the project, provided that the contractor made the request in enough time to meet the above-stated ratio. If an apprenticeship committee dispatches fewer apprentices than the contractor requested, the contractor shall be considered in compliance if the contractor employs those apprentices who are dispatched, provided that, where there is more than one apprenticeship committee able and willing to unconditionally dispatch apprentices, the contractor has requested dispatch from all committees providing training in the applicable craft or trade whose geographic area of operation include the site of the public work. Nothing in this section shall affect the right of a contractor who participates in and employs registered apprentices from programs approved under Labor Code Section 3075 outside the geographic area of the public work from employing said apprentice(s) on the site of the public work in order to meet the ratio requirement of Labor Code Section 1777.5.
(b) Apprentices employed on public works shall be paid the applicable apprentice prevailing per diem wage rate, available from DAS, and derived from the Director's survey of wages paid on public works in the geographic area of the craft or trade. DAS shall refer complaints alleging any contractor's failure to pay the proper apprentice prevailing wage rate on a public works project to the Division of Labor Standards Enforcement for investigation and appropriate action.
(c) Apprentices employed on public works can only be assigned to perform work of the craft or trade to which the apprentice is registered. Work of the craft or trade consists of job duties normally assigned to journeymen in the apprenticeable occupation. Where an employer employs apprentices under the rules and regulations of the California Apprenticeship Council, as set forth in Labor Code Section 1777.5 (c) (2), apprentices employed on public works must at all times work with or under the direct supervision of journeyman/men. The on-the-job training shall be in accordance with the apprenticeship standards and apprenticeship agreement under which the apprentice is training, provided that a contractor shall not be subject to any financial or administrative obligations to a trust fund or employee benefit plan unless the contractor has so agreed.
(d) The provisions of this regulation shall not apply to contractors on public works projects that were bid prior to July 1, 2009. Such contractors shall comply with the version of this regulation that was in effect prior to July 1, 2009.

Note: Authority cited: Section 1777.7, Labor Code. Reference: Section 1777.5, Labor Code.

STATE OF CALIFORNIA
DEPARTMENT OF INDUSTRIAL RELATIONS
DIVISION OF APPRENTICESHIP STANDARDS
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EDMUND G. BROWN, Jr., *Governor*
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ADDRESS REPLY TO:
Div. of Apprenticeship Standards
P. O. Box 420603
San Francisco, CA 94142-0603

Important Notice Regarding Changes in CCR 230.1

An addition has been made to section 230.1 regarding employment of apprentices on public works it is effective as of November 16, 2011. To see a copy of the amended regulation please click on the following link: http://www.dir.ca.gov/das/DasRegulations/201011Regs320Text.pdf

In general, for covered projects, "except for projects with less than 40 hours of journeyman work", for the purpose of determining whether a contractor has properly requested an apprentice, all requests for dispatch of an apprentice "shall be for not less than 8 hours per day per each apprentice or 20% of the estimated apprentice hours" required to meet ratio whichever is greater.

GENERAL PREVAILING WAGE APPRENTICE RATES

APPRENTICE INFORMATION

Determination: **2012--1** *Issue Date:* **02-22-2012** *Expire Date:* **06-30-2012** * *Page:* 1

Craft/Classification: **Carpenter**

Counties: Imperial, Los Angeles, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, Ventura

Period	Duration Months	OJT Hours	Hourly Basic Rate	Health & Welfare	Pension	Vacation /Holiday	Training	Other	Hourly Total Rate
1	6	600	$14.940	$4.700		$2.300	$.420	$.290	$22.650
2	6	600	$18.680	$4.700		$2.300	$.420	$.290	$26.390
3	6	600	$22.410	$4.700		$3.300	$.420	$.290	$31.120
4	6	600	$24.280	$4.700	$3.410	$3.300	$.420	$.290	$36.400
5	6	600	$26.150	$4.700	$3.410	$3.300	$.420	$.290	$38.270
6	6	600	$28.010	$4.700	$3.410	$3.300	$.420	$.290	$40.130
7	6	600	$29.880	$4.700	$3.410	$3.300	$.420	$.290	$42.000
8	6	600	$33.620	$4.700	$3.410	$3.300	$.420	$.290	$45.740

Footnote(s):

Vacation--Includes an amount for Supplemental Dues.

Other--Includes an amount for Contract Administration, Cooperation Committee & Industry Advancement.

Predetermined Increase:
None at this time.

Apprentice Prevailing Wage Rates are paid only to apprentices registered with the State of California, Division of Apprenticeship Standards, for work the registered apprentice performs in his/her specific craft or trade. You may check whether an Apprentices is registered at http://www.dir.ca.gov/DAS/appcertpw/AppCertSearch.asp

GENERAL PREVAILING WAGE APPRENTICE RATES

APPRENTICE INFORMATION

Determination: **2012--1** *Issue Date:* **02-22-2012** *Expire Date:* **06-30-2012** * *Page:* **1**

Craft/Classification: **Acoustical Installer (Carpenter)**

Counties: Imperial, Los Angeles, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, Ventura

Period	Duration Months	OJT Hours	Hourly Basic Rate	Health & Welfare	Pension	Vacation /Holiday	Training	Other	Hourly Total Rate
1		750	$14.940	$4.700		$2.300	$.420	$.290	$22.650
2		750	$18.680	$4.700		$2.300	$.420	$.290	$26.390
3		1,000	$22.410	$4.700		$3.300	$.420	$.290	$31.120
4		1,000	$24.280	$4.700	$3.410	$3.300	$.420	$.290	$36.400
5		1,000	$26.150	$4.700	$3.410	$3.300	$.420	$.290	$38.270
6		500	$28.010	$4.700	$3.410	$3.300	$.420	$.290	$40.130
7		500	$29.880	$4.700	$3.410	$3.300	$.420	$.290	$42.000
8		500	$33.620	$4.700	$3.410	$3.300	$.420	$.290	$45.740

Footnote(s):

Vacation & Holiday -- Includes an amount for supplemental dues.

Other--Coop Committee, Ind Adv Fund, and Contract Adm.

Apprentice Prevailing Wage Rates are paid only to apprentices registered with the State of California, Division of Apprenticeship Standards, for work the registered apprentice performs in his/her specific craft or trade. You may check whether an Apprentices is registered at http://www.dir.ca.gov/DAS/appcertpw/AppCertSearch.asp

GENERAL PREVAILING WAGE APPRENTICE RATES

APPRENTICE INFORMATION

Determination: **2009-1** *Issue Date:* **08-03-2012** *Expire Date:* **12-31-2012** ** *Page:* **1**

Craft/Classification: **Carpet, Linoleum and Resilient Floor Layer** *Shift:* **1**

correction

Counties: Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, Ventura

Period	Duration Months	OJT Hours	Hourly Basic Rate	Health & Welfare	Pension	Vacation /Holiday	Training	Other	Hourly Total Rate
1	6	800	$10.800		$.350	$.880	$.460	$.200	$12.690
2	6	800	$12.340	$4.980	$.600	$1.220	$.810	$.200	$20.150
3	6	800	$13.880	$4.980	$.650	$1.360	$.810	$.200	$21.880
4	6	800	$15.430	$4.980	$.700	$1.480	$.810	$.200	$23.600
5	6	800	$18.510	$4.980	$.800	$1.720	$.810	$.200	$27.020
6	6	800	$21.600	$4.980	$.900	$1.960	$.810	$.200	$30.450
7	6	800	$24.680	$4.980	$1.000	$2.200	$.810	$.200	$33.870
8	6	800	$27.770	$4.980	$1.100	$2.380	$.810	$.200	$37.240

Footnote(s):

Correction: Corrects expiration date, corrects amount for Other (first period only), adds Important Notice information effective 08-03-2012.

In compliance with the DIR's Important Notice of February 14, 2012, the predetermined reallocation of $0.35 from Training to Health and Welfare, scheduled to take effect on May 1, 2012 has been deferred to January 1, 2013.

Basic Hourly Rate -- Includes an amount for Dues Check Off.

Training -- Includes an amount for IAJTC.

Other includes amounts for Labor Management Cooperation Fund ($0.05) & for Contract Administration Fund ($0.15).

Future Wage Changes:

01-01-2013: $0.35 (JM) will be reallocated from Training to Health & Welfare.

Apprentice Prevailing Wage Rates are paid only to apprentices registered with the State of California, Division of Apprenticeship Standards, for work the registered apprentice performs in his/her specific craft or trade. You may check whether an Apprentices is registered at http://www.dir.ca.gov/DAS/appcertpw/AppCertSearch.asp

GENERAL PREVAILING WAGE APPRENTICE RATES

APPRENTICE INFORMATION

Determination: **2012-1** *Issue Date:* **02-22-2012** *Expire Date:* **06-30-2012** * *Page:* **1**

Craft/Classification: **Drywall Installer/Lather (Carpenter)**

Counties: Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, Ventura

Period	Duration Months	OJT Hours	Hourly Basic Rate	Health & Welfare	Pension	Vacation /Holiday	Training	Other	Hourly Total Rate
1	6	600	$14.940	$4.700		$2.300	$.420		$22.360
2	6	600	$18.680	$4.700		$2.300	$.420		$26.100
3	6	600	$22.410	$4.700		$3.300	$.420		$30.830
4	6	600	$24.280	$4.700	$3.410	$3.300	$.420	$.520	$36.630
5	6	600	$26.150	$4.700	$3.410	$3.300	$.420	$.520	$38.500
6	6	600	$28.010	$4.700	$3.410	$3.300	$.420	$.520	$40.360
7	6	600	$29.880	$4.700	$3.410	$3.300	$.420	$.520	$42.230
8	6	600	$33.620	$4.700	$3.410	$3.300	$.420	$.520	$45.970

Footnote(s):

Vacation/Holiday--Includes an amount per hour worked for Supplemental Dues.

Other--Includes amounts for Contract Administration, Cooperation Committee, Drywall Industry Fund.

Apprentice Prevailing Wage Rates are paid only to apprentices registered with the State of California, Division of Apprenticeship Standards, for work the registered apprentice performs in his/her specific craft or trade. You may check whether an Apprentices is registered at http://www.dir.ca.gov/DAS/appcertpw/AppCertSearch.asp

GENERAL PREVAILING WAGE APPRENTICE RATES

APPRENTICE INFORMATION

Determination: **2012-1** *Issue Date:* **02-22-2012** *Expire Date:* **09-30-2012** * *Page:* **1**

Craft/Classification: **Drywall Finisher**

Counties: Imperial, Los Angeles (Except For Antelope Valley), Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, Ventura

Period	Duration Months	OJT Hours	Hourly Basic Rate	Health & Welfare	Pension	Vacation /Holiday	Training	Other	Hourly Total Rate
1	6	900	$14.400	$5.950		$.550	$.670	$.470	$22.040
2	6	900	$15.560	$5.950	$.550	$1.050	$.670	$.470	$24.250
3	6	900	$17.220	$5.950	$.550	$1.050	$.670	$.470	$25.910
4	6	900	$18.880	$5.950	$.550	$1.050	$.670	$.470	$27.570
5	6	900	$21.560	$5.950	$1.770	$2.050	$.670	$.470	$32.470
6	6	900	$26.550	$5.950	$1.770	$2.050	$.670	$.470	$37.460

Footnote(s):

BHR -- includes amount for dues check off.

Other -- includes an amount for LMCC.

Application of wage sheet above to Los Angeles County excludes northern Antelope Valley.

Apprentice Prevailing Wage Rates are paid only to apprentices registered with the State of California, Division of Apprenticeship Standards, for work the registered apprentice performs in his/her specific craft or trade. You may check whether an Apprentices is registered at http://www.dir.ca.gov/DAS/appcertpw/AppCertSearch.asp

GENERAL PREVAILING WAGE APPRENTICE RATES

APPRENTICE INFORMATION

Determination: **2012-1** *Issue Date:* **02-22-2012** *Expire Date:* **06-30-2012** * *Page:* **1**

Craft/Classification: **Electrician, Inside Wireman** *Shift:* **1**

County: Los Angeles

Period	Duration Months	OJT Hours	Hourly Basic Rate	Health & Welfare	Pension	Vacation /Holiday	Training	Other	Hourly Total Rate
1	6	1,000	$15.180	$9.140	$.590		$.610	$.350	$25.870
2	6	1,000	$17.080	$9.140	$.640		$.610	$.350	$27.820
3	6	750	$18.980	$10.140	$6.440		$.610	$.350	$36.520
4	6	750	$20.870	$10.140	$7.060		$.610	$.350	$39.030
5	6	750	$22.770	$10.140	$7.690		$.610	$.350	$41.560
6	6	750	$24.670	$10.140	$8.320		$.610	$.350	$44.090
7	6	750	$26.570	$10.140	$8.950		$.610	$.350	$46.620
8	6	750	$28.460	$10.140	$9.570		$.610	$.350	$49.130
9	6	750	$30.360	$10.140	$10.200		$.610	$.350	$51.660
10	6	750	$32.260	$10.140	$10.830		$.610	$.350	$54.190

Footnote(s):

Pension -- includes amounts for defined contribution and benefit plans for apprentices above Period 2. Pension includes an amount equal to 3% of the Basic Hourly Rate for the National Employees' Benefit Fund. (This applies to overtime rates as well.)

Health contribution is $9.14 for 40% (1st period) and 45% (2nd period) apprentices. All other apprentices get $10.14.

Apprentice Prevailing Wage Rates are paid only to apprentices registered with the State of California, Division of Apprenticeship Standards, for work the registered apprentice performs in his/her specific craft or trade. You may check whether an Apprentices is registered at http://www.dir.ca.gov/DAS/appcertpw/AppCertSearch.asp

GENERAL PREVAILING WAGE APPRENTICE RATES

APPRENTICE INFORMATION

Determination: **2012-1** *Issue Date:* **08-03-2012** *Expire Date:* **05-31-2014** * *Page:* **1**

Craft/Classification: **Glazier**

6-1-2012 increase allocated

Counties: Los Angeles, Orange, Riverside, San Bernardino, Santa Barbara, Ventura

Period	Duration Months	OJT Hours	Hourly Basic Rate	Health & Welfare	Pension	Vacation /Holiday	Training	Other	Hourly Total Rate
1	6	1,000	$15.610	$6.250	$4.130		$.770	$.530	$27.290
2	6	1,000	$17.560	$6.250	$4.840		$.770	$.530	$29.950
3	6	1,000	$19.500	$6.250	$5.490		$.770	$.530	$32.540
4	6	1,000	$23.390	$6.250	$6.700		$.770	$.530	$37.640
5	6	1,000	$25.340	$6.250	$7.560		$.770	$.530	$40.450
6	6	1,000	$29.230	$6.250	$8.910		$.770	$.530	$45.690
7	6	1,000	$33.120	$6.250	$10.280		$.770	$.530	$50.950
8	6	1,000	$35.060	$6.250	$11.130		$.770	$.530	$53.740

Footnote(s):

The allocation of the 06-01-2012 predetermined increase to Training ($0.15) and to Other ($0.19), and the reduction to Health & Welfare ($0.10) reflected in the amounts listed above effective 08-03-2012.

BHR - Includes amount withheld for Dues checkoff (3% of gross wages, and an amount for Vacation (not factored at OT).

Health & Welfare - Includes amount for Disability Benefit pay and Injury Fund;

Other - includes amounts for LMCC & IPF (Industry Promotion to Other.

Apprentice Prevailing Wage Rates are paid only to apprentices registered with the State of California, Division of Apprenticeship Standards, for work the registered apprentice performs in his/her specific craft or trade. You may check whether an Apprentices is registered at http://www.dir.ca.gov/DAS/appcertpw/AppCertSearch.asp

GENERAL PREVAILING WAGE APPRENTICE RATES

APPRENTICE INFORMATION

Determination: **2012-1** *Issue Date:* **02-22-2012** *Expire Date:* **06-30-2012** * *Page:* **1**

Craft/Classification: **Laborer**

Counties: Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, Ventura

Period	Duration Months	OJT Hours	Hourly Basic Rate	Health & Welfare	Pension	Vacation /Holiday	Training	Other	Hourly Total Rate
1	6	500	$15.150	$4.730	$1.200	$2.520	$.640	$.320	$24.560
2	6	500	$16.660	$4.730	$1.200	$2.520	$.640	$.320	$26.070
3	6	500	$18.170	$4.730	$1.200	$2.520	$.640	$.320	$27.580
4	6	500	$21.200	$4.730	$1.200	$2.520	$.640	$.320	$30.610
5	6	500	$24.230	$4.730	$1.200	$2.520	$.640	$.320	$33.640
6	6	500	$25.750	$4.730	$1.200	$2.520	$.640	$.320	$35.160

Footnote(s):

Note: Apprentice rates are based on JM Laborer Group V rates.

Vacation -- includes an amount for supplemental dues.

Other -- includes amounts for Center for Contract Compliance, Industry Fund, and Contract Administration Fund.

Apprentice Prevailing Wage Rates are paid only to apprentices registered with the State of California, Division of Apprenticeship Standards, for work the registered apprentice performs in his/her specific craft or trade. You may check whether an Apprentices is registered at http://www.dir.ca.gov/DAS/appcertpw/AppCertSearch.asp

GENERAL PREVAILING WAGE APPRENTICE RATES

APPRENTICE INFORMATION

Determination: **2012-1** *Issue Date:* **02-22-2012** *Expire Date:* **06-30-2012** ** *Page:* **1**

Craft/Classification: **Operating Engineer**

Counties: Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, Ventura

Period	Duration Months	OJT Hours	Hourly Basic Rate	Health & Welfare	Pension	Vacation /Holiday	Training	Other	Hourly Total Rate
1	6	1,000	$23.350	$11.200		$2.820	$.800	$.290	$38.460
2	6	1,000	$25.290	$11.200		$2.820	$.800	$.290	$40.400
3	6	1,000	$27.240	$11.200	$5.950	$2.820	$.800	$.290	$48.300
4	6	1,000	$29.180	$11.200	$5.950	$2.820	$.800	$.290	$50.240
5	6	1,000	$31.130	$11.200	$5.950	$2.820	$.800	$.290	$52.190
6	6	1,000	$35.020	$11.200	$5.950	$2.820	$.800	$.290	$56.080

Footnote(s):

Vacation & Holiday: Includes an amount for Supplemental Dues.

Other: Includes amounts for Industry Fund, Engineers Contract Compliance Committee (ECCC), and Contract Administration Fund.

Predetermined Increases:
07-01-2011: $1.40 (JM) to be allocated to wages and or fringes.
07-01-2012: $1.70 (JM) to be allocated to wages and or fringes.

Apprentice Prevailing Wage Rates are paid only to apprentices registered with the State of California, Division of Apprenticeship Standards, for work the registered apprentice performs in his/her specific craft or trade. You may check whether an Apprentices is registered at http://www.dir.ca.gov/DAS/appcertpw/AppCertSearch.asp

GENERAL PREVAILING WAGE APPRENTICE RATES

APPRENTICE INFORMATION

Determination: **2012-1** *Issue Date:* **02-22-2012** *Expire Date:* **06-30-2012** ** *Page:* **1**

Craft/Classification: **Painter** *Shift:* **1**

Counties: Imperial, Los Angeles, Orange, Riverside, San Bernardino, San Diego

Period	Duration Months	OJT Hours	Hourly Basic Rate	Health & Welfare	Pension	Vacation /Holiday	Training	Other	Hourly Total Rate
1	6	900	$11.270	$4.830	$.140	$.300	$.540	$.820	$17.900
2	6	900	$12.580	$5.540	$.140	$.300	$.540	$.820	$19.920
3	6	900	$13.900	$5.700	$.680	$.300	$.540	$.820	$21.940
4	6	900	$15.220	$5.700	$1.280	$.400	$.540	$.820	$23.960
5	6	900	$16.530	$5.700	$1.340	$1.050	$.540	$.820	$25.980
6	6	900	$17.850	$5.700	$2.050	$1.050	$.540	$.820	$28.010
7	6	900	$19.170	$5.700	$2.520	$1.050	$.780	$.820	$30.040
8	6	900	$20.480	$5.700	$2.520	$1.050	$1.490	$.820	$32.060

Footnote(s):

Basic Hourly Rate -- includes amount withheld for working dues.

Other --includes LMCC Fund contribution.

Pre-determined Increases
7-1-2012: $0.05 to Other column.

Apprentice Prevailing Wage Rates are paid only to apprentices registered with the State of California, Division of Apprenticeship Standards, for work the registered apprentice performs in his/her specific craft or trade. You may check whether an Apprentices is registered at http://www.dir.ca.gov/DAS/appcertpw/AppCertSearch.asp

GENERAL PREVAILING WAGE APPRENTICE RATES

APPRENTICE INFORMATION

Determination: **2012-1** *Issue Date:* **02-22-2012** *Expire Date:* **06-30-2012** ** *Page:* **1**

Craft/Classification: **Plumber, Pipefitter, Steamfitter** *Shift:* **1**

Counties: Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, Ventura

Period	Duration Months	OJT Hours	Hourly Basic Rate	Health & Welfare	Pension	Vacation /Holiday	Training	Other	Hourly Total Rate
1	12	1,500	$16.410		$.380	$1.540	$.400	$.520	$19.250
2	12	1,500	$18.240	$7.610	$.380	$1.840	$.470	$.580	$29.120
3	12	1,500	$21.880	$7.610	$4.650	$2.140	$.480	$.580	$37.340
4	12	1,500	$25.530	$7.610	$5.030	$2.430	$.530	$.580	$41.710
5	12	1,500	$29.180	$7.610	$5.460	$2.730	$.560	$.580	$46.120

Footnote(s):

APPRENTICES INDENTURED ON 7/1/2011 AND AFTER WILL BE PAID THESE WAGES.
Basic Hourly rate - Includes an amount witheld for administrative dues.
Dues Check Off, first year apprentices, $0.45 and $0.65 = $1.10.
Dues Check Off, second - fifth year apprentices, $0.95 and $0.65 = $1.60.

Pension includes: amounts for Pension, National Pension and Retiree's X-Mas Fund.

Other - Includes: amounts for PIPE-LMCC and for CED (Contractor Education Development Fund)

Predetermined Increases:

07-01-2012: $2.41 (JM) to be allocated to wages and/or fringes.
07-01-2013: $2.51 (JM) to be allocated to wages and/or fringes.

Apprentice Prevailing Wage Rates are paid only to apprentices registered with the State of California, Division of Apprenticeship Standards, for work the registered apprentice performs in his/her specific craft or trade. You may check whether an Apprentices is registered at http://www.dir.ca.gov/DAS/appcertpw/AppCertSearch.asp

GENERAL PREVAILING WAGE APPRENTICE RATES

APPRENTICE INFORMATION

Determination: **2012-1** *Issue Date:* **02-22-2012** *Expire Date:* **06-30-2012** ** *Page:* **3**

Craft/Classification: **Plumber, Pipefitter, Steamfitter** *Shift:* **1**

Counties: Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, Ventura

Period	Duration Months	OJT Hours	Hourly Basic Rate	Health & Welfare	Pension	Vacation /Holiday	Training	Other	Hourly Total Rate
1	12	1,500	$17.950	$6.020	$.370	$1.540	$.450	$.350	$26.680
2	12	1,500	$21.530	$6.020	$.370	$1.840	$.520	$.410	$30.690
3	12	1,500	$25.120	$5.950	$4.650	$2.140	$.530	$.410	$38.800
4	12	1,500	$28.710	$5.950	$5.030	$2.430	$.580	$.410	$43.110
5	12	1,500	$32.300	$5.950	$5.460	$2.730	$.610	$.410	$47.460

Footnote(s):

APPRENTICES INDENTURED BEFORE 07-01-2011 WILL BE PAID THESE WAGES UNTIL THEIR ADVANCEMENT. AFTER THEIR ADVANCEMENT THEY WILL GO TO THE NEXT PERIOD ON PAGE 3, SHIFT 1.

Basic Hourly rate includes an amount withheld for Dues Check Off.
First period apprentices $0.45, Journeymen and all other apprentices $0.95.

Predetermined Increases:

07-01-2012: $2.41 (JM) to be allocated to wages and/or fringes.
07-01-2013: $2.51 (JM) to be allocated to wages and/or fringes.

Apprentice Prevailing Wage Rates are paid only to apprentices registered with the State of California, Division of Apprenticeship Standards, for work the registered apprentice performs in his/her specific craft or trade. You may check whether an Apprentices is registered at http://www.dir.ca.gov/DAS/appcertpw/AppCertSearch.asp

GENERAL PREVAILING WAGE APPRENTICE RATES

APPRENTICE INFORMATION

Determination: **2012--1** *Issue Date:* **02-22-2012** *Expire Date:* **03-05-2011** * *Page:* **1**

Craft/Classification: **Plumber, Refrigeration Fitter (HVAC)**

Counties: Los Angeles, Orange

Period	Duration Months	OJT Hours	Hourly Basic Rate	Health & Welfare	Pension	Vacation /Holiday	Training	Other	Hourly Total Rate
1	12	1,800	$16.210	$6.380	$.880		$.700	$.250	$24.420
2	12	1,800	$19.620	$6.380	$1.130		$.700	$.250	$28.080
3	12	1,800	$23.050	$6.380	$1.130		$.700	$.250	$31.510
4	12	1,800	$26.460	$6.380	$1.380		$.700	$.250	$35.170
5	12	1,800	$29.890	$6.380	$1.630		$.700	$.250	$38.850

Footnote(s):

Basic Hourly Rate--Includes amount withheld for dues check-off.

Pension--Includes amount for 401K plan.

Vacation/Holiday--Included in straight-time hourly rate.

Other--Includes an amount for Promotion Fund.

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GENERAL PREVAILING WAGE APPRENTICE RATES

APPRENTICE INFORMATION

Determination: **2012--1** *Issue Date:* **02-22-2012** *Expire Date:* **06-30-2012** ** *Page:* 1

Craft/Classification: **Sheet Metal Worker (HAVC)**

Increases allocated

Counties: Inyo, Los Angeles (Portions South Of A Straight Line Drawn Through Gorman And Big Pines), Mono, Orange, Riverside, San Bernardino

Period	Duration Months	OJT Hours	Hourly Basic Rate	Health & Welfare	Pension	Vacation /Holiday	Training	Other	Hourly Total Rate
1	6	812	$20.780	$4.720	$2.430		$1.020	$.470	$29.420
2	6	812	$22.440	$4.720	$2.540		$1.020	$.470	$31.190
3	6	812	$24.100	$4.720	$2.650		$1.020	$.470	$32.960
4	6	812	$25.760	$4.720	$2.770		$1.020	$.470	$34.740
5	6	812	$27.420	$7.870	$2.880		$1.020	$.470	$39.660
6	6	812	$29.090	$7.870	$3.000		$1.020	$.470	$41.450
7	6	812	$30.750	$7.870	$3.110		$1.020	$.470	$43.220
8	6	812	$32.410	$7.870	$3.220		$1.020	$.470	$44.990
9	6	812	$34.070	$7.870	$3.340		$1.020	$.470	$46.770
10	6	817	$35.730	$7.870	$3.450		$1.020	$.470	$48.540

Footnote(s):

The Wage sheet above applies to apprentices indentured before January 1, 2011.

Correction of 2011-2 apprentice wage chart is reflected in wage chart above effective 9/19/2011.

Basic Hourly Rate - Includes amount for Working Dues.

Health & Welfare - Includes amount for SMOHIT.

Pension - Includes amount for 401(k).

Other - Includes amounts for Industry Fund, LMCT, & NEMI.

FUTURE (JM) INCREASES
Eff 1/1/2012, $.05 to Pension.
Eff 7/1/2012, $.75 with $.35 to Pension and $.40 to be allocated to wages &/or fringes.
Eff 1/1/2013, $.70 to Pension.
Eff 7/1/2013, $.50 with $.20 to Pension and $.30 to be allocated to wages &/or fringes.
Eff 1/1/2014, $.70 to Pension.

Apprentice Prevailing Wage Rates are paid only to apprentices registered with the State of California, Division of Apprenticeship Standards, for work the registered apprentice performs in his/her specific craft or trade. You may check whether an Apprentices is registered at http://www.dir.ca.gov/DAS/appcertpw/AppCertSearch.asp

GENERAL PREVAILING WAGE APPRENTICE RATES

APPRENTICE INFORMATION

Determination: **2012-1** *Issue Date:* **02-22-2012** *Expire Date:* **06-30-2012** ** *Page:* **2**

Craft/Classification: **Sheet Metal Worker (HAVC)**

Increases allocated

Counties: Inyo, Los Angeles (Portions South Of A Straight Line Drawn Through Gorman And Big Pines), Mono, Orange, Riverside, San Bernardino

Period	Duration Months	OJT Hours	Hourly Basic Rate	Health & Welfare	Pension	Vacation /Holiday	Training	Other	Hourly Total Rate
1	6	812	$18.280	$4.720	$4.750		$1.020	$.470	$29.240
2	6	812	$19.940	$4.720	$4.870		$1.020	$.470	$31.020
3	6	812	$21.610	$4.720	$4.980		$1.020	$.470	$32.800
4	6	812	$23.270	$4.720	$5.100		$1.020	$.470	$34.580
5	6	812	$24.930	$7.870	$5.210		$1.020	$.470	$39.500
6	6	812	$26.590	$7.870	$5.320		$1.020	$.470	$41.270
7	6	812	$28.250	$7.870	$5.440		$1.020	$.470	$43.050
8	6	812	$29.920	$7.870	$5.550		$1.020	$.470	$44.830
9	6	812	$31.580	$7.870	$5.670		$1.020	$.470	$46.610
10	6	817	$33.240	$7.870	$5.780		$1.020	$.470	$48.380

Footnote(s):

THESE WAGES ARE FOR APPRENTICES INDENTURED ON/AFTER JANUARY 1, 2011

Los Angeles county excludes the portion of the county north of the straight line drawn through Gorman and Big Pines. Correction of 2011-2 apprentice wage chart is reflected in wage chart above effective 9/19/2011.

Basic Hourly Rate - Includes amount for Working Dues.

Health & Welfare - Includes amount for SMOHIT.

Pension - Includes amount for 401(k).

Other - Includes amounts for Industry Fund, LMCT, & NEMI.

FUTURE (JM) INCREASES
Eff 1/1/2012, $.05 to Pension.
Eff 7/1/2012, $.75 with $.35 to Pension and $.40 to be allocated to wages &/or fringes.
Eff 1/1/2013, $.70 to Pension.
Eff 7/1/2013, $.50 with $.20 to Pension and $.30 to be allocated to wages &/or fringes.
Eff 1/1/2014, $.70 to Pension.

Apprentice Prevailing Wage Rates are paid only to apprentices registered with the State of California, Division of Apprenticeship Standards, for work the registered apprentice performs in his/her specific craft or trade. You may check whether an Apprentices is registered at http://www.dir.ca.gov/DAS/appcertpw/AppCertSearch.asp

PART G

PROJECT SPECIFICATIONS

CITY OF TORRANCE
3300 CIVIC CENTER DRIVE, TORRANCE, CA 90503

SPECIFICATIONS
8/10/12

TETRA - IBI Group Architecture Planning
1055 WILSHIRE BLVD., SUITE 1885, LOS ANGELES, CA 90017
TEL. 213.250.7440

TETRA

COVER

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Not Used

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Not Used

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Not Used

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SECTION 01100

SUMMARY

PART 1 - GENERAL

1.1 Related Documents

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

1.2 Summary

A. This Section includes Work covered by the Contract Documents.

1.3 Work Covered By Contract Documents
Project Identification: Renovation of the Police Department Forensic Laboratory

A. Owner:
City of Torrance, California
Police Department

B. Architect:
Tetra – IBI Group
1055 Wilshire Blvd.
Los Angeles, CA – 90017-5601
Project Architect: Kirk Shimazu, AIA
Phone: 213-250-9440 x 234
Fax: 213-481-0947
Email: kirk.shimazu@ibigroup.com

C. Project Management:
City of Torrance
General Services Department
Project Manager:
Diane Megerdichian
Phone: 310-781-7151
Fax: 310-781-7199
e-mail: dmegerdichian@torranceca.gov

D. The Work consists of the following:

1. The Work includes:

Improvements and remodeling of the existing Forensic Science Laboratory at the Basement Level of the Torrance Police Department

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 01111

ABBREVIATIONS AND REFERENCE STANDARDS

PART 1 GENERAL

1.1 Abbreviations

A. The abbreviations herein, together with others in general use, are applicable to this Project Manual, Contract Drawings, and other Contract Documents. All abbreviations and symbols used on Contract Drawings for structural steel construction shall conform to those given by the "Manual of Steel Construction" published by the American Institute of Steel construction, Inc.

B. Common Usage: Whenever the following abbreviations are used, they shall have the meanings indicated:

ABAN	Abandon
ABAND	Abandoned
ABUT	Abutment
ABS	Acrylonitrile – butadiene – styrene
AC	Asphalt concrete
ACP	Asbestos cement pipe
ACWS	Asphalt concrete wearing surface
ADA	Americans with Disabilities Act
AGB	Alley grating basin
ALT	Alternate
AMER STD	American Standard
ATSAC	Automated Traffic Surveillance and Control System
AWG	American Wire Gage (nonferrous wire)
BB	Beginning of Bridge
BC	Beginning of curve
BCR	Beginning of curb return
BDRY	Boundary
BF	Bottom of footing
BM	Bench mark
BPW	Board of Public Works
BSJ	Bell and spigot joint
BSL	Bureau of Street Lighting
BVC	Beginning of vertical curve
B/W	Back of wall
C/C	Center to center
CAB	Crushed aggregate base
CAP	Corrugated aluminum pipe
CB	Catch Basin
Cb	Curb
CBP	Catch Basin Connection Pipe

CBR	California Bearing Ratio
CCR	California Code of Regulations
CCTV	Closed Circuit TV
CF	Curb face or Cubic foot
C&G	Curb and gutter
CGB	Curbside grating basin
CFR	Code of Federal Regulations
CIDH	Cast-in-drilled-hole
CIP	Cast iron pipe or Cast-in-place
CIPP	Cast-in place pipe
CL	Clearance, center line
CLF	Chain link fence
CLSM	Controlled Low Strength Material
CMB	Crushed miscellaneous base
CMC	Cement mortar-coated
CML	Cement mortar-lined
CO	Cleanout (sewer)
COL	Column
CONC	Concrete
CONN	Connection
CONST	Construct, Construction
COORD	Coordinate
CSP	Corrugated steel pipe
CTB	Cement treated base
CV	Check valve
CY	Cubic yard
D	Load of pipe
dB	Decibels
DBE	Disadvantaged Business Enterprise
DBL	Double
DF	Douglas fir
DIA	Diameter
DIP	Ductile iron pipe
DL	Dead load
DMBB	Double metal beam barrier
DT	Drain Tile
DWG	Drawing
DWPPS	Los Angeles Department of Water & Power, Power System
DWPWS	Los Angeles Department of Water & Power, Water System
DWY	Driveway
DWY APR	Driveway approach
EA	Each
EB	End of bridge
EC	End of curve
ECR	End of curb return
EF	Each face

EG	Edge of gutter
EGL	Energy grade line
El	Elevation
ELC	Electrolier lighting conduit
ELT	Extra long ton
ENGR	Engineer, Engineering
EP	Edge of pavement
ESMT	Easement
ETB	Emulsion-treated base
EVC	End of vertical curb
EXC	Excavation
EXP JT	Expansion joint
EXST	Existing
F	Fahrenheit
F&C	Frame and cover
F&I	Furnish and install
FAB	Fabricate
FAS	Flashing arrow sign
FD	Floor drain
FDN	Foundation
FED SPEC	Federal Specification
FG	Finished grade
FH	Fire hydrant
FL	Flow line
FS	Finished surface
FTA	Fully traffic actuated
FT-LB	Foot-pound
FTG	Footing
FW	Face of wall
GA	Gauge
GALV	Galvanized
GC	Grade change
GIP	Galvanized iron pipe
GL	Ground line or grade line
GM	Gas meter
GP	Guy pole
GR	Grade
GRTG	Grating
GSP	Galvanized steel pipe
GTE	General Telephone Company
H	High or height
HB	Hose bib
HC	House connection
HDWL	Headwall
HGL	Hydraulic grade line
HORIZ	Horizontal

HP	Horsepower
HPG	High pressure gas
HPS	High pressure sodium (Light)
HS	High strength
HYDR	Hydraulic
ID	Inside diameter
INCL	Including
INSP	Inspection
INV	Invert
IP	Iron pipe
IPW	Inspector of Public Works
JC	Junction chamber
JCT	Junction
JS	Junction structure
JT	Joint
L	Length
LAB	Laboratory
LADGS	Los Angeles Department of General Services
LADOT	Los Angeles Department of Transportation
LACDPW	Los Angeles County Department of Public Works
LAT	Lateral
LB	Pound
LD	Local depression
LF	Linear foot
LH	Lamp hole
LL	Live load
LOL	Layout line
LONG	Longitudinal
LP	Lamp post
LPS	Low pressure sodium (Light)
LS	Lump sum
LTS	Lime treated soil
MA	Mast Arm
MAINT	Maintenance
MAX	Maximum
MB	Metal beam
MBB	Metal beam barrier
MBGR	Metal beam guard railing
MBE	Minority Business Enterprise
MCR	Middle of curb return
MEAS	Measure
MED	Median
MH	Manhole, maintenance hole
MIL SPEC	Military Specification
MISC	Miscellaneous
MOD	Modified, modify

MON	Monument
MSM	Mandatory subcontracting minimum
MTA	Metropolitan Transportation Authority (of LA County)
MTH	Month
MTL	Material
MULT	Multiple
MVL	Mercury vapor light
MWD	Metropolitan Water district
NRCP	Non-reinforced concrete pipe
OBE	Other Business Enterprise
OBS	Obsolete
OC	On center
OD	Outside diameter
OE	Outer edge
OH	Overhead
OPP	Opposite
ORIG	Original
PACBELL	Pacific Bell (Pacific Telesis Group)
PB	Pull box
PC	Point of curvature
PCC	Portland cement concrete or Point of compound curvature
PCVC	Point of compound vertical curve
PE	Polyethylene
PI	Point of intersection
PL	Property line
PMB	Processed miscellaneous base
POC	Point on curve
POT	Point on tangent
PP	Power pole
PRC	Point of revere curve
PRVC	Point of reverse vertical curve
PSI	Pounds per square inch
PT	Point of tangency
PVC	Polyvinyl chloride
PVMT	Pavement
PVT R/W	Private right-of-way
Q	Rate of flow in cubic feet per second
QUAD	Quadrangle, Quadrant
R	Radius
R&O	Rock and oil
R/W	Right-of-way
RA	Recycling agent
RAC	Recycled asphalt concrete
RAP	Reclaimed asphalt pavement
RBAC	Rubberized asphalt concrete
RC	Reinforced concrete

RCB	Reinforced concrete box
RCC	Rail Construction Corporation
RCE	Registered civil engineer
RCP	Reinforced concrete pipe
RCV	Remote control valve
REF	Reference
REINF	Reinforced or reinforcement
RES	Reservoir
RGE	Registered geotechnical engineer
RR	Railroad
RSE	Registered structural engineer
RTE	Registered traffic engineer
S	Slope
SCCP	Steel cylinder concrete pipe
SCG	Southern California Gas Company
SCHED	Schedule
SCRRA	Southern California Regional Rail Authority
SD	Storm drain
SDR	Standard thermoplastic pipe dimension ratio (ratio of pipe O.D. to minimum wall thickness)
SEC	Section
SF	Square foot
SI	International System of Units (Metric)
SOCB	Side opening catch basin
SPEC	Specifications
SPPWC	Standard Plans for Public Works Construction
SR	Standard ratio
SRJ	Steel ring joint (for RCP)
SS	Sanitary sewer
SSB	Select sub-base
SSPWC	Standard Specifications for Public Works Construction
ST HWY	State highway
STA	Station
STD	Standard
STR	Straight
STR GR	Straight grade
STRUC	Structural/Structure
SW	Sidewalk
SWD	Sidewalk drain
SY	Square yard
TAN	Tangent
TC	Top of curb
TCP	Traffic control plan
TEL	Telephone
TF or T/F	Top of footing
TH	Test hole

TOPO	Topography
TR	Tract
TRANS	Transition
TS	Traffic signal or transition structure
TSC	Traffic signal conduit
TSS	Traffic signal standard
TW	Top of wall
TYP	Typical
USA	Underground Service Alert
VAR	Varies, Variable
VB	Valve box
VC	vertical curve
VCP	Vitrified clay pipe
VERT	Vertical
VOL	Volume
VT	Variable thickness
W	Wider or width
WATCH	Work Area Traffic Control Handbook
WBE	Women Business Enterprise
WI	Wrought iron
WM	Water meter
WPJ	Weakened plane joint
WUT	Western Union Telegraph
XCONN	Cross connection
XSEC	Cross section

C. Institutions: Whenever the following abbreviations are used, they shall have the meanings indicated:

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
ACRI	Air Conditioning and Refrigeration Institute
ADA	Americans with Disabilities Act
AGA	American Gas Association
AGMA	American Gear Manufacturers' Association
AI	Asphalt Institute
AISC	American Institute of Steel Construction
AISI	American Iron & Steel Institute
AITC	American Institute of Timber Construction
AAMA	American Architectural Manufacturer's Association
AMCA	Air Movement and Control Association
ANSI	American National Standards Institute
APA	American Plywood Association
API	American Petroleum Institute
AQMD	Air Quality Management District
AREA	American Railway Engineering Association

ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engneers
ASME	American Society of Mechanical Engineers
ASQC	American Society for Quality Control
ASTM	American Society for Testing and Materials
AWPA	American Wood Preservers Association
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Building Hardware Manufacturer's Association
CAC	California Administrative Code
CAL/ABL	State of California/Architectural Barriers Laws
CAL/OSHA	State of California/Occupational Safety and Health Administration
CALTRANS	California Department of Transportation
CBM	Certified Ballast Manufacturers
CITY	City of Los Angeles
CRSI	Concrete Reinforcing Steel Institute
CSI	Construction Specifications Institute
EIA/TIA	Electronic Industries Association
EPA	Environmental Protection Agency
ETL	Department of Building & Safety Electrical Test Laboratory
FCI	Fluid Control Institute, Inc.
FIA	Factory Insurance Association
FM	Factory Mutual Association
FS	Federal Specifications
GA	Gypsum Association
GRI	Geosynthetic Research Institute
ICBO	International Conference of Building Officials
ICEA	Insulated Cable Engineers Association
IEEE	Institute of Electrical and Electronics Engineers
ISA	Instrument Society of America
LA	City of Los Angeles
LABC	City of Los Angeles Building Code
LAMC	City of Los Angeles Municipal Code
NAAMM	National Architectural Association of Metal Manufacturers
NEC	National Electrical Code
NECA	National Electrical Contractors Association
NEMA	National Electrical Manufacturers Association
NFC	National Fire Code
NFPA	National Fire Protection Association
NWMA	National Wood Manufacturer's Association
NWWDA	National Wood Window and Door Association
NOAA	National Oceanic and Atmospheric Administration (Dept. of Commerce)
OSA	Office of the State Architect
OSHA	Occupational Safety and Health Administration (Dept. of Labor)

PCA	Portland Cement Association
RA	Rule of General Application – Department & Safety
RCSC	Research Council on Structural Connections of the Engineering Foundation
SAMA	Scientific Apparatus Manufacturer's Association
SDI	Steel Deck Institute
SMACNA	Sheet Metal and Air Conditioning Contractor's National Association
SSPC	Steel Structures Painting Council
SSPWC	Standard Specifications for Public Works Construction
SWRCB	State Water Resources Control Board
UBC	Uniform Building Code, International Conference of Building Officials
UL	Underwriters Laboratories, Inc.
USGS	United States Geological Survey
WATCH	Work Area Traffic Control Handbook
WCLIB	West Coast Lumber Inspection Bureau
WCRSI	Western Concrete Reinforcing Steel Institute
WIC	Woodwork Institute of California
WRI	Wire Reinforcement Institute
WWPA	Western Wood Products Association

1.2 Reference Standards

A. Applicable Publications: Whenever in these Specifications / Project Manual references are made to published specifications, codes, standards, or other requirements, it shall be understood that wherever no date is specified, only the latest specifications, standards, or requirements of the respective issuing agencies which have been published as of the date that the Work is advertised for bids shall apply; except to the extent that said standards or requirements may be in conflict with applicable laws, ordinances or governing codes. No requirements set forth herein or shown on the Drawings shall be waived because of any provision of, or omission from, said standards or requirements.

B. Specialists' Assignments: In certain instances, specification text requires (or implies) that specific work is to be assigned to specialists or expert entities, who must be engaged for the performance of that work. Such assignments shall be recognized as special requirements over which the CONTRACTOR has no choice or option. These requirements shall not be interpreted so as to conflict with the enforcement of building codes and similar regulations governing the Work; also they are not intended to interfere with local union jurisdiction settlements and similar conventions. Such assignments are intended to establish which party or entity involved in a specific unit of work is recognized as "expert" for the indicated construction processes or operations. Nevertheless, the final responsibility for fulfillment of the entire set of contract requirements remains with the CONTRACTOR.

C. Codes and Safety Standards: Without limiting the generality of other requirements of the Specifications, all work specified herein shall conform to or exceed the applicable requirements of the following Codes and Safety Standards.

1. Applicable Codes:

    a. City of Torrance Municpal Code
    b. Part 1- 2010 California Standards Administrative Code, Title 24
    c. Part 2- 2010 California Building Code (CBC) Title 24
    d. Part 3- 2010 California Electrical Code, Title 24
    e. Part 4- 2010 California Mechanical Code, (CMC)
    f. Part 5- 2010 California Energy Code
    g. Part 6- 2010 California Fire Code
    h. Part 7- 2010 California Green Code
    i. NFPA 72 National Fire Protection Association (NFPA) Standards

2. Applicable Safety Standards:

    a. OSHA Regulations for Construction
    b. OSHA Standard
    c. Cal-OSHA

    References herein to "OSHA Regulations for Construction" shall mean Title 29, Part 1926, Construction Safety and Health Regulations, Code of Federal Regulations (OSHA), including all changes and amendments thereto.

    References herein to "OSHA Standards" shall mean Title 29, Part 1910, Occupational Safety and Health Standards, Code of Federal Regulations (OSHA), including all changes and amendments thereto.

    References herein to "Cal-OSHA" shall mean State of California, Department of Industrial Relations, as amended to date, and all changes and amendments there to which are effective as of the date of construction.

    The latest edition of the codes as approved and adopted for use by the CITY as of the date of award shall apply to the Work herein, including all addenda, modifications, amendments, or other lawful changes thereto.

D. Standard Specifications: References in the Contract Documents to "Standard Specifications" shall mean the Standard Specifications for Public Works Construction, including all current supplements, addenda, and revisions thereof.

E. Standard Plans: References herein to "Standard Plans" shall mean the Standard Plans issued by the City of Torrance which drawings are hereby incorporated in and made a part of these Contract Documents.

F. Conflict Between Codes, Safety Standards, Reference Standards, Drawings And Other Contract Documents: In case of conflict between codes, reference standards, drawings and other Contract Documents, the most stringent requirements shall govern. All conflicts shall be brought to the attention of the ENGINEER for clarification and directions prior to ordering or providing any materials or labor. The CONTRACTOR shall bid for the most stringent requirements.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01113

DIVISIONS OF TECHNICAL SECTIONS OF PROJECT MANUAL

PART 1 - GENERAL

1.1 The Requirement

A. The Technical Section of the Project Manual, including the General Conditions and General Requirements, are arranged into the Construction Specifications Institute (C.S.I.) sixteen (16) Divisions - Section format. Each "Section" constitutes a unit of work and related "Sections" are grouped under broad generic headings called Divisions. The General Conditions and General Requirements apply to the entire contract.

B. The organization of the Technical Sections of the Project Manual into Division, Sections, and articles shall not control or limit the CONTRACTOR in dividing the work among Subcontractors, a Sub-subcontractor, or to establish the extent of work to be performed by any trade. The CONTRACTOR shall be solely responsible for all subcontract arrangements of work regardless of the Project Manual organization.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01150

STORAGE OF MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.1 The Requirement

A. All materials and equipment shall be stored and protected in accordance with the manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weatherproof, climate controlled enclosures. Where indoor storage is required, the equipment shall be stored inside a completely enclosed building, with the temperature controlled between 60 degrees Fahrenheit and 100 degrees Fahrenheit (60°F – 100°F) and a maximum relative humidity of ninety percent (90%) noncondensing.

B. For exterior storage of material or equipment, the materials or equipment shall be placed on sloped supports above ground. Material or equipment subject to deterioration shall be covered with an impervious covering. Where necessary ventilation and heating shall be provided to avoid condensation.

C. The CONTRACTOR shall exercise all measures necessary to ensure preservation of the quality, quantity, and fitness of the materials or equipment and shall perform the manufacturers recommended maintenance of the material or equipment. The CONTRACTOR shall adequately protect new and existing work and all items of equipment for the duration of the Contract.

D. The CONTRACTOR shall inspect the material and equipment, and submit a written monthly report to the INSPECTOR listing all the equipment stored, the results of their inspection, and the maintenance performed.

E. The materials and equipment shall not show signs of pitting, rust, decay or other deleterious effects of storage when incorporated in to the work.

F. Pumps, motors, electrical equipment, and other equipment with anti-friction or sleeve bearings shall be stored in weather tight structures maintained at a temperature above sixty degrees Fahrenheit (60°F). Electrical equipment, controls, and insulation shall be protected against moisture and water damage. All space heaters furnished in electrical equipment shall be immediately energized and operated continuously until the equipment is placed into service.

G. The CONTRACTOR shall grant the INSPECTOR and ENGINEER access to the storage facility at any time and assist the INSPECTOR and ENGINEER in conducting a full view, piece by piece, inventory of all such material or equipment. Stored materials shall be reasonably accessible for inspection.

H. The CONTRACTOR shall absorb any and all cost incurred to store, protect, and maintain the materials and equipment without modification to the Contract amount.

I. For CITY furnished equipment delivered to the site, the CONTRACTOR shall take all necessary measures to protect the equipment from damage due to the CONTRACTOR'S activities. The CONTRACTOR shall also ensure that all measures required by the CITY'S vendor to preserve and protect their equipment are maintained and are not disturbed including, but not limited to, providing for the continuous operation of space heaters furnished in electrical equipment.

J. The CONTRACTOR shall not, without the CITY'S consent, assign, sell, mortgage, hypothecate, or remove equipment or materials which have been installed or delivered and which may be necessary for the completion of the Contract.

K. Construction materials shall not be stored in streets, roads, or highways unless the CONTRACTOR has received written permission from the City and a permit from the Street Use Division of the Bureau of Street Services, and shall not be stored for more than five (5) calendar days after unloading. All materials or equipment not installed or used in construction within five (5) calendar days after unloading shall be stored elsewhere by the CONTRACTOR at its expense unless authorized additional storage time. Equipment and materials stockpiled on City streets shall not obstruct pedestrian or vehicular traffic, traffic lines of sight, or drainage paths.

L. Excavated material shall not be stored in public streets unless otherwise permitted.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01291

NOTICE TO WITHHOLD AND/OR STOP NOTICE

PART 1 GENERAL

1.1 THE REQUIREMENT

A. When a "Notice to Withhold" or "Stop Notice" is served upon the CITY, or the Board, pursuant to the lien statutes of the State of California, to withhold sufficient funds from payments to the CONTRACTOR in support of a claim resulting from default by the CONTRACTOR in payment for labor or materials used in prosecution of the Contract, the CITY shall withhold from payment due the CONTRACTOR an amount of money equal to the amount of the claim stated in the "Notice to Withhold" or "Stop Notice," and an additional amount equal to twenty-five percent (25%) of the amount of said claim, to defray the costs of litigation in the event of court action on the claim, for a total withholding of one and one quarter (1-1/4) times the stated amount of the claim. At the discretion of the CITY, the CITY may allow the CONTRACTOR to file with the CITY the bond referred to in the Civil Code of the State of California after which said monies will not be withheld on account of such "Notice to Withhold" or "Stop Notice."

B. In the event the Contract is terminated for CONTRACTOR default, any funds due the CONTRACTOR and retained by the CITY in accordance with PARTIAL PAYMENTS of these GENERAL REQUIREMENTS, shall become the property of the CITY to the extent necessary to repay to the CITY any excess in the Contract Price above the cost of the Work completed at the time of termination. After issuance of Notice To Discontinue Work, no further payments will be made to the CONTRACTOR for the Work covered by the notice until completion of work and final settlement has been made.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

SECTION 01295
FINAL PAYMENT

PART 1 - GENERAL

1.1 THE REQUIREMENT

A. Final payment to the CONTRACTOR is made following action by the BOARD that formally adopts the recommendation of the ENGINEER and the INSPECTOR to accept the Contract.

B. After acceptance of the Work by the BOARD and not more than sixty (60) calendar days after filing Notice of Completion, the CITY will make final payment to the CONTRACTOR of the amount remaining after deducting all prior payments and all amounts to be kept or retained under the provisions of the Contract, including the following items:

1. Liquidated damages, as applicable;

2. Lien claims or Stop Notices filed on behalf of suppliers, Subcontractors, and labor performed in connection with the project; except, that upon submittal of a Stop Notice Release Bond issued by an approved Surety Company executed in favor of the CONTRACTOR, the CITY will release such portion of the retainage funds to said CONTRACTOR that is being held solely to cover Stop Notice Claims;

3. No claim of the CONTRACTOR under this Article shall be allowed unless the CONTRACTOR has given the required written notice. Nor shall a claim by the CONTRACTOR for an equitable adjustment hereunder be allowed if asserted after final payment under this Contract.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01312

PROJECT MEETINGS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Work Included:

1. Required to enable orderly review during preconstruction conference and progress of Contracted Work, and to provide for systematic discussion of construction issues and other conflicts arisen, the CONTRACTOR will conduct project meetings throughout the construction period.

B. Related Work:
Documents affecting work of this Section include, but are not necessarily limited to:

1. GENERAL CONDITIONS, DIVISION 1 - GENERAL REQUIREMENTS

2. The CONTRACTOR'S relations with his Subcontractors and materials suppliers, and discussions relative thereto, are the CONTRACTOR'S responsibility and normally are not part of project meetings content.

1.2 SUBMITTALS

A. Conform to provisions of Section 01320 – SHOP DRAWINGS / SUBMITTALS of GENERAL REQUIREMENTS.

B. Agenda Items:

1. To the maximum extent practicable, advise the ENGINEER at least twenty-four (24) hours in advance of project meetings regarding items to be added to the agenda or requesting the cancellation of any Meeting.

C. Minutes:

1. The ENGINEER will compile minutes of each project meeting and will furnish one copy for their records and to the CONTRACTOR, INSPECTOR, ARCHITECT, Consultant, and all other involved parties.

2. Recipients of copies may make and distribute such other copies as they wish.

3. Special denotation mutually agreed by all parties shall be used in Meeting Minutes to identify old and new business, to distinguished new discussion/statement made in subsequent meeting from previous meetings, or any revision to any part of the minutes.

1.3 QUALITY ASSURANCE

A. For those persons designated by the CONTRACTOR to attend and participate in project meetings, provide required authority to commit the CONTRACTOR to solutions agreed upon in the project meetings.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 MEETING SCHEDULE

A. Except as noted below for Preconstruction Meeting, project meetings will be held weekly, or as otherwise directed by the ENGINEER.

B. Coordinate as necessary to establish mutually acceptable schedule for additional meetings.

3.2 MEETING LOCATION

A. The ENGINEER will establish the meeting location. To the maximum extent practicable, meetings will be held in the CITY'S offices.

3.3 PRECONSTRUCTION MEETING

A. Preconstruction Meeting will be scheduled to be held within fifteen (15) working days after the City has issued the Notice to Proceed.

1. Provide attendance by authorized representatives of the CONTRACTOR and major Subcontractors.
2. The ENGINEER will advise other interested parties.

B. Minimum Agenda: Data will be distributed and discussed on at least the following items

1. Organizational arrangement of CONTRACTOR'S forces and personnel, and those of the subcontractors, and materials suppliers.
2. Organizational arrangement of the CITY'S forces and personnel, such as the User's Agency, Project Manager, Consultant(s), CITY'S Scheduler, CITY'S Abatement Consultant, Soils Engineer, CITY'S Surveyor, INSPECTOR and other authorized representatives.
3. Channels and procedures for communication.
4. Construction schedule, including sequence of critical work.
5. Contract Documents, including distribution of required copies of original Documents and revisions.
6. Processing of Shop Drawings and other data submitted to the Consultant/ENGINEER for review.
7. Processing of Bulletin, Addenda, Field Decisions, Requests for Information, and Change Orders.
8. Rules and regulations governing performance of the Work.
9. Procedures for site security, Project quality control, housekeeping, and related matters.
10. It is the responsibility of the CONTRACTOR for Jobsite Safety & First Aid, however, it shall be on the agenda.
11. Procedures to request air monitoring services, soil inspection, survey, etc., if required, shall be provided by the ENGINEER.
12. Emergency Information: The name, addresses, telephone and fax numbers of the CONTRACTOR, and Subcontractors, or their representatives, shall be filed with the CITY prior to start of Contracted Work.

PART 1 -

3.4 PROJECT MEETINGS

A. Attendance

1. To the maximum extent practicable, the Project Superintendent and other representatives who have full knowledge of the project and full authority to act for the CONTRACTOR shall represent the CONTRACTOR at Project Meetings throughout the progress of the Work.
2. Subcontractors, materials suppliers, and others may be invited to attend these Project Meetings in which their aspect of the Work is involved.
3. CONTRACTOR may not cancel or be absent from any meeting without advanced approval from the ENGINEER. The CONTRACTOR must submit a written request with reason to the ENGINEER twenty-four (24) hours before the scheduled meeting. If approved, the CONTRACTOR shall notify all parties of the cancellation.

B. Minimum Agenda:

1. Review, revise as necessary, and approve minutes of previous meeting.
2. Review progress of the Work since last meeting. Review actual starts and finish dates of activities.
3. Review status (total complete and outstanding) of Submittal for approval, Request-for-Information and Change Orders.
4. Identify old and new problems, which impede planned progress, identify responsible party for the follow-up actions. Mutually agree to a common solution and date of correction.
5. Develop corrective measures and procedures to regain lost time on the planned schedule.
6. Review Weekly Progress Reports.
7. Status of Record drawings and the Record Project Manual.
8. Jobsite Walk-Through. Record all discussion and follow-up actions.
9. Any Jobsite health and/or accident or safety issues.

C. Minute reviews and revision:

1. Within one working day of the meeting, the ENGINEER will e-mail the draft of the meeting minutes to the CONTRACTOR. The CONTRACTOR will respond via e-mail with any comments ,corrections, or approval within one working day thereafter. The ENGINEER will incorporate the CONTRACTOR'S comments and corrections and publish the final draft of the minutes within one working day thereafter, with the following statement incorporated into the minutes:

   "These minutes have been reviewed by the City and Contractor and reflect what was stated and agreed upon during the meeting held at (location) in Torrance, CA, on (date)."

2. Unless the final draft of the published minutes are challenged in writing prior to the next regularly scheduled progress meeting, they will be accepted as properly stating the activities and decisions of the meeting.
3. Persons challenging published minutes shall e-mail copies of the challenge to all indicated recipients of the particular set of minutes one working day prior to the next regularly scheduled meeting.
4. Challenges to minutes shall be settled as priority portion of "old business" at the next regularly scheduled meeting.

3.5 SITE MEETINGS

A. Required when necessary to enable orderly review and discussion of site conditions and problems requiring solution during the progress of the contracted work. Notify the ENGINEER of the need for additional site meetings as early as possible to resolve the problem without any impact to the Project Schedule.

B. Provide necessary labor, tools, and equipment such as shoring, scaffolding, ladder, etc. to gain access to the site.

C. CONTRACTOR or CONTRACTOR'S authorized representative shall be present at all times.

D. All discussion and follow-up actions shall be recorded by ENGINEER and the minutes shall be distributed at the next meeting or at earliest time.

SECTION 01323
CONSTRUCTION STATUS REPORTS

PART 1 – GENERAL

1.1 THE REQUIREMENT

A. Weekly Status Report

During the construction phase of the Work, the CONTRACTOR shall submit weekly written status reports to the ENGINEER and the INSPECTOR. The report shall contain a record of inspections and tests, not performed by CITY forces, for all Work accomplished subsequent to the previous report and shall include the following information:

1. Type of work under way during the time frame of the report (e.g., earthwork, concrete work, structural steel erection, equipment manufacturing, component installation).
2. Inspections and tests, and location of inspections and tests that were made.
3. Results of inspections.
4. Reports of tests performed, including those specified, with the results of the tests, and acceptance criteria, including failures and remedial action to be taken. Test results, including all computations, shall be attached to the report form. Where test results cannot be completed by the time the report is submitted, a notation shall be made that the test was performed, including the approximate expected date that test results will be reported
5. Report of any nonconforming items/activities. Nonconformance report forms designed solely for this purpose shall be utilized.
6. Results of inspections of material and equipment done upon their arrival at the Jobsite and prior to their incorporation into the Work. This includes, but is not limited to, compliance with approved submittals, damage, and proper storage requirements.
7. Offsite quality control activities.
8. Instructions received from the ENGINEER or INSPECTOR.
9. In all cases, the report must be verified and signed by the CONTRACTOR'S representative. The verification is to contain the statement that all supplies and materials incorporated in the Work are in compliance with the terms of the Contract except where noted.

B. Monthly Procurement And Delivery Status Report

1. The CONTRACTOR shall prepare and submit to the INSPECTOR and the ENGINEER a comprehensive Monthly Procurement and Delivery Status Report covering the procurement and delivery of equipment and materials to the Jobsite. This report shall outline the purchasing status of all material, equipment and contracts. The purchasing status report shall include the following information:

   a. Specification, purchase order, and Contract number;
   b. Submittal Number;
   c. Item or service description;
   d. Required job site date; and
   e. Project Delivery Date.

   In addition, this report shall contain a three (3) month "Look Ahead Projection" of all factory tests, shipments to be inspected, or any other supplier activity which the CONTRACTOR, the ENGINEER, or the INSPECTOR, has the right to witness and accept. The report shall detail arrangements which are planned for meeting the witnessing and acceptance requirements, and for recording tests passed.

2. The CONTRACTOR shall obtain a submittal schedule for technical data, Shop Drawings, material and test certificates, O&M manuals, spare parts lists, and other submittals, from each supplier. This schedule shall be monitored and updated on a monthly basis and shall be submitted to the INSPECTOR and the ENGINEER with the Monthly Procurement and Delivery Status Report.

C. Miscellaneous Submittals

Required: CONTRACTOR shall prepare a Daily Construction Report recording the following information concerning events at the job-site and submit duplicate copies to the Consultant or ENGINEER at weekly intervals:

1. List of Subcontractors and Sub-Subcontractors at the site, types of works and job location.
2. Approximate count of CONTRACTOR'S personnel at the site, name, type of work and job location.
3. Construction equipments at the site.
4. High and low temperatures, general weather conditions.
5. Accidents and unusual events.
6. Meetings and significant decisions.
7. Stoppages, delays, shortages, losses.
8. Meter readings and similar recordings.
9. Emergency procedures.
10. Inspection, Orders and requests of governing authorities, type of work.
11. Change Orders received, implemented.
12. Services connected, disconnected.
13. Notice of Non-Compliance, Notice-To-Correct, and Job-Memorandum received.
14. Equipment or system tests and start-ups.
15. Preparation of Record Drawings and Project Manual.
16. Equipment or material delivered to site.
17. Partial completions, occupancies
18. Substantial completions authorized.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

SECTION 01330

SHOP DRAWINGS/SUBMITTALS

PART 1 GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall prepare, approve, sign and submit to the ENGINEER any and all Shop Drawings, Manufacturers' Project Data, Job References, Certificates, Wiring Diagrams, Operation and Maintenance Manuals and Samples required by the Contract Documents. Each Volume (1 thru 4), will require independent submittals in the quantity specified regardless of any duplication.

1. NOTE:All references in the Technical Sections under "Shop Drawings" or "Submittal" to the words "approval of" shall mean "reviewed by".

B. The CONTRACTOR, by preparing, reviewing, approving and submitting the Shop Drawings, Manufacturers' Product Data, Job References, Certifications, Wiring Diagrams, Operation and Maintenance Manuals and Samples, represents that the CONTRACTOR has determined and verified all materials, field measurements and filed construction criteria related thereto, and has checked and coordinated the information contained within such submittals with the requirements of the Work, the Project and the Contract Documents.

C. The CONTRACTOR shall inform the ENGINEER, in writing, of any and all deviations and/or questions regarding the Contract Documents, and shall properly identify these areas of concern in the letter of transmittal of the Shop Drawings, Manufacturers' Product Data, Job References, Certification, Wiring Diagram, and Samples for proper written disposition respectively by the ENGINEER. The CONTRACTOR shall provide seven (7) copies of Shop Drawings to the ENGINEER.

D. All Shop Drawings, Manufacturers' Product Data, Wiring Diagrams, Job References, Certifications, Operation and Maintenance Manuals and Samples submitted, shall be accompanied by a preprinted standard transmittal form with submittal number, and shall be addressed to the ENGINEER to be received and filed.

E. The CONTRACTOR is not relieved of the responsibility for any deviation from the requirements of the Contract Documents, by virtue of CONTRACTOR'S approval and submittal of the Shop Drawings, Manufacturers' Product Data, Wiring Diagrams, Operation and Maintenance Manuals and Samples to the ENGINEER. All deviations and/or interpretations of the Contract Documents must be approved in writing by the ENGINEER.

F. The review of the Shop Drawings, Manufacturers' Product Data, Job References, Certifications, Wiring Diagrams, Operation and Maintenance Manuals; and Samples by the ENGINEER does not relieve the CONTRACTOR of its responsibility from any requirements of the Contract Document, or any errors or omissions in such submittals, or for any failure to perform the requirements and intent of Contract Documents.

G. The Shop Drawings shall include such fabrication, erection, and setting drawings; manufacturer's standard drawings or catalog cuts, performance and test data; Job References, Certifications, wiring and control diagrams; schedules; samples; and descriptive data pertaining to material, machinery and

methods of construction as may be necessary to carry out the intent of contract Drawings and Project Manual and shall not relieve the CONTRACTOR from the responsibility for proper fitting and construction of the Work, nor from furnishing materials and Work required by the Contract, which may or may not be indicated on the Shop Drawings.

H. The CONTRACTOR shall perform no portion of the Work requiring submittal and review of Shop Drawings, Product Data, Job References, Certifications, samples, etc. until such submittals have been reviewed by the ENGINEER.

I. Shop Drawings shall show in detail the size, sections and dimensions of all the members, the arrangement and construction of all connections and joints and other pertinent details; also, all holes, straps and other fittings required by other CONTRACTORS for attaching their work. When required by the ENGINEER or by Standard Practice of the CONTRACTOR, engineering computations shall be submitted for the record. The CONTRACTOR shall be responsible to coordinate with other trades, collect all necessary data or information for preparation of shop Drawings and deliver approved copies of Shop Drawings to all others whose work is dependent thereon.

J. At all times, the CONTRACTOR shall maintain, at the site of the project, a complete file of Shop Drawings and Manufacturers' Data of its own and all Subcontractors. All Shop Drawings and Manufacturers' Data shall be reviewed by the CONTRACTOR.

K. Submittals shall be made within the times specified in the various Divisions, of the Project Manual. If time is not specified, they shall be made within a period which will cause no delay in the work. The CONTRACTOR shall allow twenty-one (21) calendar days on the project construction schedule for each item submitted for the review by the ENGINEER.

L. In the event the ENGINEER finds the submittal to be incomplete, it will be returned to the CONTRACTOR for required revised drawings. The CONTRACTOR will revise the drawings and resubmit as directed on original submittals. Any delay resulting from the need for resubmittals shall be the CONTRACTOR'S responsibility.

M. In the event the Contract Documents are prepared by a Consultant Architect or ENGINEER, the pertinent requirements of this Section will be effective, except as follows or as otherwise modified in the Divisions that follow:

1. All references in the Contract Documents to the Consultant shall mean the Consultant Architect or Consultant Engineer.
2. Seven (7) copies of each submittal are to be delivered to the ENGINEER.
3. If submittal is found to be incomplete and revised drawings are required, CONTRACTOR will be notified by the Consultant or ENGINEER.
4. The CONTRACTOR is to revise the drawings as required and to resubmit seven (7) copies of revised Shop Drawings to the ENGINEER.
5. When Shop Drawings are required in accordance with Contract, due to "substitutions" or for "or equal" determination or review as indicated hereinbefore, after final review and approval, two (2) copies, reviewed and signed by Consultant or ENGINEER shall be forwarded to the CONTRACTOR. One (1) copy shall be maintained by the Subcontractor or the Fabricator for the inspection use and the remaining copy shall be maintained by the CONTRACTOR at the Jobsite.

6. Unless otherwise specified for Operation and Maintenance Manuals, seven (7) copies are required and all copies should be delivered to the ENGINEER for review and distribution to the maintenance staff. After review and approval by the ENGINEER, the CONTRACTOR will receive a letter of acceptance of Operation and Maintenance Manual Submittal.

N. In the event the Contract Documents are prepared by CITY personnel, seven (7) copies of each submittal, or four (4) copies of each Operation and Maintenance Manuals, shall be sent to the ENGIENEER by the CONTRACTOR for review. Distribution requirements described in Items M.5 and M.6 hereinbefore remain effective.

O. CONTRACTOR'S Coordination:

1. Consultant or ENGINEER will return and will not review unrelated submittals
2. The CONTRACTOR may be required to provide drawings, setting diagrams and similar information necessary for proper coordination of Contracted Work. Such data shall remain between the CONTRACTOR and CONTRACTOR'S Subcontractor and will not be reviewed by the Consultant or ENGINEER unless specifically called for in the Contract Documents.
3. Consultant or ENGINEER will not review any required Structural Shop Drawings, Structural Calculations, etc., not prepared or signed by a State of California licensed ENGINEER.
4. Consultant or ENGINEER will return and will not review any submittal requiring coordination with other submittals until such other submittals or required information is received by the Consultant or ENGINEER.

P. CONTRACTOR'S Submittals: CONTRACTOR'S submittals required for performance of Contracted Work, shall include, but are not limited to, the following:

1. Contract Price (Cost Breakdown).
2. Construction Schedule and Notification to ENGINEER of completion of each milestone or percentage increment of the Work as required.
3. Submittal Schedule.
4. Daily Construction Reports.
5. Shop Drawings and Structural Calculations.
6. Structural, HVAC, Plumbing and Electrical Composite Drawings.
7. Manufacturer's Data and Specifications.
8. Samples.
9. Templates.
10. Certificate of Compliance.
11. Construction Photographs.
12. Substitutions.
13. Record Drawings and Record Project Manual.
14. Operation & Maintenance Manuals.
15. Stock Materials, Spare parts, tools.
16. Material Testing Results.
17. Daily Statements of cost-plus percentage Change Order.
18. Copies of Notice-To-Correction or Notice of Non-Compliance from governing authorities.
19. Maintenance Logs and Maintenance Schedule.

Q. Administrative Submittals include, but are not limited to the following:

1. Permits.
2. Request for Payments.
3. Performance and Payment Bonds.
4. Insurance Certificates.
5. List of Subcontractors and proof of qualifications.
6. Hazardous Communication Program.
7. Certified weekly payroll records.
8. Ethnic Composition of Work Force Report.
9. Third Party Testing Agency.

R. CONTRACTOR shall conform to the provisions of the Contract Document and as may be specifically directed by the Consultant or ENGINEER.

1. Preparation and processing of submittals shall be coordinated with Contracted Work operations, which includes fabrication, purchasing, and delivery of work items so as not to delay Contracted Work operations.
2. In each copy of the Submittal, mark every applicable material, product, equipment, manufacturer's data, product information, color samples, rating or values, part and model numbers, etc. by red color circle. Each of the submittal items must be clearly distinguishable from other unrelated or similar items listed in the Manufacturer's Catalog or Technical Specifications, Manuals, etc.

S. Coordination and Submittals:

1. Carefully review and coordinate all aspects of each item being submitted.
2. Carefully review contract drawings and technical sections, verify all work as laid out or indicated meeting the applicable codes and standards.
3. Ensure ample time for reviewing and processing of the submittals by the CITY or other authorized agencies, delays resulting from improper and untimely submittals shall be the responsibility of the CONTRACTOR.
4. Verify that all such submittal items conform to the Project Manual requirements noted in the Technical Sections.
5. Verify all site conditions and provide all required dimensions and measurements in Shop Drawings.
6. Where necessary, review the CITY'S comments, make changes and resubmit to local governing agencies for approval. Furnish the ENGINEER copies of the approved plans or drawings for review.
7. Submit Composite Drawings: Include dimensioned plans, elevations, sections and details and give complete information particularly as to the kinds and types of materials and equipment, size and location of sleeves, inserts, attachments, chases, openings, conduits, ducts, boxes, lighting, structural interferences.
8. Coordinate these Composite Drawings and field layouts in the field for proper relationship to work of applicable trades based on field conditions. Contractor shall have competent personnel readily available for coordinating, checking, and supervision of field layouts.

9. Do not start installation of work involved under Composite Drawings until applicable submittal is reviewed by the Architect. Discrepancies between the Drawings and Composite Drawings shall be specifically noted and identified on the Composite Drawings.
10. Drawings for the various trades involved shall be submitted as required and reviewed prior to preparation of Composite Drawings.

T. CONTRACTOR shall affix to each submittal, the CONTRACTOR'S signature certifying that required coordination has been performed and include on an attached label for processing and recording action taken, noting the following:

1. Name of the Project.
2. Date of the Submittal.
3. Name and address of Consultant.
4. Name and address of the CONTRACTOR.
5. Name and address of the Subcontractor(s).
6. Name and address of the Supplier.
7. Name and address of the Manufacturer.
8. Reference to Specification Section Number and Title.
9. Reference to Drawing Sheet Number and detail number(s).
10. Submittal Number.
11. Priority Number and expected return date.

U. CONTRACTOR shall appropriately package and label each submittal for transmittal and handling from CONTRACTOR to Consultant or ENGINEER using a preprinted standard transmittal form verifying that the CONTRACTOR has met the following CITY requirements:

1. Conformance in all respect to the Contract Document requirements.
2. Has reviewed and coordinated all aspects of each submitted item relative to manufacturer's product data, Specifications, etc.
3. Has verified with site conditions and all dimension
4. That all questions and/or comments prepared by the Consultant or ENGINEER have been reviewed and answered.
5. CONTRACTOR is not relieved from responsibilities for errors, omissions and any deviation in the required submittals as revealed resulting from the CITY'S or Consultant's review of such submittals.
6. CONTRACTOR shall add and sign the following paragraph on all submittals:

"It is hereby certified that the items and description shown and marked in this submittal is that proposed to be incorporated into the project; is in compliance with the Contract Drawings and Project Manual and can be installed in the allocated space."

Failure to add the above written statement for compliance will result in return of submittals without review.

7. In each Section of the Project Manual, all required lists of material, product or equipment; manufacturer's data; and etc., shall be appropriately grouped and submitted to the CITY for review as one submittal. Piece meal submittals will not be acceptable.

8. Any submittal with outstanding product data, manufacturer's specification or any required information shall deem to be incomplete and subject for rejection without any review. Subsequent submittal shall be considered as second submission.
9. For Division 16 - ELECTRICAL, CONTRACTOR may submit all required list of material, product or equipment, manufacturer's data, wiring diagram, product information and etc., from various Sections in one submittal.
10. For Division 5 - STRUCTURAL STEEL, Division 15 – PLUMBING and HEATING, VENTILATING & AIR CONDITIONING, CONTRACTOR may submit the required lists of material, products, equipments, manufacturer's data, product information, color or material samples, structural calculations, and etc., of each section in two separate submittals. Each submittal shall be allowed for two (2) submissions or reviews without additional charge. In the first submittal, CONTRACTOR shall provide a complete list of submittal items and a list of the outstanding product data, manufacturer's specification and etc., to be submitted in the second submittal. Failure to submit said listings shall deem the submittal to be incomplete and causing the submittal to be rejected without review.
11. All Shop Drawings shall be provided with dimensions and measurements verified at the site as stated hereinbefore. If the CONTRACTOR decides to submit the dimensions and measurements at a later time, the CONTRACTOR must state the reason, for the ENGINEER'S approval, why the dimensions and measurements cannot be taken. If approval is granted, the CONTRACTOR shall re-submit the approved submittal with the final dimensions and measurements after the Works are completed. The CONTRACTOR is not relieved from the responsibilities of error and omission, or any problem that may arise during the fabrication or installation.
12. It is considered reasonable that the CONTRACTOR shall make a complete and acceptable submittal to the ENGINEER or Consultant by the second submission of a submittal item. The CITY reserves the right to withhold moneys due to the CONTRACTOR to cover additional costs of the ENGINEER or Consultant's review beyond the second submittal. On the third submittal by CONTRACTOR, the CONTRACTOR will be charged $100 per hour of CITY'S or Consultant's review time and no additional Contract time shall be allowed.

V. Comply with pertinent provisions of the GENERAL CONDITIONS and GENERAL REQUIREMENTS as applicable, but not limited, to the following:

1. Record Drawings, Record Project Manual, Record Product Data, Record Sample and Record Submittals.
2. Operation and Maintenance Manuals.
3. Manufacturer's Reference Data.
4. Qualification of CONTRACTOR.
5. Certification of Warranty and Guarantee.
6. Manufacturer's Recommended Installation Procedures.
7. Materials List of items proposed to be provided as specified in the Technical Sections of the Project Manual.
8. Samples, illustrating assembly details, workmanship, fabrication techniques, connections, color selection to be submitted as specified in the Technical Sections of the Project Manual.
9. Regarding Concrete Work, submit Portland Cement Mill Certificates, Concrete Mix and Curing Designs, Load Tickets and Product Data.

10. Regarding shop-Inspected fabricated items, submit Shop INSPECTOR Tag, copy of the billing of lading, delivery receipt for materials or equipment.
11. Submit samples and mock-ups as required in the Project Manual.

W. The CONTRACTOR shall comply with all submittal requirements in the Contract Documents.

X. CONTRACTOR shall submit requests for changes in products, materials, equipment and methods of construction required by the Contract Documents, and all submittals shall conform to the provisions of Section 01630 – SUBSTITUTIONS AND "OR EQUAL" SUBMITTAL of the GENERAL REQUIREMENTS of the Project Manual immediately after the issuance of Notice-To-Proceed.

1. All substitution requests shall be made by the CONTRACTOR and shall imply the CONTRACTOR'S approval of such substitutions.

Y. The Following Are Not Considered As Substitutions:

1. Substitutions requested by Bidders during the bidding period or prior to award of contract will not be considered or accepted.
2. Revisions to Contract Documents requested by the ENGINEER or the Consultant.
3. Specified options of products and construction methods included in Contract Documents.
4. The CONTRACTOR'S determination of and compliance with governing regulations and orders issued by governing authorities.

Z. CONTRACTOR shall perform no portion of the Contracted Work requiring submittal and review of Shop Drawings, Product Data, Samples, etc. until such submittals have been reviewed by the Consultant or ENGINEER. All work not shown on Shop Drawings or not conforming to Contract shall be removed without additional cost to the CITY.

AA. CONTRACTOR shall be responsible for procurement and installation of equipment or material without deviation upon receipt of the reviewed submittal from the ENGINEER or Consultant bearing the stamp "APPROVED" or "PROCEED". Be responsible for the coordination with other trade, proper fitting and construction of the work, furnishing other material and work required which may not be indicated on the Contract Drawings or Submittals. All submittals shall be reviewed by the CITY for general design or compliance. CONTRACTOR will be responsible for deviation from the drawings or Project Manual, and for errors or omissions of any sort in the Submittals.

BB. CONTRACTOR shall review and attend to all "AS NOTED" and/or comments as noted by the ENGINEER or the Consultant on the Submittal. Make corrections or modifications to equipment or material and resubmit as required.

CC. CONTRACTOR shall omit any article disapproved or noted "REJECT" or "DO NOT PROCEED" by the ENGINEER, or any article not conforming to the contract, or not of proper quality or grade and provide suitable articles, in lieu thereof in conforming with the Contract.

DD. CONTRACTOR shall resubmit all submittals with corrections as noted by the ENGINEER or the Consultant or as required in timely manner without delay or impact to the contract.

1.2 COMMISSIONING DATA AND SUBMITTAL PROCEDURES

A. CONTRACTOR shall submit one copy of the approved shop drawings and equipment specifications for equipment specified in Divisions 15 and 16 to be commissioned for coordination with commissioning tests.

B. Two weeks prior to the beginning of functional testing of installed equipment, the contractor shall submit full warranty information and equipment data for commissioned equipment to the ENGINEER. This shall include:

1. The sub contractor's warranties (unsigned).
2. Manufacturer's equipment warranties.
3. Copies of installation and checkout materials shipped with the equipment including data sheets showing factory testing, serial numbers, and the like.
4. Warranties shall include a description of the owner's responsibilities in keeping the warranty in force.

C. At any time, the ENGINEER may request further documentation necessary for the commissioning process, as it relates to submittals, warranties, Operations & Maintenance materials, and general questions.

PART 2 - PRODUCTS
NOT USED

PART 3 - EXECUTION
NOT USED

SECTION 01421

SYMBOLS

PART 1 - GENERAL

1.1 THE REQUIREMENT

A. The symbols as shown shall mean:

Symbol	Definition
Δ	Delta, the central angle or angle between tangents
∠	Angle
%	Percent
'	Feet or minutes
"	Inches or seconds
#	Number
/	Per or (between words)
°	Degree
℄	Property line
℄	Centerline
℄	Survey line or station line

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 01520

CONSTRUCTION FACILITIES AND SITE PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section describes construction facilities, site protection, and temporary controls required for the Contracted Work at the Jobsite.

B. Related Work:

1. Documents affecting Work of this Section include, but are not necessarily limited to, the GENERAL CONDITIONS, DIVISION 1 - GENERAL REQUIREMENTS and other Sections of the Project Manual.
2. Disconnect all abandoned utility connections or hook ups or existing utility not indicated to remain in place.
3. Permanent installation and hookup of the various utility lines are described in other Sections.
4. Obtain all necessary permits for the installation of temporary facilities and controls.

1.2 REQUIREMENTS

A. Provide construction facilities, temporary controls, and complete installation needed for the Contracted Work including, but not necessarily limited to:

1. Temporary utilities such as water, heat, ventilation, electricity, and telephone;
2. Field Office for the CONTRACTOR'S personnel and meeting use;
3. Sanitary facilities;
4. Enclosures such as tarpaulins, barricades, and canopies;
5. Temporary fencing of the construction site; including removal and disposal of existing fencing.
6. Construction signs;
7. Plan box;
8. Temporary partitions;
9. Job Office(s) for the INSPECTOR, ENGINEER, and Consultant.

1.2 SUBMITTALS

A. Comply with the applicable provisions in GENERAL CONDITIONS, GENERAL REQUIREMENTS and other Sections of the Project Manual for review, approval or verification.
B. Submit Shop Drawings of Construction Sign to the ENGINEER for approval.
C. Submit all certification of insurance and bonding, and photographs of off-site storage area.
D. Submit duplicate copy of permits, transfer of rental fencing and utility billings.

1.3 DELIVERY, STORAGE AND HANDLING

A. Deliver temporary facilities and controls to the Jobsite and store at location where approved by the CITY or ENGINEER.

B. Maintain temporary facilities and controls at the Jobsite in proper and safe condition throughout progress of the Contracted Work.

C. Handle temporary facilities and controls in a manner prescribed by the ENGINEER to least interrupt existing facility operations.

D. Provide labor and equipment to relocate the INSPECTOR'S and ENGINEER'S Job Office to a new facility or location during the course of the Contract. New facility shall be properly equipped and conformed to the requirements shown in Subsections 2.2, Field Offices and Sheds, herein. The CONTRACTOR shall obtain the ENGINEER'S approval of new location thirty (30) days in advance.

E. The CONTRACTOR shall give the CITY thirty (30) days advance notice for relocation of the INSPECTOR'S and ENGINEER'S Job Office due to the Contract Work. The CONTRACTOR shall provide temporary power, telephone, adequate lighting and security at the new location.

PART 2 - PRODUCTS

2.1 UTILITIES

A. Water:

1. CONTRACTOR to arrange with the CITY's Water and Power providers, assume all costs to remove all existing connections to water facilities, make new connection for construction water including water as necessary for required tests. CONTRACTOR shall make transfer of billing of any existing water facilities prior to start of work. CONTRACTOR shall deliver duplicates of such transfer to the ENGINEER.

B. Heating:

1. Provide and maintain required temporary heat at no cost to the CITY for proper conduct of Contracted Work operations, conforming to all requirements of the City of Torrance.

C. Temporary Ventilation

1. Provide adequate means to furnish temporary ventilation within Work areas at CONTRACTOR'S own expense and conforming to applicable requirements and stan¬dards of Federal, State, County and the City of Torrance Building Codes and Amendments.

D. Temporary Light and Power:

1. CONTRACTOR to arrange with CITY's Water and Power providers; to assume all costs; to remove all existing connections to power facilities; and to make new connections for construction light and power including light and power as necessary for required tests. CONTRACTOR shall maintain all necessary facilities or operations, and turn off all unnecessary equipment. CONTRACTOR shall make transfer of billing of any existing power facilities prior to start of work. CONTRACTOR shall deliver duplicate copy of such transfer to the ENGINEER.

E. Telephone:

1. CONTRACTOR to arrange with the Telephone Company; to assume all costs and pay for all calls made on job telephone, job fax machine, and INSPECTOR'S and ENGINEER'S job fax machine(s)

and telephone(s) to be so located in the job INSPECTOR'S and ENGINEER'S offices. The INSPECTOR'S and ENGINEER'S job telephone shall be for CITY personnel use only.

F. Gas for Tests (if required):

1. CONTRACTOR to arrange with the Gas Company and to assume all costs.

2.2 FIELD OFFICES AND SHEDS

A. CONTRACTOR'S Facilities:

1. CONTRACTOR shall locate "Storage Area" at a location designated on the plans or where approved by the ENGINEER for the safe storage of CONTRACTOR'S materials, tools, equipment, field office, and sanitary facilities. This area shall be fully enclosed, with adequate temporary fencing, gates, partitions and/or doors. This area shall be kept in a clean, safe and orderly condition at all times. Exercise care not to damage existing facilities, structures and/or equipment. If necessary, provide temporary lighting from existing sources at the Jobsite as directed by the ENGINEER. Upon completion of Contracted Work, remove all temporary fencing, gates, doors, or enclosures and leave the area free of materials, tools, equipment, field office, sanitary facilities, and in a broom clean condition.

2. CONTRACTOR shall provide, if required, an adequate size temporary shed for the safe storage of materials and equipment. The shed shall be located where approved by the ENGINEER. The shed shall be weather tight with a wood floor above grade. The shed shall be removed from the Jobsite upon the completion of Contracted Work or when so ordered by the ENGINEER.

B. Sanitary Facilities:

1. Adequate sanitary conveniences of an approved type for the use of persons employed on the Work, and properly secluded from public observation, shall be provided and maintained by the CONTRACTOR in such a manner and at such points as shall be required or approved by the ENGINEER. These conveniences shall be maintained at all times without nuisances and their use shall be strictly enforced. Upon completion of the Contracted Work, they shall be removed from the premises, leaving the premises clean and free from a nuisance.

C. Potable Water Facility:

1. Adequate potable water facility of an approved type for the use of all persons employed on the Work, shall be provided and maintained by the CONTRACTOR in such manner to be required or approved by the ENGINEER. The potable water facility shall be disinfected clean and equipped with sink, soap, paper towels and maintained clean at all time without nuisances. CONTRACTOR shall provide water supply for the public use, and required drain system.

D. Job Bulletin Board:

1. Provide and mount on the CONTRACTOR'S Field Office, where it can be readily seen by the CONTRACTOR'S employees, a substantially built 3-feet high x 4-feet wide bulletin board, with a framed glass door protected on the outside with a 2-inch x 2-inch galvanized mesh and lock.

E. Job Office:

1. The CONTRACTOR shall provide a facility for the INSPECTOR for the entire period of construction or until ENGINEER directs its removal. The location shall be as directed by the ENGINEER. The construction shall be temporary; weather tight; 12-feet by 48-feet (single wide), 576 square foot floor area handicapped-accessible; horizontal sliding windows with screens and security bars; two steel doors with commercial grade security locksets; furniture shall be provided as indicated on the SK-02 - CONSTRUCTION FACILITIES LAYOUT (INSPECTOR), nominal 8-foot ceiling height, paneled or vinyl gypsum walls, carpet floors, T-grid ceiling, fluorescent ceiling lights, 120/240 volt single phase electric, exterior wood siding, I-beam or perimeter frame, and standard drip rail gutters. Bottled drinking water in a water cooler provided by the CONTRACTOR during the course of the contract or a minimum of 15 months; electrical power shall be provided with duplex convenient outlets; provide operational telephone lines and outlets as indicated on the SK-02 - CONSTRUCTION FACILITIES LAYOUT (INSPECTOR). Provide central HVAC of sufficient capacity to control the temperature at all times, including air-conditioned meeting rooms with conference tables, minimum of ten (10) chairs and utilities for construction meeting in each meeting room.

   a. The CONTRACTOR shall provide, for the duration of the project, and an additional six months, the following new equipment (including installation, maintenance, insurance, and setup, which also apply to the computers and wireless network with its associated 128 bit security encryption):

      1) One (1) separate fax machines with dedicated phone line.
      2) One (1) combination LaserJet Color Printer: Integrated Ethernet, 802.11b, USB connectivity, scanner function, HEWLETT-PACKARD, Model: HP Officejet # 7300 (Q5562A) or equal.
      3) One digital phone per section 2.1.E.
      4) One dedicated DSL phone line for computer access to the Web.
      5) One (1) notebook computer (with leather case): Pentium M 2 GHz, 400 MHz Data Bus Speed, 1 GB DDR SDRAM, 60 GB IDE hard drive, CD-RW/DVD, minimum 15 inch display, Integrated Ethernet/IEEE 802.11b, IEEE 802.11g, connections, 56Kbps fax/modem, SanDisk Mini 256 MB USB 2.0 flash drive, Windows XP Professional, Microsoft Office XP (most recent version), Adobe Acrobat 7.0 Professional (or most recent version), Norton Anti-Virus (most recent version) license, DELL, Model: LATITUDE D800 or equal.
      6) One (1) Digital Camera with MMC/128 MB Multimedia Card for each, HEWLETT-PACKARD, Model: HP Photosmart R707 or equal

2. The Job Offices and furniture shall be new or in good and clean condition at the time of delivery and subject to the approval of the ENGINEER. The CONTRACTOR shall provide all maintenance materials such as the toners for the fax machine and photocopier. The CONTRACTOR shall provide maintenance and insurance service agreement for the Job Office and equipment mentioned above during the course of the Contract and Extra Work. All equipment shall be returned to the CONTRACTOR after the acceptance of the contract. CONTRACTOR shall make reference to the CONSTRUCTION FACILITIES LAYOUTS. Any items not shown on the CONSTRUCTION FACILITIES LAYOUTS that are mentioned here are not meant as an omission and shall be provided by the CONTRACTOR. Any items not mentioned here that are shown on the

CONSTRUCTION FACILITIES LAYOUTS are not meant as an omission and shall be provided by the CONTRACTOR.

3. Provide for duration of the contract a weekly janitorial service, and maintenance agreement for all equipment provided under this Section.

4. The CONTRACTOR shall utilize the Bond Program, E2020 web-based document control system. The website address will be provided by the PROJECT MANAGER after award of the contract. The information to be generated, transmitted and tracked by the document control system shall include, but not be limited to the following:
   a. Correspondence
   b. Requests for Information
   c. Shop Drawings
   d. Plan Clarifications
   e. Meeting Minutes
   f. Change Orders
   g. Progress Photos
   h. Project Schedules
   i. Field Orders/Memos
   j. Daily Reports
   k. Inspections and Testing Reports
   l. Non-Compliance Notices
   m. Punch Lists

   In addition to hard copies, the CONTRACTOR shall submit all incoming documentation to the City in Adobe Acrobat (PDF) format or other electronic format acceptable to the City. The CONTRACTOR shall be responsible for the installation of their own computer hardware and the procurement of an Internet Service Provider (IPS) with a broadband Internet connection to access the City's document control system.

2.3 ENCLOSURES

A. The CONTRACTOR shall exercise precautions at all times for the protection of persons and property.

B. CONTRACTOR shall furnish, or cause to be furnished, and maintained for the duration of Contracted Work, all scaffolds, covers, tarpaulins, canopies, warning signs, steps, bridges and other temporary construction and other protective devices as required by the INSPECTOR and the Local and State Rules, Ordinances and/or Regulations necessary for protection of public and private property and the public safety.

C. Such enclosures shall be of reasonable good appearances and shall be maintained free of signs, posters, writing, markings and any other thing, which would detract from reasonably good appearance.

2.4 TEMPORARY FENCING AND GATES

A. Requirement:

1. Provide and maintain for the duration of the Contracted Work temporary plywood or chain link fencing, minimum six (6) feet high, as specified by the ENGINEER, of design and type needed to prevent entry onto the Jobsite and exterior Work area by the public.

B. Construction shall conform to the City of Torrance Building Code and Amendments where adjacent to any public way.

C. Plywood Fence and Canopy Along the Property Line where Adjacent to Public Way:

1. Required by the CITY of Torrance Building Codes and Amendments along the property lines where adjacent to a public way; apply two coats of an exterior semi-gloss enamel and Anti-Graffiti Coating.
2. Plywood fences shall be constructed on concrete foundation and subject to the wind force or other loading.
3. Paint Color shall be as directed by the CITY ENGINEER.
4. Any company logo or other posting is prohibited.
5. Remove graffiti (if any) once a week during the Contract time.

D. Chain Link Fence:

1. Where required, conform to the City of Torrance Building Code and Amendments and Standard Specifications for Public Works Construction.
2. Provide an approved six (6) foot high chain link fence with three (3) foot high barbed wire and metal supports above the fence. All vertical poles and horizontal rails, tension bars, etc. shall be in conformance with the Standard Specifications for Public Works Construction.

E. Chain Link Fence and/with an Opening Along Property Lines:

1. Provide an approved 6-foot high chain link fence and gate with metal supports along the property lines and/or at openings to prevent access to the Jobsite.

F. Chain Link Fence Outside Of Property Lines:

1. CONTRACTOR shall obtain all necessary written approvals from the ENGINEER and the local authorities having jurisdiction prior to erecting any temporary fencing. CONTRACTOR shall remove all fencing and repair all sidewalks or existing improvements after completion of Contract.

2.5 PLAN BOX

A. Purpose: For the storage of a full set of Contract Drawings and Project Manual.

B. Duration: During the entire Contracted Work period or until the INSPECTOR directs its removal.

C. Location: Where directed by the INSPECTOR, for location in close proximity of the CONTRACTOR'S Field Office on the Jobsite

D. Construction: The box shall be of size to contain the Contract Drawings and the Project Manual, shall be temporary, weather tight, with cover, lock and proper identification.

2.6 CONSTRUCTION SIGN

A. Design: Per City of Torrance requirements.

B. Materials:

1. Base: 4-inch x 4-inch redwood, C.R.A. Foundation grade.
2. Sign Frame: Douglas fir solid stock, W.C.L.I.B., and Better, V.G. Finish, 2-inch x 4-inch.
3. Metal Panel: No. 22 gauge sheet steel.
4. CITY Seal: Provided by ENGINEER.

C. Fabrication:

1. Securely attach frame to posts with adequate fasteners.
2. Miter and nail frames, conceal fastenings and set nails.
3. Secure a sheet metal panel to frame with wood stops.

D. Painting:

1. By sign painters.
2. On all surfaces of posts, panel and frame, 1 coat of primer and 1 coat of finish paint on concealed surfaces not glued; 1 coat of primer and 2 coats of finish paint on exposed surfaces, and anti-graffiti coating.
3. With exterior wood primer and exterior oil paint, as specified in Section 09900.
4. White finish on all surfaces; black letters and black frame reveal.

E. Installation:

1. Set posts into natural ground; location as directed by the ENGINEER or where indicated on the Contract Drawings.

F. Removal:

1. Upon completion of Contracted Work or when directed by the ENGINEER.

G. Modifications:

1. During the course of the Contract, the CONTRACTOR may be required to make changes to lettering, as directed by the ENGINEER, up to forty (40) letters regardless of the letter size, without additional cost to the CITY.
2. Repair and recoat the modified area in a manner that will eliminate the evidence of the changes.

2.7 GUARD SERVICE

A. Contractor shall provide guard service at his sole discretion, in order to maintain the safety and security of the site.

B. Contractor shall provide off-hour guard service between the date of Substantial Completion, and the date of the occupancy. A cash allowance of $18,000 is provided for this service.

PART 3 - EXECUTION

3.1 MAINTENANCE AND REMOVAL

A. The CONTRACTOR shall provide temporary facilities and control as soon as possible. The CONTRACTOR shall commence Contract Works and provide security and protection to existing facility and Jobsite within 15 calendar days from the Notice-To-Proceed.

B. CONTRACTOR shall maintain temporary facilities and controls as long as needed for safe and proper completion of the Contracted Work.

C. Temporary fencing and gate(s) shall be with a double-locking method to allow dual access by the CITY Employee and CONTRACTOR.

D. CONTRACTOR shall remove such temporary facilities and controls as rapidly as progress of the Contracted Work will permit, or as directed by the ENGINEER.

E. CONTRACTOR shall repair all streets or yard paving to the original conditions.

END OF SECTION

SECTION 01561

ENVIRONMENTAL CONTROL

PART 1 - GENERAL

1.1 THE REQUIREMENT

A. Explosives for Blasting

1. The use of explosives for blasting purposes on the work shall not be permitted.

B. Fugitive Dust and Smoke Control

1. The CONTRACTOR shall furnish all labor, equipment, and means required and shall carry out effective measures wherever and as often as necessary to prevent its operation from producing dust in amounts damaging to property, cultivated vegetation, or domestic animals, or causing a nuisance as defined by the INSPECTOR. The CONTRACTOR shall be responsible for any damage resulting from any dust originating from its operations. The dust abatement measures shall be continued until the CONTRACTOR is relieved of further responsibility by the INSPECTOR. No separate payment shall be allowed for dust abatement measures and all costs thereof shall be included in the CONTRACTOR'S Bid. The use of water resulting in mud on streets, sidewalks, driveways, shall not be permitted as a substitute for sweeping or other methods of dust control.
2. The CONTRACTOR shall not discharge smoke, dust, or any other air contaminants into the atmosphere in such quantity as will violate the regulations of any legally constituted authority.
3. The CONTRACTOR shall comply with the requirements of Title 8, California Code of Regulations, concerning handling of asbestos dust.

C. Rubbish Control

1. Through all phases of construction, including suspension of Work and until final acceptance of the Project, the CONTRACTOR shall keep the Worksite and other areas used by it in a neat and clean condition, and free from any accumulation of rubbish and debris. The CONTRACTOR shall dispose of all rubbish and waste materials of any nature occurring at the Worksite and shall establish regular intervals of collection and disposal of such materials and waste. The CONTRACTOR shall also keep its haul roads free from dirt, rubbish, and unnecessary obstructions resulting from its operations. Care shall be taken to prevent spillage on haul routes. Any such spillage shall be removed immediately and the area cleaned by the CONTRACTOR. Equipment and material storage shall be confined to areas approved by the INSPECTOR. Disposal of all rubbish and surplus materials shall be off the site of construction, at the CONTRACTOR'S expense, all in accordance with local codes and ordinances governing locations and methods of disposal, and in conformance with all applicable safety laws, and the requirements of the OSHA Safety and Health Standards for Construction. All cleanup cost shall be included in the CONTRACTOR'S Bid.

D. Sanitation

1. Fixed or portable chemical toilets shall be provided for the use of the CONTRACTOR'S employees. These accommodations shall be maintained in a neat and sanitary condition. Toilets at construction sites shall conform to the requirements of Title 8, California Code of Regulations.

2. Wastewater conveyance and disposal shall not be interrupted. Should the CONTRACTOR disrupt existing sewer facilities, sewage shall be conveyed in closed conduits and disposed of in a sanitary sewer system. Sewage shall not be permitted to flow in trenches or be covered by backfill.

3. The CONTRACTOR shall establish a regular schedule for collection of all sanitary and organic waste. All wastes and refuse from sanitary facilities provided by the CONTRACTOR or organic material wastes from any other source related to the CONTRACTOR'S operations shall be disposed of away from the site in a manner satisfactory to the INSPECTOR and in accordance with all laws and regulations pertaining thereto. Disposal of all such wastes shall be at the CONTRACTOR'S expense.

E. Chemicals

1. The following paragraph does not relieve the CONTRACTOR from its responsibility for obtaining prior approval from the ENGINEER for chemical usage when otherwise required.
2. The CONTRACTOR shall provide four (4) copies of the MSDS to the INSPECTOR for all chemicals used during project construction or furnished for project operation, prior to bringing them on site, whether defoliant, soil sterilant, herbicide, pesticide, disinfectant, polymer, reactant, or of other classification, which shall show approval of either the U.S. Environmental Protection Agency or the U.S. Department of Agriculture. Use of all such chemicals and disposal of residues shall be in strict accordance with the printed instructions of the manufacturer and with all other applicable laws and regulations.

F. Lead paint notification

1. The CONTRACTOR is hereby notified that the facility, or facilities, demolished under this Contract may contain Lead (Pb), Chromium (Cr) and Molybdenum (Mo).
2. If any paints containing Lead or Chromium are to be physically disturbed or made airborne during the progress of the Work by activities such as abrasive blasting, welding, cutting, or torch burning, the CONTRACTOR shall provide appropriate worker protection in accordance with OSHA Lead in Construction Standard and in any other applicable regulations.
3. All paint which is removed or disturbed during the progress of the Work or any demolition debris which contains these paints, either of which contains in excess of 5 ppm (mg/l) Lead or Hexavalent Chromium when tested in accordance with the Waste Extraction Test (WET) method of the California Code of Regulations, Title 22, shall be disposed of as hazardous waste. The CONTRACTOR shall be responsible for such disposal in accordance with all applicable laws and regulations.

G. Hazardous Waste

1. Hazardous waste generated by the CONTRACTOR at the site shall be disposed of in accordance with NOTIFICATION OF HAZARDOUS SUBSTANCES of the General Conditions.

H. Odor Control

1. The CONTRCTOR shall furnish all labor, materials, and equipment required and shall carry out effective measures whenever and as often as necessary to prevent the discharge of a nuisance odor from its operation into the atmosphere in such quantity as will violate the regulations of any legally constituted authority. During construction, the CONTRACTOR

shall notify the ENGINEER and the INSPECTOR at least forty-eight (48) hours in advance when potential odor-causing activities are scheduled for construction.

I. Drainage Control

1. The CONTRACTOR shall maintain drainage within and through the Work areas. Earth dams will not be permitted in paved areas. Temporary dams of sandbags, asphaltic concrete, or other acceptable material will be permitted when necessary. Such dams shall be removed from the site as soon as their use is no longer necessary.

J. Graffiti Control

1. Throughout all phases of Work, including suspension of work, and until final acceptance, the CONTRACTOR shall keep all equipment, field offices, storage facilities and other facilities free of graffiti. Graffiti shall be painted over, masked or cleaned off within twenty-four (24) hours after notification by the INSPECTOR

K. Vermin Control

1. At the time of acceptance, structures entirely constructed under the Contract shall be free of rodents, insects, vermin, and pests. Necessary extermination work shall be arranged and paid for by the CONTRACTOR as part of the work within the contract time, and shall be performed by a licensed exterminator in accordance with requirements of governing authorities. The CONTRACTOR shall be liable for injury to persons or property and responsible for the elimination of offensive odors resulting from extermination operations.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

SECTION 01611

GUARANTY/WARRANTY

PART 1 - GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall and does hereby warrant and guaranty that all work executed under this Contract will be free from defects of materials and workmanship for a period of one (1) year from the date of final acceptance of the project by the City of Torrance, except certain specific items of Work, materials and equipment requiring a guaranty or warranty for a greater period of time as hereinafter specified. In the event, however, that portions of the Work are sufficiently complete to allow use or occupancy by the CITY in the manner and for the purposes intended prior to final completion and acceptance of the project, the guarantee period will commence on the date shown on the Statement of Partial Completion.

B. The CONTRACTOR hereby agrees to indemnify and save harmless the CITY, and their officers, agents and employees against and from all claims and liability arising from damage and injury due to said defects. The CONTRACTOR shall repair or replace, at no cost to the CITY, any and all such defective Work and all other Work damaged thereby, which becomes defective during the term of the above-mentioned guaranties and warranties.

C. Within thirty (30) calendar days prior to completion of all Work the CONTRACTOR shall submit to the CITY original copies of all manufacturers guaranties covering all supplied and installed equipment and, where applicable, systems.

D. In addition to the requirements of INSURANCE, Contract Bonds, of the GENERAL CONDITIONS, it shall be understood that the Surety for the faithful performance bond, submitted in conformance with the terms of the Contract for this project, is liable on its bond for all obligations of the CONTRACTOR including guaranty provisions.

E. The CONTRACTOR shall, within twenty-four (24) hours of notice from the ENGINEER of any Work not in accordance with the requirements of the Contract, or any defects in the Work, commence and prosecute with due diligence all work necessary to fulfill the terms of this Section and to complete the Work within a period of time as approved by the ENGINEER. The CONTRATOR shall notify the ENGINEER of the repair schedule before commencing the repairs and notify the ENGIENER to arrange for inspection. The CONTRACOR shall submit a written report of the defect and methods of correction. In the event of failure by the CONTRACTOR and/or its surety to respond to the notice or to complete the Work required by this Section within the time specified, the CITY shall proceed to have such Work done at the CONTRACTOR'S expense. The CONTRACTOR or its Surety shall promptly reimburse the CITY all direct and indirect cost associated with performing this Work.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

SECTION 01630

SUBSTITUTIONS AND "OR EQUAL" SUBMITTAL

PART 1 - GENERAL

1.1 Summary

A. CONTRACTOR may supply any of the materials specified or offer an equivalent. The ENGINEER will determine whether the material offered is equivalent to that specified. CONTRACTOR shall make all "Or Equal" submittals within 30 calendar days after issuance of Notice to Proceed. Request or submittal received after the specified period will be considered as NOT EQUAL to that so specified and will be processed as a substitution described hereinafter.

B. CONTRACTOR shall determine if proposed substitutions are an equivalent before submitting data to the ENGINEER. Substitution request shall be reviewed and signed by CONTRACTOR stating that he has reviewed and has determined that the request is justified and appropriate.

C. Whenever any particular material, process, or equipment is indicated by patent, proprietary or brand name, or by name of manufacturer, such wording is used for the purpose of facilitating its description and shall be deemed to be followed by the words 'or equal.' A listing of materials is not intended to be comprehensive, or in order of preference. The CONTRACTOR may offer any material, process, or equipment considered to be equivalent to that indicated. The substantiation of offers shall be submitted as provided in the Contract Documents.

D. The CONTRACTOR shall, at its expense, furnish data concerning items offered by it as equivalent to those specified. The CONTRACTOR shall have the material tested as required by the ENGINEER to determine that the quality, strength, physical, chemical, or other characteristics, including durability, finish, efficiency, dimensions, service, and suitability are such that the items will fulfill its intended function.

E. Test methods shall be subject to the approval of the ENGINEER. Test results shall be reported promptly to the ENGINEER, who will evaluate the results and determine if the substitutes items is equivalent. The ENGINEER'S findings shall be final. Installation and use of a substitute items shall not be made until approved by the ENGINEER.

F. All manufacturers' data submitted to the ENGINEER for review and acceptance shall clearly identify each proposed substitute with the corresponding Contract Drawing detail and Specification Section. If the ENGINEER decides to accept for use in the Project a material, process, or article which is not the equal of that specified, substitution shall be made in the manner described in CHANGES AND EXTRA WORK of the GENERAL CONDITIONS, with a credit to the CITY for the difference in value.

G. The ENGINEER shall determine whether the material offered is equivalent to that specified. Any revision to structures, piping, mechanical, electrical, or any other work made necessary by such substitution must be approved by the ENGINEER, and the entire cost both direct and indirect of these revisions shall be borne by the CONTRACTOR.

H. Any materials, process, or article may be requested as a substitution by the CONTRACTOR, in lieu of that specified, under the following conditions:

1. Requests must be submitted in writing and in the manner described in SHOP DRAWINGS / SUBMITTALS of these GENERAL REQUIREMENTS.
2. Requests must be submitted thirty (30) calendar days prior to starting the work, as established by the ENGINEER, so as not to cause any delay in completion of the Project. No other request will be considered after expiration of the period specified, except that in exceptional cases where it is determined to be in the best interest of the CITY, as approved by the ENGINEER.
3. The CONTRACTOR agrees to pay for all Engineering and design services, if required, to make all changes and adjustments in material and work of all trades directly or indirectly affected by the substitute, to the satisfaction of the ENGINEER, at no cost to the CITY.
4. All requests for substitution shall be made through the CONTRACTOR. Submissions by the CONTRACTOR shall imply the CONTRACTOR'S approval of such substitution.
5. No requests for substitutions will be considered during the bidding period.
6. The CONTRACTOR shall submit adequate data with each request for approval of a substitute to enable the ENGINEER to evaluate the proposed substitution.
7. If a substitute offered by the CONTRACTOR is not found to be equal to the specified material, then CONTRACTOR shall furnish and install the specified material.
8. The specified Contract completion time shall not be affected by any circumstance developing from the provisions of this Section.
9. The same, or better, warranty will be provided for substitution as for specified product.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

SECTION 01770

PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including GENERAL CONDITIONS, DIVISION 1 - GENERAL REQUIREMENTS and other Sections of the Project Manual, applies to this Section.

1. Section 01330 – SHOP DRAWINGS / SUBMITTALS.
2. Section 01520 – CONSTRUCTION FACILITIES.
3. Section 01740 – REMOVAL, CLEAN-UP AND DEMOBILIZATION.
4. Section 01783 – RECORD DRAWINGS AND RECORD PROJECT MANUAL.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for a Project Closeout, including but not limited to:

1. Inspection procedures.
2. Project record document submittals.
3. Operation and Maintenance Manual submittal.
4. Submittal of warranties.
5. Final cleaning.

B. Closeout requirements for specific construction activities are included in the appropriate Technical Sections in Divisions 2 through 16 of the Project Manual.

1.3 FINAL INSPECTION

A. Preliminary Procedures: Before requesting final inspection for the Contracted Works, the CONTRACTOR shall complete the following.

1. In the "Request for Payment" that coincides with, or first follows, the date the final inspection is requested, show one-hundred percent (100%) completion for the portion of the Contracted Work claimed as complete. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
   a. Include a list of incomplete or outstanding works established during a Pre-final walk-thru and all supporting evidence or documentation for completion.
   b. If one-hundred percent (100%) completions cannot be shown, include a list of incomplete items and all correction notices, the value of incomplete construction, and reasons as to why the Work is not complete.
2. Advise CITY of pending insurance changeover requirements.
3. Submit specific warranties, reduced faithful performance bonds for guarantee work, maintenance agreements, final certifications and similar documents.
4. Obtain and submit releases from local authorized agencies enabling the CITY unrestricted use of the Work and access to services and utilities; include the certificate of occupancy, permits or operating certificates and similar releases. Return all Building & Safety's sign-off sheet and Inspection Records to the CITY.
5. Submit Record Drawings and Record Project Manual, maintenance manuals, final Project photographs, damage or settlement survey, property survey, and similar final record information.
6. Deliver tools, spare parts, extra stock, and similar items.
7. Make a final changeover of permanent locks and transmit keys to the ENGINEER. Advise the CITY'S personnel of the changeover in security provisions.

8. Complete start-up testing of systems, and instruction/training of the CITY'S operating and maintenance personnel. Discontinue or change over and remove temporary facilities from the Jobsite, along with construction tools, mockups, and similar elements.
9. Complete all required testing including mechanical/electrical/plumbing systems, balancing test, bacteriological analysis, etc. Submit all test reports.
10. Return all original permits and manifests to the ENGINEER.
11. Advise the CITY of pending change over of the utility services upon start-up testing of the systems and completion of final inspection.
12. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.
13. Make ready to proceed with landscape establishment period and elevator maintenance service. Submit all maintenance schedules and logs.
14. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Final Acceptance, or when the CITY took possession of and responsibility for corresponding elements of the Work.
15. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
16. Obtain Certificate of Occupancy.
17. Complete final cleaning.

B. Inspection Procedures: The INSPECTOR, with cooperation from the Consultant and the ENGINEER, will prepare a Final Inspection Correction list to that effect following inspection, or advise the CONTRACTOR of construction that must be completed or corrected before the construction work can be considered complete. The Contract time shall continue to be assessed.

1. Upon acceptable completion of all Work including all work described in paragraph A above, the INSPECTOR will request Final Inspection.
2. Final Inspection will be conducted by the Bureau of Contract Administration Final Inspection Group accompanied by the Engineer and the owner representative, and a Final Inspection Correction List will be issued to CONTRACTOR.
3. CONTRACTOR is to forward the Final Subcontracting Report and all outstanding Certified Payrolls to OCC as soon as possible following Final Inspection.
4. At the time of Final Inspection, the Project Administration Section of the Bureau of Contract Administration will generate a draft copy of the Acceptance Board Report for the Project.

   a. Maintenance Service items will be included in the Final Inspection Correction List and must be satisfied prior to Final Acceptance of the Project.

5. Upon completion of all physical corrections required by the Final Inspection Correction List, the Inspector shall reinspect the corrections for compliance, and upon satisfactory completion shall issue a Partial Acceptance of the work completed.
6. All Retention for work items acceptably completed, less maintenance service items and/or disputed funds, shall be released upon issuance of the Partial Acceptance by the Final Inspector. The Contract time shall stop when all corrections are considered complete by the CITY.

C. Reinspection Fees: Should the Consultant and the CITY'S personnel perform reinspection due to failure of the Work to comply with CONTRACTOR'S claim of completion, the CONTRACTOR will compensate the CITY for such additional services. The CITY will deduct the amount of such compensation from the Final Payment to the CONTRACTOR.

1.4 FINAL ACCEPTANCE

A. Preliminary Procedures: Before requesting Final Acceptance and Final Payment, the CONTRACTOR shall complete the following and list exceptions in the request.

1. Upon completion of all physical corrections required by the Final Inspection Correction List and maintenance service items required by contract, the Final Inspector will issue a Notice of Completion for the Project. Submit a certified copy of the INSPECTOR'S (combined with Consultant's and ENGINEER'S) final inspection list of items to be completed or corrected, stating that each item has been

completed or otherwise resolved for acceptance, and the list has been endorsed and dated by the INSPECTOR, the Consultant or ENGINEER.

a. Issuance of the Notice of Completion by the Final Inspector shall signify Final Field Acceptance (FA) of the Project.

2. Submit the Final Payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of guarantee for products and completed operations where required. Final payment shall be processed upon issuance of the Notice of Completion by the Final Inspector.
3. The final Acceptance Board Report will be prepared by the Bureau of Contract Administration upon completion of all work required by the contract, including maintenance service items.
4. Submit consent of surety to Final Payment.
5. Submit a final liquidated damages settlement statement.
6. Unconditional Final Lien Releases from all subcontractors and material supplier.
7. Submit all required certified weekly payroll records, ethnic composition of work force reports.
8. Final acceptance of the Project by the Board of Public Works shall take place upon completion of any investigations by OCC and/or negotiation of Final Change Orders by the ENGINEER.

1.5 RECORD DOCUMENTS SUBMITTALS

A. General: Do not use Record Documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Consultant's or ENGINEER'S reference during normal working hours.

B. Record Drawings: Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Contracted Work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately; where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. All Record Drawings, Record Project Manual and new markings shall be submitted to the ENGINEER for review prior to the approval of the Progress Payments. Give particular attention to concealed elements that would be difficult to measure and record at a later date. Upon completion of the Work, submit Record Drawings, Record Project Manual etc, to the Consultant or ENGINEER for review and for the CITY'S records.

1. Mark Record Sets with a red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.

2. Mark new information that is important to the CITY, including detail from "Request-for-Information" which was not shown on Contract Drawings or Shop Drawings, as soon as it is made available. Any subsequent revision or changes, to the details from an earlier "Request-for-Information", shall also be marked immediately on the Record Drawings.
3. Note related finalized or pending "Change Order" numbers where applicable.
4. Note all addenda, drawing modification, etc. on Record Drawings.
5. Where Shop Drawings are used for actual performance of the Contract Work and are most capable of showing actual details, conditions, and dimensions fully and accurately, record all the Shop Drawings and place them in good order with the Record Drawings. Properly identified and bound of field, and ready for continued use and reference.
6. Organize Record Drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.
7. Transfer of data to electronic Drawing Files:

a. Carefully transfer change data shown on the job set of record drawings to the corresponding AutoCAD 2000 electronic drawing files, (base files available from the Architect), coordinating the changes as required.
b. Clearly indicate at each affected detail and other drawing a full description of changes made during construction, and the actual location of items. Call attention to each entry by drawing a "cloud" around the area or areas affected.

c. Make changes neatly, consistently, and with the proper skill in CAD drafting to ensure a quality equal to that of the construction documents.

C. Record Project Manual: Maintain one complete copy of the Project Manual, including addenda, and one copy of other written construction documents such as "Change Orders" and modifications issued in printed form during construction. Mark these documents to show the variations in actual Contracted Work performed in comparison with the text of the Project Manual and modifications. Give particular attention to substitutions, selection of options and similar information on elements that are concealed or cannot otherwise be readily discerned later by direct observation. Note related Record Drawing information and Product Data.

1.Upon completion of the Work, submit record Project Manual to the Consultant or ENGINEER for review and for the CITY'S record.

D. Record Schedule: Provide one (1) electronic copy of the Construction Schedule. Record this document to show the actual schedules and sequences the actual Works were performed in comparison with Baseline Construction Schedule approval in accordance with GENERAL REQUIREMENTS Section 01321 – CONTRACTOR'S CONSTRUCTION SCHEDULE AND REPORTS.

E. Record Product Data: Maintain one (1) copy of each Product Data submittal. Mark these documents to show significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the site, and from the manufacturer's installation instructions and recommendations. Give particular attention to concealed products and portions of the Work, which cannot otherwise be readily discerned later by direct observation. Note related Change Orders and markup of Record Drawings and Project Manual.

1.Upon completion of a markup, submit a complete set of Record Product Data to the Consultant or ENGINEER for review and for the CITY'S records.

F. Record Sample Submitted: Prior to the date of Final Inspection, CONTRACTOR shall meet at the Jobsite with the ENGINEER and the CITY personnel to determine which of the submitted Samples that have been maintained during progress of the Work are to be transmitted to the CITY for record purposes. Comply with delivery to the CITY Sample storage area.

G. Miscellaneous Record Submittals: Refer to other Sections of the Project Manual for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the Contract Work. Submit to the Consultant or the ENGINEER miscellaneous records for the CITY'S records.

H. Maintenance Manuals: Organize operating and maintenance data into suitable sets of manageable size. Bind properly indexed data in individual heavy-duty 2 inch 3-ring vinyl-covered binders, with pocket folders for folded sheet information. Dividers with permanently marked tabs of card stock shall separate each section and sub section. Tab labels shall not be handwritten. Mark appropriate identification on front and spine of each binder. Include the following types of information. Provide a title page and table of contents at the beginning of each binder. The table of contents will list the specification sections:

1. Emergency instructions. Provide the name, address, and telephone number of the manufacturer and subcontractor, as well as the 24-hour number for emergency service for each piece of equipment.
2. Spare parts list with model/part numbers.
3. Copies of work permits and warranties.
4. Wiring diagrams.
5. Recommended "turn around" cycles.
6. Inspection procedures; Operation and Maintenance Instructions.
7. Shop Drawings and Product Data.
8. Small scale of "Record" Drawings of such operating equipment.

9. Preventative maintenance instructions and information. Provide a list showing the piece of equipment, the O&M document name, and the O&M document page number that contains the instructions.
10. Warranties. Provide all specified warranties with expiration dates, and a list of the conditions to be maintained to keep the warranty in effect.
11. Service Contracts. Provide copies of all service contracts and the scope of work included.
12. Control Drawings. Provide control drawings and the final sequence of operations, set points, and schedules as set during the commissioning process.
13. Operation and Maintenance Instructions. Manufacturer's data with the model number and features of this installation clearly marked, including:

    a. Installation, startup, and break-in instructions.
    b. Starting, normal shutdown, emergency shutdown, manual operation, seasonal changeover and normal operating procedures and data, including any special limitations.
    c. O&M and installation instructions that were shipped with the unit.
    d. Preventative maintenance and service procedures and schedules.
    e. Troubleshooting procedures.
    f. Parts list edited to omit reference to items which do not apply to this installation.
    g. List of special tools required to service or maintain the equipment.
    h. Performance data, ratings, and curves.

14. Fixture lamping schedules.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 CLOSEOUT PROCEDURES

A. Operation and Maintenance Instructions: In addition to the maintenance manuals described hereinabove, arrange for each installer of equipment that requires regular maintenance to meet with the CITY'S personnel to provide instruction in proper operation and maintenance. If installers are not experienced in procedures, provide instruction by manufacturer's representatives. Include a detailed review of the following items:

    1. Maintenance Manuals.
    2. Permit and Record Documents.
    3. Spare parts and materials.
    4. Tools.
    5. Lubricants.
    6. Fuels.
    7. Identification systems.
    8. Control sequences.
    9. Hazards.
    10. Cleaning.
    11. Warranties and bonds.
    12. Maintenance agreements and similar continuing commitments.

B. As Part of Instruction for Operating Equipment, Demonstrate the Following Procedures:

    1. Start-up.
    2. Shutdown.
    3. Emergency operations.

4. Noise and vibration adjustments.
5. Safety procedures.
6. Economy and efficiency adjustments.
7. Effective energy utilization.

C. 45 days prior to the scheduled substantial completion prepare and submit operations & maintenance manuals for commissioning equipment as described in Section 01810.

D. 60 days prior to Final Inspection, provide a written training plan for each training session using a template form provided by the ENGINEER. Training plan shall be completed by the individual who shall conduct the training session.

E. Conduct training prior to Final Inspection using the training plan approved by the ENGINEER. Notify the Commissioning Authority (CA) of the training schedule. The commissioning authority may attend any of the training sessions.

F. The CA will oversee and approve the content and adequacy if the training of CITY personnel for commissioned equipment.

G. Length of training for each commissioned system listed in Section 01810 shall be minimum 1.5 hours for Mechanical systems and minimum 2.0 hours for each Electrical system

H. For the primary HVAC and lighting equipment, the Controls subcontractor shall provide a short discussion of the control of the equipment during the mechanical or electrical training conducted by others.

3.2 FINAL CLEANING

A. General: General cleaning during construction is required by the GENERAL CONDITIONS and GENERAL REQUIREMENTS.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.

1. Complete the following cleaning operations before requesting inspection prior to CITY'S acceptance of Contracted Work.

a. Remove labels that are not permanent labels.
b. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials at no added cost to the CITY.
c. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces, shampoo where necessary.
d. Clean roof drains, scuppers, floor drains and area drains free of debris. Verify that they drain properly.
e. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.
f. Restore damaged, including stained materials, and finishes that cannot be satisfactorily repaired, or that show evidence of repair unacceptable to the Architect, with new, undamaged materials. Repair and restoration of damaged finishes shall be done by the original installers or experienced craftsmen thoroughly familiar with the work at hand.
g. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps. Clean tops of equipment, both below and above ceiling spaces. Clean ductwork, piping and conduit.

h. Clean the site, including landscape development areas of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textures surface.

i. Contaminated earth: Final clean-up operation includes the removal and disposal of earth contaminated or unsuitable for support of plant life in planting areas, and filling of resulting excavations with suitable soil. Contaminated areas include those used for disposal of waste concrete, mortar, plaster, masonry, and similar materials, areas in which washing out of concrete and plaster mixers or washing of tools and like cleaning operations have been performed, and areas that have been oiled, paved or chemically treated. Do not dispose of waste oil, solvents, paints, solutions, or like penetrating material by depositing or burying on Owner's property.

j. Remove all temporary detour stripping by the wet sandblasting method.

C. Pest Control: Engage an experienced exterminator to make a final inspection, and rid the Project of rodents, insects and other pests.

D. Removal of Protection: Remove temporary protection and facilities installed for protection of the Contracted Work during construction.

E. Compliance:

1. Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the CITY'S property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner.

2. Where extra materials of value remaining after completion of associated Work have become the CITY'S property, arrange for disposition of these materials as directed.

SECTION 01740

REMOVAL, CLEANUP, AND DEMOBILIZATION

PART 1 - GENERAL

1.1 THE REQUIREMENT

A. Throughout all phases of construction, including suspension of work, and until the Final Acceptance, the CONTRACTOR shall keep the site clean and free from rubbish and debris. The CONTRACTOR shall also abate dust nuisance by cleaning, sweeping and sprinkling with water, or other means as necessary. The use of water resulting in mud on public streets will not be permitted as a substitute for sweeping or other methods.

B. The road(s) on the construction site shall be paved immediately after the installation of planned utilities and the constructions and underground/final inspection of SS, SD, curbs, and gutters. The exit road on the construction site shall be paved first.

C. Vehicles exiting the construction site shall have all dirt clods and mud removed from their tires.

D. When required by the Plans or Specifications, the CONTRACTOR shall furnish and operate a self-loading motor sweeper with spray nozzles at least once each working day for the purpose of keeping paved areas acceptably clean whenever construction, including restoration, is incomplete.

E. Materials and equipment shall be removed from the site as soon as they are no longer necessary. Before the final inspection, the site shall be cleared of equipment, unused materials and rubbish so as to present a satisfactory clean and neat appearance. All cleanup costs shall be included in the CONTRACTOR'S Bid.

F. Care shall be taken to prevent spillage on haul routes. Any such spillage shall be removed immediately and the area cleaned.

G. Excess excavated material from catch basins or similar structures shall be removed from the site immediately. Sufficient material may remain for use as backfill if permitted by the Specifications. Forms and form lumber shall be removed from the site as soon as practicable after stripping.

H. Failure of the CONTRACTOR to comply with the CITY'S cleanup orders may result in an order to suspend work until the condition is corrected. No additional compensation will be allowed as a result of such suspension.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

SECTION 01783

RECORD DRAWINGS AND RECORD PROJECT MANUAL

PART 1 - GENERAL

1.1 THE REQUIREMENT

A. Record Drawings are full size drawings (Plans) and Record Project Manual which are marked up during construction to delineate the actual in-place constructed conditions. Record Drawings shall be provided by the CONTRACTOR for this Project. Requirements for Record Drawings as specified elsewhere shall supplement the requirements specified herein.

B. Record Drawings and Record Project Manual shall include all changes in the Plans including those issued as Change Orders, Plan Clarifications, Addenda, Notice to Bidders, responses to Requests for Information, Jobsite Memos, and any additional details needed for the construction of the Project but not shown on the Plans. Any substructures encountered while excavating that are left in place shall be located by survey, to the satisfaction of the ENGINEER, shown, and identified on the Record Drawings. All substructures including, but not limited to, concrete structures, electrical conduit and duct banks, drains and sanitary sewer pipelines, process piping, water lines, etc, whose installed location differs from that shown on the original Plans shall be precisely located by survey to the satisfaction of the ENGINEER and recorded on the As-Built Drawings before backfilling.

C. The Record Drawings and Record Project Manual, including those of all Subcontractors, shall be kept by the CONTRACTOR in the CONTRACTOR'S Jobsite office, shall be updated during construction, and shall be available for the ENGINEER'S inspection and copying at all times. The ENGINEER will review the Record Drawings prior to submittal of all Monthly Payment Requests. If, in the opinion of the ENGINEER, the Record Drawings are not current, approval of the Monthly Payment may be withheld until the drawings are made current. In addition, the CONTRACTOR shall submit a signed certification with each Monthly Payment Request stating that all Record Drawings are complete and accurate as of the date of the payment request.

D. Where the Plans are diagrammatic or lacking precise details, the CONTRACTOR shall produce dimensioned full size sheets as the Record Drawings. For installations outside of structures, the locations shall be given by coordinates and elevations. Where substructures are encased in concrete, the outside dimensions of the encasement shall also be given.

E. In the case of those Drawings which depict the detail requirements for equipment to be assembled and wired in the factory, the Record Drawings shall be updated by indicating those portions which are superseded by final Shop Drawings, and by including appropriate reference information describing the Shop Drawings by manufacturer, drawing and revision numbers.

F. An approved set of Drawings stamped by the City of Torance, Department of Building and Safety Plan Check Division must be kept on site for inspection by the City of Torrance Building and Safety Inspector. This set of stamped drawings is a part of the Contract Documents and is to be protected as such. The stamped set is not to be marked on or used as filed construction Drawings or As-Built Record Drawings.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 MAKE ENTRIES ON DRAWINGS

A. Record Drawings and Record Project Manual shall be marked with red ink or chemical fluid on one (1) set of full size prints to produce a record of the complete installation. Any additional drawings that may be required to indicate record conditions shall be prepared on 24" x 36" paper. All additions to Contract Drawings shall employ and use drafting standards which are consistent with the drafting standards used in the Contract Drawings. Call attention to the entry by a "cloud" drawn around the area or areas affected.

B. Date all entries.

C. In the event of overlapping changes, use different colors for the overlapping changes.

D. Make entries in the pertinent other documents as approved by the ENGINEER.

3.2 FINAL PROJECT RECORD DRAWINGS

A. At the Completion of the Work and after Final Inspection, the CONTRACTOR shall copy its Record Drawing (as installed) data, using red ink, onto a new set of high quality blueline prints provided by the CITY. The CONTRACTOR shall certify to the completeness and accuracy of the "as installed" information indicated on the blueline prints with its signature. The CONTRACTOR shall then deliver as a submittal to the ENGINEER, for review and approval, both the field developed blueline prints and the final signed blueline prints as a condition precedent to the CITY'S release of any retained funds.

B. Review and submittal:

1. Submit the completed set of project record documents to the CITY.

2. Participate in review meetings as required.

3. Make required changes and promptly deliver the final project record documents to the CITY.

3.3 CHARGES SUBSEQUENT TO ACCEPTANCE

A. The Contractor has no responsibility for recording changes in the Work subsequent to final completion, except for changes resulting from work performed under Warranty.

SECTION 06105

MISCELLANEOUS CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Rooftop equipment bases and support curbs.
3. Wood blocking, cants, and nailers.
4. Wood furring and grounds.
5. Wood sleepers.
6. Utility shelving.
7. Plywood backing panels.

B. These performance specifications represent minimum requirements. The contractor is responsible for the complete analysis, design, documentation, and implementation of Project, including integration and coordination of each aspect of the Project with the Work of this Section. The Work shall comply with scope, Standards, qualities, procedures, performance, materials, and products stipulated in this Section.

C. Related Requirements:
1. Division 6 Interior Architectural Woodwork, section 06402.

1.3 DEFINITIONS

A. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.

B. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. NeLMA: Northeastern Lumber Manufacturers' Association.
2. NHLA: National Hardwood Lumber Association.
3. NLGA: National Lumber Grades Authority.
4. SPIB: The Southern Pine Inspection Bureau.
5. WCLIB: West Coast Lumber Inspection Bureau.
6. WWPA: Western Wood Products Association.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.5 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Preservative-treated wood.
2. Fire-retardant-treated wood.
3. Power-driven fasteners.
4. Powder-actuated fasteners.
5. Expansion anchors.
6. Metal framing anchors.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Certified Wood: Lumber and plywood shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

B. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
4. Provide dressed lumber, S4S, unless otherwise indicated.

C. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.

D. Application: Treat following items:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
4. Wood framing members that are less than 18 inches above the ground in crawl spaces or unexcavated areas.
5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are required, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Use treatment that does not promote corrosion of metal fasteners.
2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
4. Design Value Adjustment Factors: Treated lumber shall be tested according ASTM D 5664, and design value adjustment factors shall be calculated according to ASTM D 6841. For enclosed roof framing, framing in attic spaces, and where high temperature fire-retardant treatment is required, provide material with adjustment factors of not less than 0.85 modulus of elasticity and 0.75 for extreme fiber in bending for Project's climatological zone.

C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.

D. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.

E. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.

F. Application: Treat following items:

1. Framing for raised platforms.
2. Concealed blocking.
3. Roof framing and blocking.

4. Wood cants, nailers, curbs, equipment support bases, blocking, and similar members in connection with roofing.
5. Plywood backing panels.

2.4 DIMENSION LUMBER FRAMING

A. General: Provide lumber framing of species and grade as required by structural engineering analysis.

2.5 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber of species and grade as required by structural engineering analysis for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Rooftop equipment bases and support curbs.
4. Cants.
5. Furring.
6. Grounds.
7. Utility shelving.

2.6 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: DOC PS 1, Exterior, AC, fire-retardant treated, in thickness required, but not less than 1/2-inch nominal thickness. Plywood 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."

2.7 FASTENERS

A. General: Provide fasteners of size and type required that comply with requirements specified in this article for material and manufacture. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

E. Screws for Fastening to Metal Framing: ASTM C 1002 or ASTM C 954 as applicable, length as recommended by screw manufacturer for material being fastened.

F. Lag Bolts: ASME B18.2.1.

G. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.8 METAL FRAMING ANCHORS

A. General: Provide framing anchors as required by structural engineering analysis for support or attachment of other construction.

2.9 MISCELLANEOUS MATERIALS

A. General: Provide miscellaneous materials as required by structural engineering analysis for support or attachment of other construction.

B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

B. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

C. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels.

E. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

F. Do not splice structural members between supports unless otherwise indicated.

G. Provide blocking and framing as required to support facing materials, fixtures, specialty items, and trim. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

H. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:

1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal thickness.
3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. and to solidly fill space below partitions.
4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet o.c.

I. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

J. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use inorganic boron for items that are continuously protected from liquid water.
2. Use copper naphthenate for items not continuously protected from liquid water.

K. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.

L. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 WOOD GROUND, SLEEPER, BLOCKING, AND NAILER INSTALLATION

A. Install where required for attaching other work. Cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 WOOD FURRING INSTALLATION

A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

3.4 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06105

SECTION 06402

INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Wood cabinets.
2. Solid-surfacing-material countertops.
3. Closet and utility shelving.
4. Shop finishing of interior woodwork.

B. These performance specifications represent minimum requirements. The contractor is responsible for the complete analysis, design, documentation, and implementation of Project, including integration and coordination of each aspect of the Project with the Work of this Section. The Work shall comply with scope, Standards, qualities, procedures, performance, materials, and products stipulated in this Section.

C. Related Sections include the following:

1. Division 6 Section "Miscellaneous Carpentry" for wood furring, blocking, shims, and hanging strips required for installing woodwork and concealed within other construction before woodwork installation.

1.3 DEFINITIONS

A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction before woodwork installation.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Data: For panel products, high-pressure decorative laminate, solid-surfacing material, fire-retardant-treated materials, cabinet hardware and accessories, handrail brackets, and finishing materials and processes.

C. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

D. Samples for Initial Selection:

1. Plastic laminates.
2. Thermoset decorative panels.
3. Solid-surfacing materials.

E. Product Certificates: For each type of product, signed by product manufacturer.

F. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

G. Qualification Data: For fabricator.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

B. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of interior architectural woodwork with sequence-matched wood veneers.

C. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.

D. Fire-Test-Response Characteristics: Where fire-retardant materials or products are indicated, provide materials and products with specified fire-test-response characteristics as determined by testing identical products per test method indicated by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.

E. Forest Certification: Provide interior architectural woodwork produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.8 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide materials that comply with requirements of AWI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.

B. Wood Products: Comply with the following:

1. Softwood Plywood: DOC PS 1.
2. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1, made with adhesive containing no urea formaldehyde.

C. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1. Provide PVC or polyester edge banding complying with LMA EDG-1 on components with exposed or semiexposed edges.

D. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2.

2.2 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this Article, that are acceptable to authorities having jurisdiction.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Comply with performance requirements of AWPA C20 (lumber) and AWPA C27 (plywood).

2.3 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets.

B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 170 degrees of opening, self-closing.

C. Back-Mounted Pulls: BHMA A156.9, B02011.

D. Wire Pulls: Back mounted, solid metal.

E. Catches: Push-in magnetic catches, BHMA A156.9, B03131.

F. Shelf Rests: BHMA A156.9, B04013; metal.

G. Drawer Slides: BHMA A156.9, B05091.

H. Door Locks: BHMA A156.11, E07121.

I. Grommets for Cable Passage through Countertops: Molded-plastic grommets and matching plastic caps with slot for wire passage.

J. Paper Slots: molded-plastic, paper-slot liner with 1/4-inch lip.

K. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.

1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
2. Satin Stainless Steel: BHMA 630.

L. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.4 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.

B. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln dried to less than 15 percent moisture content.

C. 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.

D. VOC Limits for Installation Adhesives and Glues: Use installation adhesives that comply with requirements of authorities having jurisdictionj.

E. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified for faces.

2.5 FABRICATION, GENERAL

A. Interior Woodwork Grade: Unless otherwise indicated, provide Custom-grade interior woodwork complying with referenced quality standard.

B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.

C. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.

D. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

E. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs. Seal edges of openings in countertops with a coat of varnish.

F. Install glass to comply with applicable requirements in Division 8 Section "Glazing" and in GANA's "Glazing Manual." For glass in wood frames, secure glass with removable stops.

2.6 WOOD CABINETS FOR TRANSPARENT FINISH

A. Grade: Custom.

B. AWI Type of Cabinet Construction: Flush overlay.

2.7 SOLID-SURFACING-MATERIAL COUNTERTOPS

A. Grade: Custom.

B. Solid-Surfacing-Material Thickness: 3/4 inch.

C. Epoxy Resin Countertops and Sinks: 1 inch thick epoxy resin for countertops and sinks, conforming to the requirements of AWI.

D. Epoxy Resin tops and curbs shall be a uniform mixture throughout their full thickness, and shall not depend upon a surface coating that is readily removed by chemical and/or physical abuse. Tops and curbs shall be 1 inch thick, exposed edges beveled top and bottom, and drip grooves provided on the underside at all exposed edges. 4 inches high curbs at the backs and ends of tops and shall be 1 inch thick and bonded to the deck to form a square watertight joint. Sink cutouts shall be smooth and uniform without saw marks with the top edge beveled. The bottom edge of the sink opening shall be finished smooth with the edge broken to prevent sharpness. Corners of sink cutouts shall be radiused no less than 3/4 inch.

E. Molded Epoxy Resin Sinks shall be non-glaring with all inside corners coved and the bottom pitched to the drain outlet. Sinks shall possess a high resistance to mechanical and thermal shock. Sinks to be drop-in type.

F. Sink Tailpieces: Corrosion resistant polypropylene piping.

G. Fabricate tops in one piece, unless otherwise indicated. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.

H. Install integral sink bowls in countertops in shop.

I. Drill holes in countertops for plumbing fittings and soap dispensers in shop.

2.8 CLOSET AND UTILITY SHELVING

A. Grade: Economy.

B. Shelf Material: 3/4-inch thermoset decorative panel with PVC or polyester edge banding.

2.9 SHOP FINISHING

A. Grade: Provide finishes of same grades as items to be finished.

B. General: Finish architectural woodwork at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.

C. Shop Priming: Shop apply the prime coat including backpriming, if any, for transparent-finished items specified to be field finished. Refer to Division 9 painting Sections for material and application requirements.

D. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.

E. Transparent Finish Grade: Custom.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.

B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.

B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.

C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.

D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions, including those for adhesives used to install woodwork.

F. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.

G. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items.

1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
2. Maintain veneer sequence matching of cabinets with transparent finish.

H. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.

I. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 06402

SECTION 07841

PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes through-penetration firestop systems for penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items.

B. Related Sections include the following:

1. Division 21 Sections specifying fire-suppression piping penetrations.
2. Divisions 22 and 23 Sections specifying duct and piping penetrations.
3. Division 26 Sections specifying cable and conduit penetrations.

1.3 PERFORMANCE REQUIREMENTS

A. General: For penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.

B. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per UL 1479:

1. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
2. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:

a. Penetrations located outside wall cavities.
b. Penetrations located outside fire-resistance-rated shaft enclosures.

C. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.

1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.

2. For floor penetrations with annular spaces exceeding 4 inches in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved, either by installing floor plates or by other means.
3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

D. For through-penetration firestop systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For each through-penetration firestop system, show each type of construction condition penetrated, relationships to adjoining construction, and type of penetrating item. Include firestop design designation of qualified testing and inspecting agency that evidences compliance with requirements for each condition indicated.

1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.
2. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

C. Through-Penetration Firestop System Schedule: Indicate locations of each through-penetration firestop system, along with the following information:

1. Types of penetrating items.
2. Types of constructions penetrated, including fire-resistance ratings and, where applicable, thicknesses of construction penetrated.
3. Through-penetration firestop systems for each location identified by firestop design designation of qualified testing and inspecting agency.

D. Qualification Data: For Installer.

E. Product Certificates: For through-penetration firestop system products, signed by product manufacturer.

F. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.

1.5 QUALITY ASSURANCE

A. Delegated Design Responsibility: Manufacturer shall be responsible for determining appropriate systems for each penetration condition requiring protection, including all components. Engineer licensed in State of California shall perform engineering analysis, and seal and sign documentation. Prepare data for system, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard products applied to conditions similar to those indicated for this Project.

B. Installer Qualifications: A firm that has been approved by FMG according to FMG 4991, "Approval of Firestop Contractors."

C. Installer Qualifications: A firm experienced in installing through-penetration firestop systems similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its through-penetration firestop system products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

D. Installation Responsibility: Assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single qualified installer.

E. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, through one source from a single manufacturer.

F. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article: Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life if applicable, qualified testing and inspecting agency's classification marking applicable to Project, curing time, and mixing instructions for multi-component materials.

B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.

C. Notify Owner's inspecting agency at least seven days in advance of through-penetration firestop system installations; confirm dates and times on days preceding each series of installations.

D. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until each installation has been examined by Owner's inspecting agency and building inspector, if required by authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, through-penetration firestop systems that may be incorporated into the Work include, but are not limited to, those systems indicated that are produced by one of the following manufacturers:

1. A/D Fire Protection Systems Inc.
2. Grace, W. R. & Co. - Conn.
3. Hilti, Inc.
4. Johns Manville.
5. Specified Technologies Inc.
6. 3M; Fire Protection Products Division.
7. Tremco; Sealant/Weatherproofing Division.
8. USG Corporation.

2.2 FIRESTOPPING, GENERAL

A. Compatibility: Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.

B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:

1. Permanent forming/damming/backing materials, including the following:
   a. Slag-/rock-wool-fiber insulation.
   b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
   c. Fire-rated form board.
   d. Fillers for sealants.
2. Temporary forming materials.
3. Substrate primers.
4. Collars.
5. Steel sleeves.

2.3 FILL MATERIALS

A. General: Provide through-penetration firestop systems containing the types of fill materials indicated in the Through-Penetration Firestop System Schedule at the end of Part 3 by referencing the types of materials described in this Article. Fill materials are those referred to in directories of referenced testing and inspecting agencies as "fill," "void," or "cavity" materials.

B. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

C. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.

D. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

E. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.

F. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.

G. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

H. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

I. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives.

J. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

K. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and other surfaces requiring a nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.
2. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.
3. Grade for Vertical Surfaces: Nonsag formulation for openings in vertical and other surfaces.

2.4 MIXING

A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of work. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with firestop system manufacturer's written instructions and with the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.3 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

A. General: Install through-penetration firestop systems to comply with Part 1 "Performance Requirements" Article and with firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

C. Install fill materials for firestop systems by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

A. Identify through-penetration firestop systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of edge of the firestop systems so that labels will be visible to anyone seeking to remove penetrating items or firestop systems. Use mechanical fasteners for metal labels. For plastic labels, use self-adhering type with adhesives capable of permanently bonding labels to surfaces on which labels are placed and, in combination with label material, will result in partial destruction of label if removal is attempted. Include the following information on labels:

1. The words "Warning - Through-Penetration Firestop System - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Through-penetration firestop system designation of applicable testing and inspecting agency.
4. Date of installation.
5. Through-penetration firestop system manufacturer's name.
6. Installer's name.

3.5 FIELD QUALITY CONTROL

A. Inspecting Agency: Owner will engage a qualified, independent inspecting agency to inspect through-penetration firestops. Independent inspecting agency shall comply with ASTM E 2174 requirements including those related to qualifications, conducting inspections, and preparing test reports.

B. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

C. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued and firestop installations comply with requirements.

3.6 CLEANING AND PROTECTING

A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce systems complying with specified requirements.

3.7 THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE

A. Where UL-classified systems are indicated, they refer to alpha-alpha-numeric designations listed in UL's "Fire Resistance Directory" under product Category XHEZ.

B. Firestop Systems with No Penetrating Items: Available UL-Classified Systems: C-AJ- 0001-0999.

C. Firestop Systems for Insulated Pipes: Available UL-Classified Systems: C-AJ- and W-L- 5001-5999.

D. Firestop Systems for Miscellaneous Mechanical Penetrants: Available UL-Classified Systems: C-AJ- and W-L- 7001-7999.

E. Firestop Systems for Metallic Pipes, Conduit, or Tubing: Available UL-Classified Systems: C-AJ- and W-L- 1001-1999.

F. Firestop Systems for Nonmetallic Pipe, Conduit, or Tubing: Available UL-Classified Systems: C-AJ- and W-L- 2001-2999.

G. Firestop Systems for Electrical Cables: Available UL-Classified Systems: C-AJ- and W-L- 3001-3999.

H. Firestop Systems for Miscellaneous Electrical Penetrants: Available UL-Classified Systems: C-AJ- and W-L- 6001-6999.

I. Firestop System for Structural Rod Penetration Through Rated Tunnel: Basis of Design Product: Subject to compliance with requirements, provide Specified Technologies, Inc., either Series SSS or Series LCI latex based intumescent sealant as recommended by manufacturer for applicable condition.

END OF SECTION 07841

SECTION 07920

JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Urethane joint sealants.
3. Latex joint sealants.
4. Acoustical joint sealants.
5. Fire rated sealants.
6. Fire resistive sealants.

B. These performance specifications represent minimum requirements. The contractor is responsible for the complete analysis, design, documentation, and implementation of Project, including integration and coordination of each aspect of the Project with the Work of this Section. The Work shall comply with scope, Standards, qualities, procedures, performance, materials, and products stipulated in this Section.

C. Related Sections:

1. Division 8 Section "Glazing" for glazing sealants.
2. Division 9 Section "Gypsum Board" for sealing perimeter joints.
3. Division 9 Section "Ceramic Tile" for sealing tile joints.
4. Division 9 Section "Acoustical Panel Ceilings" for sealing edge moldings at perimeters with acoustical sealants.

1.3 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

E. Qualification Data: For qualified Installer.

F. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.

G. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.

H. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.

I. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:

1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

J. Preconstruction Field-Adhesion Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.

K. Field-Adhesion Test Reports: For each sealant application tested.

L. Warranties: Sample of special warranties.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

C. Product Testing: Test joint sealants using a qualified testing agency.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
2. Test according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.

D. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1.5 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.6 WARRANTY

A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period. Warranty Period: Two years from date of Substantial Completion.

C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from natural causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with requirements of authorities having jurisdiction.

C. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates. Suitability for Immersion in Liquids. Where sealants are required for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.

D. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

E. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

F. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.

B. Single-Component, Nonsag, Acid-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.

C. Mildew-Resistant, Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.

2.3 URETHANE JOINT SEALANTS

A. Single-Component, Nonsag, Traffic-Grade, Urethane Joint Sealant: ASTM C 920. Type S, Grade NS, Class 25, for Use T.

B. Multicomponent, Nonsag, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Use T.

2.4 LATEX JOINT SEALANTS

A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

2.5 ACOUSTICAL JOINT SEALANTS

A. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

2.6 JOINT SEALANT BACKING

A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.7 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Masonry.
    c. Unglazed surfaces of ceramic tile.
    d. Exterior insulation and finish systems.

3. Remove laitance and form-release agents from concrete.

4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

a. Metal.
b. Glass.
c. Porcelain enamel.
d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193.
4. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.
5. Provide recessed joint configuration of recess depth per Figure 8C in ASTM C 1193. Use masking tape to protect surfaces adjacent to recessed tooled joints.

G. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

3.4 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed and cured sealant joints as follows:

   a. Perform 10 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate.
   b. Perform 1 test for each 1000 feet of joint length thereafter or 1 test per each floor per elevation.

2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
3. Inspect tested joints and report on the following:

   a. Whether sealants filled joint cavities and are free of voids.
   b. Whether sealant dimensions and configurations comply with specified requirements.
   c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.

4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

B. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without

deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 07920

SECTION 08110

HOLLOW METAL FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes standard hollow metal frames.

B. Related Sections:

1. Division 08 Section "Finish Hardware" for door hardware for hollow metal doors.
2. Division 09 Sections "Exterior Painting" and "Interior Painting" for field painting hollow metal doors and frames.
3. Division 16 Sections for electrical connections including conduit and wiring for door controls and operators.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings.

B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, fire-resistance rating, and finishes.

B. Shop Drawings: Include the following:

1. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
2. Locations of reinforcement and preparations for hardware.
3. Details of each different wall opening condition.
4. Details of anchorages, joints, field splices, and connections.
5. Details of accessories.

6. Details of moldings, removable stops, and glazing.
7. Details of conduit and preparations for power, signal, and control systems.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification:

1. For each type of exposed finish required, prepared on Samples of not less than 3 by 5 inches.
2. For the following items, prepared on Samples about 12 by 12 inches to demonstrate compliance with requirements for quality of materials and construction:

a. Doors: Show vertical-edge, top, and bottom construction; core construction; and hinge and other applied hardware reinforcement. Include separate section showing glazing if applicable.

E. Other Action Submittals: Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of hollow metal door and frame assembly.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.

B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to UBC Standard 7-2.

1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
2. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.

C. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to UBC Standard 7-4. Label each individual glazed lite.

D. Smoke-Control Door Assemblies: Comply with UBC Standard 7-2.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch high wood blocking. Do not store in a manner that traps excess humidity. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.8 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available 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. Amweld Building Products, LLC.
2. Ceco Door Products; an Assa Abloy Group company.
3. Curries Company; an Assa Abloy Group company.
4. Steelcraft; an Ingersoll-Rand company.

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.

D. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z coating designation; mill phosphatized. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

F. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow metal frames of type indicated.

G. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.

H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. density; with maximum flame-spread and smoke-development indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

I. Glazing: Comply with requirements in Division 08 Section "Glazing."

J. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 STANDARD HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

B. Exterior Frames: Fabricated from metallic-coated steel sheet.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as full profile welded unless otherwise indicated.
3. Frames for Level 3 Steel Doors: 0.053-inch thick steel sheet.
4. Frames for Level 4 Steel Doors: 0.067-inch thick steel sheet.

C. Interior Frames: Fabricated from cold-rolled steel sheet unless metallic-coated sheet is indicated.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as full profile welded unless otherwise indicated.
3. Frames for Level 3 Steel Doors: 0.053-inch thick steel sheet.
4. Frames for Wood Doors: 0.053-inch thick steel sheet.
5. Frames for Borrowed Lights: Same as adjacent door frame.

D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.

2.4 FRAME ANCHORS

A. Jamb Anchors:

1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
2. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.

B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch thick, and as follows: Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.5 STOPS AND MOLDINGS

A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch thick, fabricated from same material as door face sheet in which they are installed.

B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch high unless otherwise indicated.

C. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch thick, fabricated from same material as frames in which they are installed.

2.6 ACCESSORIES

A. Ceiling Struts: Minimum 1/4-inchthick by 1-inch wide steel.

2.7 FABRICATION

A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.

C. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
2. Sidelight Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
4. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
5. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
6. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

        1) Two anchors per jamb up to 60 inches high.
        2) Three anchors per jamb from 60 to 90 inches high.
        3) Four anchors per jamb from 90 to 120 inches high.
        4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.

    b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

1) Three anchors per jamb up to 60 inches high.
2) Four anchors per jamb from 60 to 90 inches high.
3) Five anchors per jamb from 90 to 96 inches high.
4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
5) Two anchors per head for frames above 42 inches wide and mounted in metal-stud partitions.

c. Compression Type: Not less than two anchors in each jamb.

7. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.

a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

D. Fabricate concealed stiffeners, edge channels, and hardware reinforcement 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 the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

F. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
4. Provide loose stops and moldings on inside of hollow metal work.
5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.8 STEEL FINISHES

A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:

1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.

C. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11.

1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

a. At fire-protection-rated openings, install frames according to NFPA 80.
b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.

c. Install frames with removable glazing stops located on secure side of opening.
d. Install door silencers in frames before grouting.
e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
g. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
5. Concrete Walls: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
6. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
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, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

3.4 CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 081113

SECTION 08 130

ELECTRONIC ACCESS CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. The work of this performance specification consists of furnishing and installing prescribed systems and equipment, in accordance with the Owner's directives and requirements. The Contractor shall design, install, and configure systems to provide the exact function described herein and in related Section 08710 Door Hardware, and will be held to the operational criteria. The Contractor shall be responsible for furnishing and installing a complete and fully operational system, with the intended features and capabilities, whether or not all required parts, components, systems or accessories are specified in the construction documents. Contractor shall provide all required parts, components, systems, labor, materials and accessories needed for a complete and operational system, without additional cost to the owner

B. Furnish all labor, software, materials, tools, equipment, and services for all Access Control Equipment, as indicated, in accord with provisions of Contract Documents. Final terminations and system commissioning to be performed by a factory certified technician.

C. Items include but are not limited to the following:

1. Schlage Security Management System (SMS) and PC Server.
2. Reader Controller.
3. Reader Interface
4. Power Supplies.
5. Schlage Biometric Reader.
6. Smart Card Readers and Credentials.
7. All low voltage wiring, switches, and ancillary equipment. (Any required conduit and 120 VAC electrical installation is the responsibility of the Project Electrical Contractor.)
8. Although such work is not specifically indicated, provide and install supplementary or miscellaneous items, appurtenances and devices incidental to, or necessary for, a sound, secure and complete installation.
9. Training on operation and software of the access control system per Section 3.7 of this specification section.

A. Intent of Access Control specification

1. The following specification shall be considered as coordinated with the general conditions, special conditions and the preamble of this and other related sections. It shall be the Access Control Contractor's responsibility to furnish all necessary systems and equipment, in accordance with the Owner's directives and requirements.
2. Where items aren't definitely or correctly specified and are required for completion of the work, a written statement of such omission, error, or other discrepancy shall be sent to the Architect, prior to date specified for receipt of bids for clarification by addendum; or, furnish such items in the type and quality established by this specification, and appropriate to the service intended.
3. Adjustments to the Contract Sum will not be allowed for omissions not clarified prior to bid opening.

1.2 RELATED SECTIONS

A. Division 01 - General Requirements

B. Division 26: Electrical

C. Section 087100: Door Hardware

1.3 REFERENCES

A. All State and Local Codes including Authority Having Jurisdiction

B. UL - Underwriter's Laboratories

C. ADA – Americans with Disabilities Act

D. NFPA 70 National Electric Code

1.4 ABBREVIATIONS AND ACRONYMS

A. ACS: Access control system.

B. LAN: Local area network.

C. LED: Light-emitting diode.

D. TCP/IP: Transport control protocol/Internet protocol incorporated into Microsoft Windows

E. UPS: Uninterruptible power supply.

1.5 DEFINITIONS

A. Smart Card: Contactless credential designed to add additional layers of security protection having diversified key encryption, with data storage and memory available.

B. Key pad: For the validation of a pre-programmed personal identification number or "PIN".

C. Credential: Data assigned to an entity and used to identify that entity.

D. RS-485: A TIA/EIA standard for multipoint communications.

E. Workstation: A PC that is connected to the network and can access the controller

1.6 SUBMITTALS

A. Submit data consisting of shop drawings and catalog cuts complete with technical data necessary to evaluate the material and equipment. Include dimension, wiring and block diagrams, performance data, ratings, control sequences, and other descriptive data necessary to describe the item proposed and its operating characteristics. Include a complete technical specification for the submitted equipment, noting differences and adherence to all Division 26 sections and this section.

B. Submit installation shop drawings and product data in accordance with Division 01 and this Section.

1. Coordinate with other trades in submittal of shop drawings.
2. Shop drawings shall detail space conditions and shall be subject to final review by the Architect.
3. Provide an operational narrative of each component/system. See Section 08710 Door Hardware for operational description.
4. Submit to Owner a complete listing of proposed devices, indicating interconnection equipment locations and specifying terminal/connecter termination locations. Submit a complete set of proposed drawings, identifying equipment locations, types of cabling, numbers of conductors, raceway locations, and termination points of each conductor.
5. Cable Requirements
    a. Twisted, shielded, plenum-rated type cable shall be used.
    a. All exposed wiring shall be in ridged conduit and surface "Wiremold" raceway unless otherwise noted in Division 26.
    b. All cables shall be fastened to the structure at least every 4 feet where not in conduit.
6. The approval of shop drawings or samples does not relieve the Access Control Contractor of responsibility for any deviation from the requirements of the Contract Documents, unless the Access Control Contractor has informed the Architect in writing of such deviation at the time of submission, has noted the deviation on the shop drawings, and the Architect has given written approval of the specific deviation. The Architect's approval also does not relieve the Access Control Contractor from responsibility for errors or omissions in the shop drawings or samples.
7. Coordinate equipment submittals with construction schedules.
8. Do not purchase or install equipment requiring submittal until the review process is complete.

C. Qualification Data: For system supplier. Compliance with this Section shall include letters of certification. Certifications shall be submitted for approval with and be incorporated with submittal. Submittals will not be considered without the certifications from the equipment manufacturer on the Manufacturer's letterhead.

D. Closeout submittals Warranty Documentation provide copies of manufacturers warranties for all system components and applicable equipment. Include statement of labor warranty from the manufacturer, Access Control Contractor, and/or 3rd party entity

E. Record Documentation.

1. Submit a copy of a signed agreement between the Access Control Contractor and the Owner stipulation that the license of all software and operation systems residing on the server and workstations shall become the sole property of the Owner.

2. Submit to Owner upon completion of Work, all passwords used to access all aspects of the operating system software and database utilized by the system. Documentation shall include the name and position of anyone who has knowledge or record of these passwords.

F. Extra Stock Materials: Furnish materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses of all kinds, power and electronic, equal to 10 percent of amount installed for each size used, but no fewer than three units.

2. Substantial Design Closeout Documentation

3. Operation and Maintenance Manual Data: Submit data in accordance with Division 01 and this Section for all equipment specified in this Section. Include complete set of supplier's operating instructions, installation instructions, and troubleshooting guide. Include final listing of doors, locations and normal status in MS Excel format.

4. Prior to Substantial Completion, provide schematic drawings depicting type and location of interface equipment/components, number of cables and conductors, raceway locations, types of connectors, circuit requirements and type and dimensions of enclosures.

G. Tools

1. The Access Control Contractor shall provide documentation of any specialized tools required by the End User in order to perform routine maintenance.

2. Commissioning Reports: Access Control Contractor shall provide documentation of both the Final Test Acceptance and Start Up Testing as per Part 3, 3.07.

1.7 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:

1. Furnish security equipment to comply with the requirements of laws, codes, ordinances, and regulations of the governmental authorities having jurisdiction where such requirements exceed the requirements of the Specifications.

2. Furnish security equipment to comply with the requirements of American National Standards for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People (ICC/ANSI A117.1), the governmental authority having jurisdiction and to comply with Americans with Disabilities Act.

B. System supplier to be certified by the equipment manufacturer as capable of purchasing, designing, selling, installing, supporting, maintaining and servicing the products to be furnished. Certification shall be submitted on the equipment manufacturer's letterhead. The Access Control Contractor shall be certified to the Enterprise Level for the Schlage Security Management System.

C. Contractor Qualifications:

1. Company that is trained, authorized, and certified to sell, purchase, design, engineer,

install, train, maintain and service the specified products.

2. Company with a minimum of 5 (five) years system design, engineering supervision, and installation experience for projects of similar complexity and electronic product mix including Schlage AD Series Electronic Locksets.

3. The contractor will maintain a fully staffed local office within 50 miles of the work site. The service center will be staffed by factory trained technicians and must be adequately equipped to provide emergency phone service within twenty four (24) hours on a twenty-four (24) hour, 365 days per year basis, whether or not the owner purchases a maintenance contract with the contractor.

4. Within the local service center, the contractor must maintain an inventory of spare parts and other items critical to system operation and as necessary to meet the emergency service requirements.

5. The contractor must have in-house engineering and project management capability consistent with the requirements of this project. The contractor shall provide a project manager who is actively in the project. This person shall be the same individual throughout the course of the project and shall be the person responsible for the scheduling of the system programming, preparation of the Operation and Maintenance Manuals, Training Programs, documentation and system testing, maintenance of Drawings and the coordination of all subcontract labor. The owner reserves the right to approve the contractor's Project Manager.

D. Testing Agency: 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.

E. Pre-Installation Conference: Prior to installation, arrange conference between supplier and related trades to review materials, procedures, and coordinating related work.

F. Sequencing: The work shall be performed in the following sequence:

1. Installation of Access Controllers & Modules.

2. Installation of new devices and new readers.

3. Installation of site control equipment.

4. Commissioning of the new system components.

G. The Authorized Dealer will provide pricing for both 1 and 5 year maintenance/warranty/service contracts from date of purchase.

1.8 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Acceptance: Upon delivery to the site, Contractor shall inspect all products and materials for any damage. Acceptance of the units constitutes that the inspection has occurred and no damaged or unacceptable products were found, and any damage or unacceptable products would be the responsibility of the Contractor.

B. Product Storage and Handling Requirements

1. Central Server, Workstations, and Controllers:

a. Store in temperature and humidity controlled environment in original manufacturer's sealed containers. Maintain ambient temperature between 50 and 85 deg F (10 and 30 deg C), and not more than 80 percent relative humidity, non-condensing.

b. Open each container; verify contents against packing list, and file copy of packing list, complete with container identification for inclusion in operation and maintenance data.
c. Save original manufacturer's containers and packing materials and deliver as directed under provisions covering extra materials.

1.9 PROJECT CONDITIONS

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

1.10 COORDINATION

A. Coordinate work of this Section with other directly affected Sections and work/information indicated on the electrical and communication drawings.

B. Conduit and raceways as needed for electrical hardware items. Fire/life-safety system interfacing. Point-to-point wiring diagrams plus riser diagrams to related trades.

C. The Access Control Contractor shall be responsible for coordinating with Section 08 7100 Door Hardware. That Section may provide certain items of door hardware for use by the System including power transfer hinges, door position switches, request-to-exit switches and other accessories. The Access Control Contractor shall be responsible for all low voltage installation required to integrate the devices furnished by Section 087100 into the SMS.

D. The Access Control Contractor shall be responsible for coordinating with Section 08 7100 Door Hardware to determine whether a Biometric Reader or card reader is required for a specific door. The Access Control contractor shall furnish and install the Biometric Reader or card reader and furnish and install the low voltage power supplies required to power the electric locks.

1.11 WARRANTY

A. All components shall be supplied with a one- (1) year warranty against defects in materials and workmanship, commencing with substantial completion of the project.

B. During system warranty period, system updates are to be made available to owner at no charge to owner.

C. During warranty period, provide twenty-four (24) hour toll-free technical support.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Access Control System Hardware/Firmware/Software:

1. This performance specification is based on Schlage Security Management System (SMS) as manufactured by Schlage Electronics.

2.2 SYSTEM CAPABILITIES

A. The access control system software shall serve as a database manager, controlling badge data, access rights, time schedules, multiple operation modes, elevator control, visitor sign-

in/sign-out and access privileges and alarm point information. Database changes shall be updated or downloaded automatically from the system server to the field panels. The system server shall determine which changes are to be downloaded to which field panels.

B. All databases should have the ability to add, delete, report, view and edit information.

C. The system shall provide storage of all system transactions in a retrievable file.

D. Log all events by time and date.

E. The software shall use drop-down menus for all previously entered system-required data.

F. The system shall offer 'lock-down' capability in which the user can lock (or change the state of) all doors simultaneously with one single mouse click.

G. The system shall provide mode of system operation that requires the operator to enter a response to an event when acknowledging it.

H. The system shall provide a hierarchical structure of alarm set up and acknowledgement that allows acknowledged alarms to be automatically cleared.

I. The system shall provide a mode of operation where unacknowledged alarms can be re-routed to different groups of workstations.

J. The system shall provide a mode of operation that does not allow the operator to clear an alarm prior to being restored to normal.

K. The system shall provide ability to manually operate the system doors. The manual functions include the ability to Lock, Un-Lock, Shunt, Un-Shunt and Return to Time Zone.

2.3 SYSTEM PROGRAMMING

A. The contractor shall furnish and install all hardware, software, devices and components to meet the performance and functional requirements described in these contract documents. Include all items required, whether or not individually specified, to ensure a completely operational integrated Security Management System. The contractor must complete all database entry, and provide the owner with training on cardholder entry, as well as all system programming. No additional costs shall be allowed to make the system operational or to meet specifications.

B. The contractor shall coordinate with Section 08710 to insure that the sequence of operation specified in the respective electric/electronic Hardware Sets is achieved through system programming and appropriate access control system hardware and accessory device installation.

2.4 SYSTEM ARCHITECTURE:

A. System Description:

1. Primary function is to regulate access through specific portals to Secured areas.
2. Shall utilize card technology as its primary access device.
3. Surge Protection Components must be protected from voltage surges originating externally to equipment housing and entering through power, communication, signal, control, or sensing leads. Must also include surge protection for external wiring of each conductor-entry connection to components.

4. Power: Any special power treatment required, such as filtering or spike elimination that may be required for proper operation and protection of the ACS, shall be provided with the system Step down power supply with battery backup of at least 4 hours of system Reader Controllers, electronic locks, and lock power supplies of at least 4 hours.

5. Backup Power: ACS equipment power shall be supplied from a UPS system, which shall be tied to emergency building power circuits. The UPS shall power the equipment including, but not limited to, the Reader Controller, electronic locks and lock power supplies for a minimum of 4 hours.

2.5 SYSTEM SOFTWARE:

A. Software and Server Package

1. The Contractor shall furnish and install Schlage Part No. E-SENT-SVR-5 Enterprise 5 Client Software with PC Server.

2. Access Control & Alarm monitoring software includes in base package:
   a. Transaction & Alarm monitoring / routing
   b. Cardholder management (includes special access needs)
   c. Unlimited card holder capacity
   d. Unlimited card reader capacity
   e. Unlimited alarm capacity
   f. Unlimited operator capacity
   g. Manage on-line and off-line locks/readers
   h. Portrait Capture and card production (printers not included)
   i. Video & Camera control via Schlage NVR & DVR's (not included)
   j. Complete Auditing/Reporting capabilities
   k. Auto scheduling of predefined reports
   l. Elevator Control Software Module

3. Unless otherwise specified by owner, server shall be provided by the Access Control Contractor. Minimum requirements are MS Windows XP Pro Operating System or higher, network card, DVD/CD-RW, 17" flat screen monitor, 104-key keyboard and mouse.

4. Enrollment Reader: The Access Control Contractor shall furnish and install one (1) enrollment reader. Schlage Model No. SENROLL.

2.6 SYSTEM HARDWARE

A. Reader Controllers: Mount in selected Electrical/Communication Rooms. The Project Electrical Contractor shall provide 120VAC power and TCP/IP network drop for each Reader Controller.

B. Reader Controller SRCNX-R – as manufactured by Schlage Electronics. Furnish and installed as required to integrate all specified biometric readers, card readers, and interface with electric/electronic door hardware.

1. The reader controllers shall be independently programmed, intelligent devices, which shall be able to make decisions and store transactions at the local level. The system shall provide reader controllers for one reader up to 16 reader capacity, and field configurable by standard system software. Capable of being fully networked into (TCP/IP LAN/WAN) network connectivity. Downstream communication shall be done through RS-485.

Enclosure to be lockable NEMA rated 20"x 20" x 4".

2. Downstream communication via RS-485 connects directly to the following devices:
   a. SRINX.
   b. SIONX-8.
   c. Schlage AD Series locks.
   d. Schlage wireless PIM-485

3. Scalable for the following:
   a. 1-16 door controller: SRCNX-R

4. Specifications:
   a. Up to16 input device channels
   b. Up to 16 supervised or non-supervised inputs
   c. Up to 16 SP/DT relays
   d. Flashable Firmware
   e. 64 MB RAM for ID capability
   f. Power requirements 24 VAC @ 14 amps

C. Reader Interface:

1. Reader Interface model. SRINX – as manufactured by Schlage Electronics. Furnish and install as required for any door requiring a Card Reader or Biometric Reader.

2. Each reader in the system shall have a dedicated reader interface panel able to connect to the controller via RS-485 protocol, able to support proximity, smart card, magnetic stripe, biometric, bar code, and Wiegand technologies. The reader interface panel shall have two form "C" SP/DP 1 amp relay outputs, four supervised or unsupervised contact inputs.

5. Specifications:
   a. Dimensions - 8 ¼"H x 7 ½"W x 3 ½"D
   b. Power input - 14-24 VDC
   c. Max. Current req. – 120 mA (without read head)
   d. Operating Temperature - 0° to 49° C or 32° to 120° F
   e. Cable spec. – 18 AWG 2 conductor stranded, shielded, twisted for data to SRCNX-R & 18 AWG 2 conductor stranded, shielded, twisted for power, & 18 AWG 6 conductor for readers.
   f. Cable distance – with RS-485 4,000 ft. for data to SRCNX-R & 500 ft for power & 500 ft for read head.
   g. Operating humidity – 10% to 90% (non condensing)
   h. UL Listed for UL294.

2.7 POWER SUPPLIES:

A. Schlage PS900 Series as mfg. by Schlage Electronics. Furnish and install as required to power Reader Controllers and electric locks or door strikes. Electric latch retraction panic hardware furnished by Section 008710, shall have their power supply furnished by that Section.

1. Having LED's indicators show good AC power and DC on.

2. Model PS902, PS904, PS906 as required.

3. Emergency Interface Relay (FA.)

4. Isolated SPDT contacts to monitor AC power status.

5. 900-BBK-Battery Backup Kit with (2)-7/AH Batteries.

6. Specifications:
   a. Power input – 120VAC-240VAC
   b. Power output – 2A, 4A, or 6A @ 12 or 24 VDC
   c. Enclosure dimension – 14.0" x 12.0" x 4.0"
   d. Operating temperature - -32F° to 120° F (0° to 49°C)
   e. UL listed for UL294 access control; RoHS, FCC Part 15.

2.8 Schlage Biometric Hand Geometry Reader

A. A Schlage Biometric Hand Geometry Reader, HandKey II, shall be used for biometric authentication for entry into the Evidence Storage Room. The Biometric Reader shall be equipped with an on-board MIFARE smart card reader and have memory for 512 Users and be expandable for additional users in the future. The Contractor shall furnish, install and integrate the Biometric Reader into the SMS.

B. HandKey II –as mfg. by Schlage Electronics.

1. Model Number: HK-2F3 x SC-100 x PS-110 x BB-250.
   a. Power supply – 120VAC to 13.5 VDC with Battery Back-up
   b. Voltage range – 12 to 24 VDC
   c. Users – 512 (Expandable to 259,072)
   d. Card Reader – MIFARE Smart Card Reader.
   e. System interface –26 bit Wiegand
   f. Antimicrobial – On Platen.
   g. Operating temperature - -32F to 113F
   h. Template Size--9 bytes
   i. Operating temperature - 31° to 151°F
   j. Dimensions HxWxD--11.65 in.(29.6 cm) x 8.85 in. (22.5 cm) x 8.55 in. (21.7 cm)

2.9 SMART CARD CREDENTIALS AND CARD READERS:

A. Smart Cards: The Contractor shall furnish to the Owner, two hundred (200) MIFARE Smart Cards with Magnetic Stripe using 13.56 Smart Technology and meeting ISO Standard 14443A. Schlage Electronic Model Number: SXF9520MS.

B. Smart Card Readers: Certain doors will be equipped with electrified door hardware and wall-mounted smart card readers. Those doors will be identified in Section 08710 by the statement "card reader by Access Control Section." The Contractor shall furnish and install a wall-mounted smart card reader with keypad, Schlage Electronic Model SXF2220. The Contractor shall integrate the card reader and door position switch, request-to-exit switch and accessories furnished by Section 08710 and integrate them into the SMS.

PART 3 - EXECUTION

3.1 SITE VERIFICATION OF CONDITIONS:

A. Examine pathway elements intended for cables. Check raceways, cable trays, and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions affecting installation.

B. Examine rough-in for LAN and control cable conduit systems to PCs, Controllers, card readers, and other cable-connected devices to verify actual locations of conduit and back boxes before device installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Furnish any inserts required for building into concrete, masonry, and other work, to support and attach work of this section. Furnish in ample time to comply with schedule of work into which inserts are built.

B. Verify that power and outlets are in correct locations.

C. Verify that building structure is properly prepared for mounting, attachment and support of equipment.

D. Prior to installation of systems components and devices, verify all required preparations have been properly performed and that substrates are acceptable for installation.

E. Verify all rough-ins and field dimensions.

F. Report in writing to the Architect any prevailing conditions that will adversely affect satisfactory execution of Work in this Section.

1. Architect reserves the right to review proposed methods of construction/installation, reject proposed methods, and have the installation done in a satisfactory method at the Contractor's cost.

3.3 INSTALLATION OF SYSTEM

A. Install work in accordance with manufacturer's recommendations, instructions and final Shop Drawings. All control panels and power supplies should be installed so as to allow easy access for service in the future

B. Anchor components securely in place, plumb, level, and accurately aligned. Provide separators and isolators to prevent corrosion and electrolytic deterioration.

C. For card readers that are located in equipment traffic areas, and that are exposed to damage due to collision or impact from forklifts, or manually moved carts, carriers, or other equipment used by the Owner, provide protective bollards, railings, coverings etc. to ensure that all card readers installed are properly protected from such damage.

D. Provide fastenings, plates, and other incidental items required for complete and operational installation.

E. Provide all required low voltage electrical work for installation of the system. Provide low voltage work in accordance with code requirements.

3.4 SYSTEM SOFTWARE

A. Develop, install, and test software databases for the complete and proper operation of systems involved. Assign software license to Owner and assign secured IP address to / or supplied by Owner

3.5 SYSTEM PROGRAMMING

A. The Contractor shall work with the owner to ensure that the new components will be properly programmed into the existing system.

B. Coordination required is as follows;

1. Personal/staff information.

2. Access time for all personal /staff.

3. Definitions of openings for staff access.

4. Holiday definition.

5. Special access privileges.

6. Lock down conditions.

3.6 SITE QUALITY CONTROL

A. The Contractor shall develop a Final Test and Acceptance (FTA) Plan. The plan shall identify each new system component provided in the work, intent of test, method or methods of test and expected results. Each component listed in the plan shall include space for test part signatures, brief comments, time of test and pass/fail check boxes. The FTA plan shall be submitted to the owner's representative 30 days prior to the scheduled final test.

B. Provide manufacturer's certified representative supervision of final testing of each system.

1. On-Site Testing: Manufacturer trained and certified Systems Integrator shall functionally test each component in the system after installation to verify proper operation and confirm that the wiring and dressing conform to the wiring documentation.

C. Each system shall test free from interference, opens, grounds, and short circuits.

D. Start-up Test

2. Following completion of the Final Test, the system shall undergo a thirty (30) day Operational Demonstration Test (ODT). This operational demonstration period shall start when all specified systems and equipment have been installed and "Substantial Completion" is reached, with only a moderate number of punch list items remaining.

3. During this period, the system shall be operated under a normal facility traffic load for no less than 30 days. If any item or system fails during the ODT, the 30-day burn-in period shall be suspended for that item until repaired or replaced. Once repaired or replaced, the burn-in period shall recommence.

4. Final system acceptance of the entire project will be withheld until after successful completion of this operational demonstration period for all systems and components.

5. System will not be considered substantially complete until the following activities have been successfully completed:
   a. Acceptance of all submittals.
   b. Delivery of final documentation
   c. Successful Final Test and Inspection
   d. Successful Operational Demonstration Test
   e. Successful training and demonstration, including operation of systems using the manuals.
   f. Purging of Contractor User privileges and return of all key card media.

3.7 OWNER PERSONNEL TRAINING

A. On Site Operator training: instruct administrative/operating staff in proper operation, including hands-on training.

1. Minimum of sixteen (16) hours covering the operations for each system installed. Training to cover all administrative and management functions for all owner designated individuals.

2. Training sessions shall be provided to supervisors, staff utilizing systems and equipment provided under this section, maintenance personnel and any other personnel designated by the owner.

3. Access Control Contractor shall be prepared to provide training sessions on all work shifts, including day, evening and night shifts.

B. Refresher training: provide a refresher training session to operators and administrators scheduled at the discretion of the owner 30-90 days after the original training.

1. Minimum of eight (8) hours of refresher training for all owner-designated individuals.

2. Training shall cover summaries of all operator and administrator training topics and shall include greater detail on subject areas or operations not yet mastered by operators or administrators.

C. Review in detail all information in the operations and maintenance manuals for each system provided.

D. Prior to administering the above training, the contractor(s) shall prepare an outline of the training, identifying the goals and expectations of the course and detailing what students are expected to learn.

E. Training course shall be equivalent to Schlage End User Course part no. SEUADMIN performed on site by a factory trained instructor.

3.8 CLEANING AND WASTE MANAGEMENT

A. Cleaning and Touchup: Immediately after installation, including the completion of wiring and testing, clean all work and touchup all damaged factory finishes.

3.9 PROTECTION

A. Maintain strict security during the installation of equipment and software. Rooms housing the control station, and workstations that have been powered up shall be locked and secured during periods when a qualified operator in the employ of Contractor is not present.

B. Protection: Provide protective covers, fenders, and barriers as necessary to maintain Work of this Section in same condition as installed until time of Substantial Completion.

3.10 LIFE CYCLE ACTIVITIES

A. Commissioning: All system components shall be commissioned as to conform to the manufacturer's recommendations for maximum life cycle.

B. Operation and Use: Provide, in writing, Operation and Use procedures for each system component. Such procedures shall be written in order to conform to the manufacturer's recommendations for maximum life cycle.

C. Maintenance: Provide, in writing, Maintenance procedures for each system component. Such procedures shall be written in order to conform to the manufacturer's recommendations for maximum life cycle.

END OF SECTION

SECTION 08710

DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Door Hardware.

B. Related Sections:

1. Section 07920 - Joint Sealers – Exterior thresholds
2. Section 08110 – Hollow Metal Frames
3. Section 08120 - Aluminum Frames
4. Section 08211 – Flush Wood Doors

C. Specific Omissions: Hardware for the following is specified or indicated elsewhere.

1. Windows.
2. Cabinets, including open wall shelving and locks.
3. Signs, except where scheduled.
4. Toilet accessories, including grab bars.
5. Installation.
6. Rough hardware.

1.2 REFERENCES:

Use date of standard in effect as of Bid date.

A. American National Standards Institute – ANSI 156.18 – Materials and Finishes.

B. ICC/ANSI A117.1 - 1998 – Specifications for making buildings and facilities usable by physically handicapped people.

C. ADA – Americans with Disabilities Act of 1990

D. BHMA – Builders Hardware Manufacturers Association

E. DHI – Door and Hardware Institute

F. NFPA – National Fire Protection Association

1. NFPA 80 – Fire Doors and Windows
2. NFPA 105 – Smoke and Draft Control Door Assemblies
3. NFPA 252 – Fire Tests of Door Assemblies

G. UL – Underwriters Laboratories

1. UL10C – Positive Pressure Fire Tests of Door Assemblies.
2. UL 305 – Panic Hardware

H. WHI – Warnock Hersey Incorporated State of California Building Code

I. Local applicable codes

J. SDI – Steel Door Institute

K. WI – Woodwork Institute

L. AWI – Architectural Woodwork Institute

M. NAAMM – National Association of Architectural Metal Manufacturers

1.3 SUBMITTALS & SUBSTITUTIONS

A. SUBMITTALS: Submit six copies of schedule per Section 01330. Only submittals printed one sided will be accepted and reviewed. Organize vertically formatted schedule into "Hardware Sets" with index of doors and headings, indicating complete designations of every item required for each door or opening. Include following information:

1. Type, style, function, size, quantity and finish of hardware items.
2. Use BHMA Finish codes per ANSI A156.18.
3. Name, part number and manufacturer of each item.
4. Fastenings and other pertinent information.
5. Location of hardware set coordinated with floor plans and door schedule.
6. Explanation of abbreviations, symbols, and codes contained in schedule.
7. Mounting locations for hardware.
8. Door and frame sizes, materials and degrees of swing.
9. List of manufacturers used and their nearest representative with address and phone number.
10. Catalog cuts.

B. Bid and submit manufacturer's updated/improved item if scheduled item is discontinued.

C. Deviations: Highlight, encircle or otherwise identify deviations from "Schedule of Finish Hardware" on submittal with notations clearly designating those portions as deviating from this section.

D. If discrepancy between drawings and scheduled material in this section, bid the more expensive of the two choices, note the discrepancy in the submittal and request direction from Architect for resolution.

E. Substitutions per Division 1. Include product data and indicate benefit to the Project. Furnish operating samples on request.

F. Items listed with no substitute manufacturers have been requested by Owner to meet existing standard.

G. Furnish as-built/as-installed schedule with closeout documents, including keying schedule, wiring diagrams, manufacturers' installation, adjustment and maintenance information, and supplier's final inspection report.

1.4 QUALITY ASSURANCE:

A. Qualifications:

1. Hardware supplier: direct factory contract supplier who employs a certified architectural hardware consultant (AHC), available at reasonable times during course of work for project hardware consultation to Owner, Architect and Contractor.

a) Responsible for detailing, scheduling and ordering of finish hardware. Detailing implies that the submitted schedule of hardware is correct and complete for the intended function and performance of the openings.

B. Hardware: Free of defects, blemishes and excessive play. Obtain each kind of hardware (latch and locksets, exit devices, hinges and closers) from one manufacturer.

C. Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.

D. Fire-Rated Openings: NFPA 80 compliant. Hardware UL10C / California State Fire Marshal Standard 12-7-4 (positive pressure) compliant for given type/size opening and degree of label. Provide proper latching hardware, non-flaming door closers, approved-bearing hinges, and resilient seals. Coordinate with wood door section for required intumescent seals. Furnish openings complete.

E. Note: scheduled resilient seals may exceed selected door manufacturer's requirements.

F. See 2.6.E for added information regarding resilient and intumescent seals.

G. Furnish hardware items required to complete the work in accordance with specified performance level and design intent, complying with manufacturers' instructions.

1.5 DELIVERY, STORAGE AND HANDLING:

A. Delivery: coordinate delivery to appropriate locations (shop or field).

1. Permanent keys and cores: secured delivery direct to Owner's representative.

B. Acceptance at Site: Items individually packaged in manufacturers' original containers, complete with proper fasteners and related pieces. Clearly mark packages to indicate contents, locations in hardware schedule and door numbers.

C. Storage: Provide securely locked storage area for hardware, protect from moisture, sunlight, paint, chemicals, dust, excessive heat and cold, etc.

1.6 PROJECT CONDITIONS AND COORDINATION:

A. Where exact types of hardware specified are not adaptable to finished shape or size of members requiring hardware, provide suitable types having as nearly as practical the same operation and quality as type specified, subject to Architect's approval.

B. Coordination: Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements indicated, as necessary for proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents. Furnish related trades with the following information:

1. Location of embedded and attached items to concrete.

2. Location of wall-mounted hardware, including wall stops.

3. Location of finish floor materials and floor-mounted hardware.

4. Locations for conduit and raceways as needed for electrical, electronic and electro-pneumatic hardware items. Fire/life-safety system interfacing. Point-to-point wiring diagrams plus riser diagrams to related trades.

5. Manufacturer templates to door and frame fabricators.

C. Check Shop Drawings for doors and entrances to confirm that adequate provisions will be made for proper hardware installation.

D. Prior to submittal, carefully inspect existing conditions to verify finish hardware required to complete Work, including sizes, quantities, existing hardware scheduled for re-use, and sill condition material. If conflict between the specified/scheduled hardware and existing conditions, submit request for direction from Architect. Include date of jobsite visit in the submittal.

1. Submittals prepared without thorough jobsite visit by qualified hardware expert will be rejected as non-compliant.

1.7 WARRANTY:

A. Part of respective manufacturers' regular terms of sale. Provide manufacturers' written warranties:

1.	Extra Heavy Duty Cylindrical Lock:	Seven Years
2.	Exit Devices:	Three years
3.	Closers:	Ten years
4.	Hinges:	One year
5.	Other Hardware	Two years

1.8 COMMISSIONING:

A. Conduct these tests prior to request for certificate of substantial completion:

1. With installer present, test door hardware operation with climate control system at rest and while in full operation.

1.9 REGULATORY REQUIREMENTS:

A. Locate latching hardware between 30" to 44" above the finished floor, per California Building Code, Section 1133B.2.5.2.

1. Locate panic hardware between 36" to 44" above the finished floor.

2 Centerline of exit device shall be located at 39-13/16" AFF and 39-11/16" AFF when used with a mullion

B. Adjust doors to open with not more than 5.0 lbs pressure to open at exterior doors and 5.0 lbs at interior doors. As allowed per California Building Code, Section 1133B.2.5, local authority may increase the allowable pressure for fire doors to achieve positive latching, but not to exceed 15 lbs.

C. 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 from the latch, measured to the landing side of the door, per California Building Code Section 1133B.2.5.1

D. Meet California Building Code Sections 1133B.2.1, 1133B.2.5.1 and 1003.3.1.8l.

E. Thresholds: Comply with California Building Code Section 1133B.2.4.1.

F. Floor stops: Do not locate in path of travel. Locate no more than 4" from walls, per DSA Policy #99008 (Access).

PART 2 PRODUCTS

2.1 MANUFACTURERS:

A. Listed acceptable alternate manufacturers: submit for review products with equivalent function and features of scheduled products.

ITEM:	MANUFACTURER:	ACCEPTABLE SUB:
Hinges	(IVE) Ives	Hager, Bommer
Continuous Hinges	Markar	College Standard
Key System	(BES) Best Kaba Peaks	District Standard
Locks	(SCH) Schlage	District Standard
Exit Devices	(VON) Von Duprin	District Standard
Closers	(LCN) LCN	District Standard
Auto Flush Bolts	(IVE) Ives	DCI
Coordinators	(IVE) Ives	DCI
Silencers	(IVE) Ives	Rockwood, Trimco
Push & Pull Plates	(IVE) Ives	Rockwood, Trimco
Kickplates	(IVE) Ives	Rockwood, Trimco
Stops	(IVE) Ives	Rockwood, Trimco
Overhead Stops	(GLY) Glynn-Johnson	College Standard
Thresholds	(NGP) NGP	Pemko
Seals & Bottoms	(NGP) NGP	Pemko

2.2 HINGING METHODS:

A. Drawings typically depict doors at 90 degrees, doors will actually swing to maximum allowable. Use wide-throw conventional or continuous hinges as needed up to 8 inches in width to allow door to stand parallel to wall for true 180-degree opening. Advise architect if 8-inch width is insufficient.

B. Conform to manufacturer's published hinge selection standard for door dimensions, weight and frequency, and to hinge selection as scheduled. Where manufacturer's standard exceeds the scheduled product, furnish the heavier of the two choices, notify Architect of deviation from scheduled hardware.

C. Conventional Hinges: Steel or stainless steel pins and concealed bearings. Hinge open widths minimum, but of sufficient throw to permit maximum door swing.

1. Outswinging exterior doors: non-ferrous with non-removable (NRP) pins and security studs.

2. Non-ferrous material exteriors and at doors subject to corrosive atmospheric conditions.

2.3 LOCKSETS, LATCHSETS, DEADBOLTS:

A. Extra Heavy Duty Cylindrical Locks and Latches: as scheduled.

1. Chassis: cylindrical design, corrosion-resistant plated cold-rolled steel, through-bolted.

2. Locking Spindle: stainless steel, integrated spring and spindle design.

3. Latch Retractors: forged steel. Balance of inner parts: corrosion-resistant plated steel, or stainless steel.

4. Latchbolt: solid steel.

5. Backset: 2-3/4" typically, more or less as needed to accommodate frame, door or other hardware.

6. Lever Trim: accessible design, independent operation, spring-cage supported, minimum 2" clearance from lever mid-point to door face.

7. Strikes: 16 gage curved steel, bronze or brass with 1" deep box construction, lips of sufficient length to clear trim and protect clothing.

8. Lock Series and Design: Schlage D series, "Rhodes" design.

9. Certifications:

a) ANSI A156.2, 1994, Series 4000, Grade 1.

b) UL listed for A label and lesser class single doors up to 4ft x 8ft.

10. Accepted substitutions: None

2.4 CLOSERS

A. Surface Closers: (4040 & 4040XP)

1. Full rack-and-pinion type cylinder with removable non-ferrous cover and cast iron body. Double heat-treated pinion shaft, single piece forged piston, chrome-silicon steel spring.
2. ISO 2000 certified. Units stamped with date-of-manufacture code.
3. Independent lab-tested 10,000,000 cycles.
4. Non-sized, non-handed, and adjustable. Place closer inside building, stairs, and rooms.
5. Plates, brackets and special templating when needed for interface with particular header, door and wall conditions and neighboring hardware.
6. Adjustable to open with not more than 5.0lbs pressure to open at exterior doors and 5.0lbs at interior doors. As allowed per California Building Code, Section 1133B.2.5, local authority may increase the allowable pressure for fire doors to achieve positive latching, but not to exceed 15lbs.
7. Separate adjusting valves for closing speed, latching speed and backcheck, fourth valve for delayed action where scheduled.
8. Extra-duty arms (EDA) at exterior doors scheduled with parallel arm units.
9. Exterior door closers: tested to 100 hours of ASTM B117 salt spray test, furnish data on request.
10. Exterior doors: seasonal adjustments not required for temperatures from 120 degrees F to -30 degrees F, furnish checking fluid data on request.
11. Non-flaming fluid, will not fuel door or floor covering fires.
12. Pressure Relief Valves (PRV) not permitted.
13. Accepted substitutions: None

2.6 OTHER HARDWARE

A. Automatic Flush Bolts: Low operating force design.

B. Overhead Stops: Non-plastic mechanisms and finished metal end caps. Field-changeable hold-open, friction and stop-only functions.

C. Kick Plates: Four beveled edges, .050 inches minimum thickness, height and width as scheduled. Sheet-metal screws of bronze or stainless steel to match other hardware.

D. Door Stops: Provide stops to protect walls, casework or other hardware.

1. Unless otherwise noted in Hardware Sets, provide wall type with appropriate fasteners. Where wall type cannot be used, provide floor type. If neither can be used, provide overhead type.

2. Locate overhead stops for maximum possible opening. Consult with Owner for furniture locations. Minimum: 90deg stop / 95deg deadstop. Note degree of opening in submittal.

E. Seals: Finished to match adjacent frame color. Resilient seal material: polyurethane, polypropylene, nylon brush, silicone rubber or solid high-grade neoprene as scheduled. Do not furnish vinyl seal material. UL label applied to seals on rated doors. Substitute products: certify that the products equal or exceed specified material's thickness and durability.

1. Proposed substitutions: submit for approval.

2. Solid neoprene: MIL Spec. R6855-CL III, Grade 40.

3. Non-corroding fasteners at in-swinging exterior doors.

4. Sound control openings: Use components tested as a system using nationally accepted standards by independent laboratories. Ensure that the door leafs have the necessary sealed-in-place STC ratings. Fasten applied seals over bead of sealant.

5. Fire-rated Doors, Resilient Seals: UL10C / UBC Standard 7-2 compliant. Coordinate with selected door manufacturers' and selected frame manufacturers' requirements. Where rigid housed resilient seals are scheduled in this section and the selected door manufacturer only requires an adhesive-mounted resilient seal, furnish rigid housed seal at minimum, or both the rigid housed seal plus the adhesive applied seal. Adhesive applied seals alone are deemed insufficient for this project where rigid housed seals are scheduled.

6. Fire-rated Doors, Intumescent Seals: Furnished by selected door manufacturer. Furnish fire-labeled opening assembly complete and in full compliance with UL10C / UBC Standard 7-2. Where required, intumescent seals vary in requirement by door type and door manufacture -- careful coordination required

F. Automatic door bottoms: low operating force units. Doors with automatic door bottoms plus head and jamb seals cannot require more than two pounds operating force to open when closer is disconnected.

G. Thresholds: As scheduled and per details. Comply with CBC Section 1133B.2.4.1. Substitute products: certify that the products equal or exceed specified material's thickness. Proposed substitutions: submit for approval.

1. Exteriors: Seal perimeter to exclude water and vermin. Use sealant complying with requirements in Division 7 "Thermal and Moisture Protection". Non-ferrous 1/4inch fasteners and lead expansion shield anchors, or Red-Head #SFS-1420 (or approved equivalent) Flat Head Sleeve Anchors (SS/FHSL).

2. Fire-rated openings, 90min or less duration: use thresholds to interrupt floor covering material under the door where that material has a critical radiant flux value less than 0.22 watts per square centimeter, per NFPA 253. Use threshold unit as scheduled. If none scheduled, request direction from Architect.

3. Acoustic openings: Set units in full bed of Division-7-compliant, leave no air space between threshold and substrate.

4. Plastic plugs with wood or sheet metal screws are not an acceptable substitute for specified fastening methods.

5. Fasteners: Generally, exposed screws to be Phillips or Robertson drive. Pinned TORX drive at high security areas. Flat head sleeve anchors (FHSL) may be slotted drive. Sheet metal and wood screws: full-thread. Sleeve nuts: full length to prevent door compression.

H. Exposed Through-Bolts: Do not use SNB, grommet nuts, sleeve nuts or other such clamping type fasteners, intent is for minimal exposed hardware. Coordinate with wood doors; ensure provision of proper blocking to support wood screws for mounting panic hardware and door closers. Coordinate with metal doors and frames; ensure provision of proper reinforcement to support machine screws for mounting panic hardware and door closers.

I. Silencers: Interior hollow metal frames, 3 for single doors, 4 for pairs of doors. Omit where adhesive mounted seal occurs. Leave no unfilled/uncovered pre-punched silencer holes.

2.7 FINISH:

A. Generally BHMA 630 Satin Stainless Steel and 626 Satin Chrome.

B. Door closers: factory powder coated to match other hardware, unless otherwise noted.

C. Aluminum items: match predominant adjacent material. Seals to coordinate with frame color.

2.8 KEYING REQUIREMENTS:

A. SFIC Cores: Best Kaba Peaks 7-Pin B2 Part # 1CK7B21-626.

B. Key blanks: Best Kaba Peaks 1AK1B21.

C. Keying Notes:

a. Contractor will also deliver to ELAC, at a time in the project when the locks are purchased for the project, an equal amount of un-combinated SFIC cores of the type listed above. This will allow ELAC to pin cores for use after the contractor removes the construction cores and turns over the building to ELAC.

b. For each door without card access ELAC will need 50 (fifty) uncut key blanks of the part number listed above.

PART 3 - EXECUTION

3.1 ACCEPTABLE INSTALLERS:

A. Can read and understand manufacturers' templates, suppliers' hardware schedules and printed installation instructions. Can readily distinguish drywall screws from manufacturers' furnished fasteners. Available to meet with manufacturers' representatives and related trades to discuss installation of hardware.

3.2 PREPARATION:

A. Ensure that walls and frames are square and plumb before hardware installation. Make corrections before commencing hardware installation.

B. Locate hardware per SDI-100 and applicable building, fire, life-safety, accessibility, and security codes.

1. Notify Architect of code conflicts before ordering material.

2. Locate levers, key cylinders, t-turn pieces, touchbars and other operable portions of latching hardware between 30 inches to 44 inches above the finished floor, per CBC Section 1133B.2.5.1. For Exit Devices: Centerline of device shall be located at 39-13/16" AFF and 39-11/16" AFF when used with a mullion.

3. Where new hardware is to be installed near existing doors/hardware scheduled to remain, match locations of existing hardware.

C. Overhead stops: before installing, determine proposed locations of furniture items, fixtures, and other items to be protected by the overhead stop's action.

D. Existing frames and doors to be retrofitted with new hardware:

1. Field-verify conditions and dimensions prior to ordering hardware. Fill existing hardware cut outs not being reused by the new hardware. Remove existing hardware not being reused, return to Owner unless directed otherwise.

2. Cut and weld existing steel frames currently prepared with 2-¾" height strikes. Cut an approx. 8" section from the strike jamb and weld in a reinforced section to accommodate specified hardware's strike.

3.3 INSTALLATION

A. Install hardware per manufacturer's instructions and recommendations. Do not install surface-mounted items until finishes have been completed on substrate. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate for proper installation and operation. Remove and reinstall or replace work deemed defective by Architect.

1. Gaskets: install jamb-applied gaskets before closers, overhead stops, rim strikes, etc; fasten hardware over and through these seals. Install sweeps across bottoms of doors before astragals, cope sweeps around bottom pivots, trim astragals to tops of sweeps.

2. When hardware is to be attached to existing metal surface and insufficient reinforcement exists, use RivNuts, NutSerts or similar anchoring device for screws.

3. Use manufacturers' fasteners furnished with hardware items, or submit Request for Substitution with Architect.

4. Replace fasteners damaged by power-driven tools.

B. Locate floor stops no more than 4 inches from walls and not within paths of travel. See paragraph 2.2 regarding hinge widths, door should be well clear of point of wall reveal. Point of door contact no closer to the hinge edge than half the door width. Where situation is questionable or difficult, contact Architect for direction.

C. Core concrete for exterior door stop anchors. Set anchors in approved non-shrink grout.

D. Locate overhead stops for minimum 90 degrees and maximum allowable degree of swing.

E. Drill pilot holes for fasteners in wood doors and/or frames.

F. Lubricate and adjust existing hardware scheduled to remain. Carefully remove and give to Owner items not scheduled for reuse.

G. Field verify existing conditions and measurements prior to ordering hardware. Fill existing hardware cut outs not being used by the new hardware. Remove existing hardware not being reused.

H. Where existing wall conditions will not allow door to swing using the scheduled hinges, provide wide-throw hinges and if needed extended arms on closers.

I. Provide proper brackets to accommodate the mounting of closers on doors with flush transoms.

3.4. ADJUSTING

A. Adjust and check for proper operation and function. Replace units, which cannot be adjusted to operate freely and smoothly.

1. Hardware damaged by improper installation or adjustment methods: repair or replace to Owner's satisfaction.

2. Adjust doors to fully latch with no more than 1 pound of pressure.

3. Adjust delayed-action closers on fire-rated doors to fully close from fully-opened position in no more than 10 seconds.

4. Adjust door closers per 1.9 this section.

B. Inspection: Use hardware supplier's consultant or consultant's agent. Include supplier's report with closeout documents.

C. Final inspection: Installer to provide letter to Owner that upon completion installer has visited the Project and has accomplished the following:

1. Re-adjust hardware.

2. Evaluate maintenance procedures and recommend changes or additions, and instruct Owner's personnel.

3. Identify items that have deteriorated or failed.

4. Submit written report identifying problems

3.5 DEMONSTRATION:

A. Demonstrate mechanical hardware and electrical, electronic and pneumatic hardware systems, including adjustment and maintenance procedures.

3.6 PROTECTION/CLEANING:

A. Cover installed hardware, protect from paint, cleaning agents, weathering, carts/barrows, etc. Remove covering materials and clean hardware just prior to substantial completion.

B. Clean adjacent wall, frame and door surfaces soiled from installation/reinstallation process.

3.7 SCHEDULE OF FINISH HARDWARE

A. See door schedule in drawings for hardware set assignments.

B. Miscellaneous Material

DOOR HARDWARE

HW SET: 01 3' X 1'6" LEAF

5	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	ELECTRIC HINGE	3CB1 4.5 X 4.5 TW8	652	IVE
1	SET	CONST LATCHING BOLT	FB61P	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	EU STOREROOM LOCK	RX-ND80PDEU RHO 14-042	626	SCH
1	EA	COORDINATOR	COR X FL COMPLETE	628	IVE
1	EA	ASTRAGAL	139SP X 2525	600	NGP
2	EA	SURFACE CLOSER	4040XP RW/PA	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW	630	IVE
2	EA	DOME STOP	FS438	626	IVE
1	SET	SEALS	155V	AL	NGP
1			POWER SUPPLY FOR ELECTRIC LOCKS BY ACCESS CONTROL		
2	EA	DOOR POSITION SWITCH	679-05 HM		SCE
1			ASTRAGAL MUST BE PAINTED TO MATCH DOOR FINISH		
1		SECURITY	CARD READER BY ACCESS CONTROL SECTION		
1	EA	THRESHOLD	THRESHOLD AS REQUIRED		

HW SET: 02

2	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	ELECTRIC HINGE	3CB1 4.5 X 4.5 TW8	652	IVE
1	EA	EU STOREROOM LOCK	RX-ND80PDEU RHO 14-042	626	SCH
1	EA	SURFACE CLOSER	4040XP RW/PA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS401CVX	626	IVE
1	SET	SEALS	155V	AL	NGP
1			POWER SUPPLY FOR ELECTRIC LOCKS BY ACCESS CONTROL		
1	EA	DOOR POSITION SWITCH	679-05 HM		SCE
1		SECURITY	CARD READER BY ACCESS CONTROL SECTION		
1	EA	THRESHOLD	THRESHOLD AS REQUIRED		

HW SET: 03

3	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	ND70PD RHO	626	SCH
1	EA	SURFACE CLOSER	4040XP SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	SET	SEALS	155V	AL	NGP
1	EA	THRESHOLD	THRESHOLD AS REQUIRED		

HW SET: 04

3	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	ENTRANCE LOCK	ND53PD RHO	626	SCH
1	EA	SURFACE CLOSER	4040XP HW/PA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS401CVX	626	IVE
1	SET	SEALS	155V	AL	NGP

HW SET: 05

3	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	EU STOREROOM LOCK	RX-ND80PDEU RHO 14-042	626	SCH
1	EA	OVERHEAD STOP	900S SERIES	630	GLY
1			POWER SUPPLY FOR ELECTRIC LOCKS BY ACCESS CONTROL		
1	EA	DOOR POSITION SWITCH	679-05 HM		SCE
1		SECURITY	CARD READER BY ACCESS CONTROL SECTION		

HW SET: 06

3	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	EU STOREROOM LOCK	RX-ND80PDEU RHO 14-042	626	SCH
1	EA	WALL STOP	WS401CVX	626	IVE
1			POWER SUPPLY FOR ELECTRIC LOCKS BY ACCESS CONTROL		
1	EA	DOOR POSITION SWITCH	679-05 HM		SCE
1		SECURITY	CARD READER BY ACCESS CONTROL SECTION		

HW SET: 07

3	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	EU STOREROOM LOCK	RX-ND80PDEU RHO 14-042	626	SCH
1	EA	WALL STOP	WS401CVX	626	IVE
1			POWER SUPPLY FOR ELECTRIC LOCKS BY ACCESS CONTROL		
1	EA	DOOR POSITION SWITCH	679-05 HM		SCE
1		SECURITY	BIOMETRIC READER BY ACCESS CONTROL SECTION		

End of Section 08710

SECTION 08800

GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Scoping documents and general provisions of the Contract, including General and Supplementary Conditions and Division 1 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.
3. Interior borrowed lites.
4. Vision Panels in doors

B. These performance specifications represent minimum requirements. The contractor is responsible for the complete analysis, design, documentation, and implementation of Project, including integration and coordination of each aspect of the Project with the Work of this Section. The Work shall comply with scope, Standards, qualities, procedures, performance, materials, and products stipulated in this Section.

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.

C. Interspace: Space between lites of an insulating-glass unit.

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 CBC 2007 by a qualified professional engineer:

1. 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, whichever is less.
2. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

1.5 SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Glass Samples: For each type of the following products; 12 inches square.

C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

D. 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.

E. Qualification Data: For installers and manufacturers of insulating-glass units with sputter-coated, low-e coatings.

F. Product Certificates: For glass and glazing products, from manufacturer.

G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for coated glass, insulating glass, glazing sealants and glazing gaskets.

H. Preconstruction adhesion and compatibility test report.

I. Warranties: Sample of special warranties.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved by coated-glass manufacturer.

B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

C. 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 Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

F. 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. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

G. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F, and the fire-resistance rating in minutes.

H. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Install glazing in mockups specified in Division 8 Sections "Aluminum-Framed Entrances and Storefronts" and "Aluminum Windows" to match glazing systems required for Project, including glazing methods.
2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.
2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.

B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

C. 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.

2.2 GLASS PRODUCTS

A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.

B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.

1. Spacer: Manufacturer's standard spacer material and construction.
2. Desiccant: Molecular sieve or silica gel, or blend of both.

2.3 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. EPDM complying with ASTM C 864.
2. Silicone complying with ASTM C 1115.
3. Thermoplastic polyolefin rubber complying with ASTM C 1115.

2.4 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.

2.5 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.

2.6 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

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.

2.7 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

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.

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.

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 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 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 08800

SECTION 09111

NON-LOAD-BEARING STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior gypsum board assemblies.

B. Design/Build Responsibility: These performance specifications represent minimum requirements. Design/Builder is responsible for the complete analysis, design, documentation, and implementation of Project, including integration and coordination of each aspect of the Project with the Work of this Section. The Work shall comply with scope, Standards, qualities, procedures, performance, materials, and products stipulated in this Section.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 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, G60, hot-dip galvanized unless otherwise indicated.

C. Studs and Runners: ASTM C 645.

D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing.

E. Cold-Rolled Channel Bridging: Steel, 0.053-inch minimum base-metal thickness, with minimum 1/2-inch- wide flanges.

F. Hat-Shaped, Rigid Furring Channels: ASTM C 645.

G. Resilient Furring Channels: 1/2-inch- deep, steel sheet members designed to reduce sound transmission. Configuration: Asymmetrical or hat shaped.

H. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch- wide flanges.

I. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-metal thickness of 0.018 inch, and depth required to fit insulation thickness indicated.

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.

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. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Single-Layer Application: 16 inches o.c. unless otherwise indicated.
2. Multilayer Application: 16 inches o.c. unless otherwise indicated.
3. Tile Backing Panels: 16 inches o.c. unless otherwise indicated.

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 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. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

D. Direct Furring:

1. Screw to wood framing.
2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

E. Z-Furring Members:

1. Erect insulation, specified in Division 7 Section "Building Insulation," vertically and hold in place with Z-furring members spaced 24 inches o.c.
2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

END OF SECTION 09111

SECTION 08811

FIRE-RATED GLASS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Fire-rated glazing materials installed as vision lights in fire-rated doors.
2. Fire-rated glazing materials installed as windows in fire-rated frames.

B. Related Sections include the following:

1. Section 08110: Hollow Metal Doors and Windows.
2. Section 08210: Wood Doors.

1.02 REFERENCES

1. ASTM E2074-00: Standard Test Method for Fire Tests of Door Assemblies, Including Positive Pressure Testing of Side-Hinged and Pivoted Swinging Door Assemblies.
2. ASTM E2010-01: Standard Test Method for Positive Pressure Fire Tests of Window Assemblies.

B. American National Standards Institute (ANSI):

1. ANSI Z97.1: Standard for Safety Glazing Materials Used in Buildings

C. Consumer Product Safety Commission (CPSC):

1. CPSC 16 CFR 1201: Safety Standard for Architectural Glazing Materials

D. Glass Association of North America (GANA):

1. GANA – Glazing Manual.
2. FGMA – Sealant Manual.

E. National Fire Protection Association (NFPA):

1. NFPA 80: Fire Doors and Windows.
2. NFPA 252 – Fire Tests of Door Assemblies.
3. NFPA 257 – Fire Tests of Window Assemblies.

F. Underwriters Laboratories, Inc. (UL):

1. UL 9 – Fire Tests of Window Assemblies.
2. UL 10B – Fire Tests of Door Assemblies.
3. UL 10C – Positive Pressure Fire Tests of Door Assemblies.

1.03 PERFORMANCE REQUIREMENTS

A. Fire-rated glass ceramic laminated clear and wireless glazing material for use in impact safety-rated locations such as doors, transoms and borrowed lites with fire rating requirements ranging from 20 minutes to 3 hours with required hose stream test.

B. Passes positive pressure test standards UL10C, UBC 7-2 and UBC 7-4.

1.04 SUBMITTALS

A. Comply with requirements of Section 01300.

B. Product Data: Submit manufacturer's technical data for each glazing material required, including installation and maintenance instructions.

C. Certificates of compliance from glass and glazing materials manufacturers attesting that glass and glazing materials furnished for project comply with requirements. Separate certification will not be required for glazing materials bearing manufacturer's permanent label designating type and thickness of glass, provided labels represent a quality control program involving a recognized certification agency or independent testing laboratory acceptable to authority having jurisdiction.

D. Product Test Listings: From UL indicating fire-rated glass complies with requirements, based on comprehensive testing of current product.

E. Samples: Submit, for verification purposes, approx. 8-invh by 10-inch sample for each type of glass indicated.

1.05 QUALITY ASSURANCE

A. Glazing Standards: FGMA Glazing Manual and Sealant Manual.

B. Fire Protective Rated Glass: Each lite shall bear permanent, non-removable label of UL certifying it for use in tested and rated fire protective assemblies.

C. Fire Protective Glazing Products for Door Assemblies: Products identical to those tested per ASTM E2074-00 and UL 10B, labeled and listed by UL.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle materials under provisions of Section 01600.

B. Deliver materials to specified destination in manufacturer's or distributor's packaging, undamaged, complete with installation instructions.

C. Store off ground, under cover, protected from weather and construction activities.

1.07 WARRANTY

A. Provide manufacturer's limited warranty under provision of Section 017400.

B. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 FIRE-RATED GLAZING MATERIALS

A. Manufacturer: FireLite Plus® as manufactured by Nippon Electric Glass Company, Ltd., and distributed by Technical Glass Products, Kirkland, Washington, voice 1-800-426-0279, fax 1-800-451-9857,
e-mail sales@fireglass.com, web site www.fireglass.com.

B. Properties:

1. Thickness: 5/16 inch [8 mm] overall.
2. Weight: 4 lbs./sq. ft.
3. Approximate Visible Transmission: 85 percent.
4. Approximate Visible Reflection: 9 percent.
5. Fire-rating: 20 minutes to 3 hours for doors; 20 minutes to 90 minutes for other applications.
6. Impact Safety Resistance: ANSI Z97.1 and CPSC 16CFR1201 (Cat. I and II).
7. STC Rating: Approximately 35 dB.
8. Surface Finish: Premium (polished).
9. Positive Pressure Test: UL 10C, UBC 7-2 and 7-4; passes.

C. Maximum sheet sizes based on surface finish:

1. Premium: 48 inches by 96 inches.

D. Labeling: Permanently label each piece of FireLite Plus® with the FireLite® logo, UL logo and fire rating in sizes up to 3,325 sq. in., and with the FireLite label only for sizes that exceed the listing (as approved by the local authority having jurisdiction).

E. Fire Rating: Fire rating listed and labeled by UL for fire rating scheduled at opening locations on drawings, when tested in accordance with ASTM E2074-00 and ASTM E2010-01, NPFA 252 and NFPA 257, UL 9, UL 10B and UL 10C.

2.02 GLAZING COMPOUND FOR FIRE-RATED GLAZING MATERIALS

A. Glazing Tape: Closed cell polyvinyl chloride (PVC) foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent. Glass panels that exceed 1,393 sq. inches for 90-minute ratings must be glazed with fire-rated glazing tape supplied by manufacturer.

B. Setting Blocks: Neoprene, EPDM, or silicone; tested for compatibility with glazing compound; of 70 to 90 Shore A hardness.

C. Cleaners, Primers, and Sealers: Type recommended by manufacturer of glass and gaskets.

2.03 FABRICATION

A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with recommendations of product manufacturer and referenced glazing standard as required to comply with system performance requirements.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine glass framing, with glazier present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, offsets at corners.
2. Minimum required face or edge clearances.
3. Observable edge damage or face imperfections.

B. Do not proceed with glazing until unsatisfactory conditions have been corrected.

C. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings that are not firmly bonded to substrates.

3.02 INSTALLATION (GLAZING)

A. Comply with referenced FGMA standards and instructions of manufacturers of glass, glazing sealants, and glazing compounds.

B. Protect glass from edge damage during handling and installation. Inspect glass during installation and discard pieces with edge damage that could affect glass performance.

C. Set units of glass in each series with uniformity of pattern, draw, bow, and similar characteristics.

D. Cut glazing tape to length and set against permanent stops, flush with sight lines to fit openings exactly, with stretch allowance during installation.

E. Place setting blocks located at quarter points of glass with edge block no more than 6 inches from corners.

F. Glaze vertically into labeled fire-rated metal frames or partition walls with same fire rating as glass and push against tape for full contact at perimeter of pane or unit.

G. Place glazing tape on free perimeter of glazing in same manner described above.

H. Install removable stop and secure without displacement of tape.

I. Install in vision panels in fire-rated doors to requirements of NFPA 80.

J. Install so that appropriate UL markings remain permanently visible.

3.03 CLEANING

A. Wash glass on both faces not more than four days prior to date scheduled for inspections intended to establish date of substantial completion. Wash glass by method recommended by glass manufacturer.

B. Remove debris, rubbish and waste material and legally dispose of off the Project site.

3.04 PROTECTION

A. Protect glass from contact with contaminating substances resulting from construction operations. Remove any such substances by method approved by glass manufacturer.

B. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 09250

GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes interior gypsum board.

B. Design/Build Responsibility: These performance specifications represent minimum requirements. Design/Builder is responsible for the complete analysis, design, documentation, and implementation of Project, including integration and coordination of each aspect of the Project with the Work of this Section. The Work shall comply with scope, Standards, qualities, procedures, performance, materials, and products stipulated in this Section.

C. Related Requirements:
1. Division 9 Section "Non-Load-Bearing Steel Framing" for non-structural framing and suspension systems that support gypsum board panels.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Laboratory Test Reports for Credit EQ 4: For adhesives used to laminate gypsum board panels to substrates, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

1.4 QUALITY ASSURANCE

A. Mockups: Before beginning gypsum board installation, install mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Install mockups for the following:

a. Each level of gypsum board finish indicated for use in exposed locations.
b. Each texture finish indicated.

2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
3. Simulate finished lighting conditions for review of mockups.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or 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. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

C. 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 INTERIOR GYPSUM BOARD

A. Gypsum Wallboard: ASTM C 1396/C 1396M.

B. Gypsum Board, Type X: ASTM C 1396/C 1396M.

C. Flexible Gypsum Board: ASTM C 1396/C 1396M. Manufactured to bend to fit radii and to be more flexible than standard regular-type gypsum board of same thickness.

D. Gypsum Ceiling Board: ASTM C 1396/C 1396M.

E. Abuse-Resistant Gypsum Board: ASTM C 1629/C 1629M, Level 1.

F. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.

2.3 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.

2.4 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.

2.5 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.

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

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.

E. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

F. Thermal Insulation: As specified in Division 7 Section "Building Insulation."

G. Vapor Retarder: As specified in Division 7 Section "Building Insulation."

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 panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

C. 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.

D. Form control and expansion joints with space between edges of adjoining gypsum panels.

E. 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. 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- wide joints to install sealant.

F. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

G. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

H. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.

I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

3.4 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. 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 4: At panel surfaces that will be exposed to view unless otherwise indicated. Primer and its application to surfaces are specified in other Division 9 Sections.
3. Level 5: At panel surfaces that will receive other than flat finishes. Primer and its application to surfaces are specified in other Division 9 Sections.

3.5 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 09250

SECTION 09511

ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes acoustical panels and exposed suspension systems for ceilings.

B. These performance specifications represent minimum requirements. The contractor is responsible for the complete analysis, design, documentation, and implementation of Project, including integration and coordination of each aspect of the Project with the Work of this Section. The Work shall comply with scope, Standards, qualities, procedures, performance, materials, and products stipulated in this Section.

C. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete at ceilings.

1.3 DEFINITIONS

A. AC: Articulation Class.

B. CAC: Ceiling Attenuation Class.

C. LR: Light Reflectance coefficient.

D. NRC: Noise Reduction Coefficient.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

1. Ceiling suspension system members.
2. Method of attaching hangers to building structure.
3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
4. Minimum Drawing Scale: 1/4 inch = 1 foot.

C. Samples for Initial Selection: For components with factory-applied color finishes.

D. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.

1. Acoustical Panel: Set of full-size Samples of each type, color, pattern, and texture.
2. Exposed Suspension System Members, Moldings, and Trim: Set of 12-inch- long Samples of each type, finish, and color.

E. Qualification Data: For testing agency.

F. Field quality-control test reports.

G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each acoustical panel ceiling.

H. Research/Evaluation Reports: For each acoustical panel ceiling and components and anchor and fastener type.

I. Maintenance Data: For finishes to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Acoustical Testing Agency Qualifications: An independent testing laboratory, or an NVLAP-accredited laboratory, with the experience and capability to conduct the testing indicated. NVLAP-accredited laboratories must document accreditation, based on a "Certificate of Accreditation" and a "Scope of Accreditation" listing the test methods specified.

B. Source Limitations:

1. Acoustical Ceiling Panel: Obtain each type through one source from a single manufacturer.
2. Suspension System: Obtain each type through one source from a single manufacturer.

C. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:

1. Fire-Resistance Characteristics: Where indicated, provide acoustical panel ceilings identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
    a. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.
    b. Identify materials with appropriate markings of applicable testing and inspecting agency.

2. Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84: Smoke-Developed Index: 450 or less.

D. Seismic Standard: Provide acoustical panel ceilings designed and installed to withstand the effects of earthquake motions.

E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.8 COORDINATION

A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 ACOUSTICAL PANELS, GENERAL

A. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.

B. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

C. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

2.2 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING

A. Classification: Provide fire-resistance-rated panels complying with ASTM E 1264 for type, form, and pattern.

2.3 METAL SUSPENSION SYSTEMS, GENERAL

A. Metal Suspension System Standard: Provide manufacturer's heavy duty direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.

B. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated.

C. Wire Hangers, Braces, and Ties: Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.

D. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

E. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch- thick, galvanized steel sheet complying with ASTM A 653/A 653M, G90 coating designation; with bolted connections and 5/16-inch- diameter bolts.

F. Seismic Clips: Manufacturer's standard perimeter clips designed to accommodate seismic forces.

G. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.

H. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical panels in-place.

2.4 METAL EDGE MOLDINGS AND TRIM

A. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.

2.5 ACOUSTICAL SEALANT

A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

B. Acoustical Sealant for Concealed Joints: Manufacturer's standard nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce airborne sound transmission.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION

A. General: Install acoustical panel ceilings to comply with UBC Standard 25-2 and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook." Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
4. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
5. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
6. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both structure to which hangers are attached and type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
7. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
8. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
9. Do not attach hangers to steel deck tabs.
10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections and prepare reports:

1. Suspended ceiling system.
2. Hangers, anchors and fasteners.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections and prepare test reports.

C. Tests and Inspections: Testing and inspecting of completed installations of acoustical panel ceiling hangers and anchors and fasteners shall take place in successive stages, in areas of extent and using methods as follows. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations of acoustical panel ceiling hangers show compliance with requirements.

D. Remove and replace acoustical panel ceiling hangers and anchors and fasteners that do not pass tests and inspections and retest as specified above.

3.5 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09511

SECTION 09651

VINYL SHEET FLOORING

PART 1 GENERAL

1.01 THIS SECTION INCLUDES

A. Flooring and accessories as shown on the drawings and schedules and as indicated by the requirements of this section.

1.02 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract (including General and Supplementary Conditions and Division 1 sections) apply to the work of this section.

1.03 RELATED SECTIONS

A. Other Division 9 sections for floor finishes related to this section but not the work of this section.

B. Division 3 Concrete; not the work of this section.

C. Division 6 Wood and Plastics; not the work of this section.

D. Division 7 Thermal and Moisture Protection; not the work of this section.

1.04 QUALITY ASSURANCE AND REGULATORY REQUIREMENTS

A. Select an installer who is competent in the installation of Armstrong resilient sheet flooring [using heat-welded seams][using Armstrong S-761Seam Adhesive method].

B. If required, provide types of flooring and accessories supplied by one manufacturer, including leveling and patching compounds, and adhesives.

C. If required, provide flooring material to meet the following fire test performance criteria as tested by a recognized independent testing laboratory:

a. ASTM E 648 Critical Radiant Flux of 0.45 watts per sq. cm. or greater, Class I.

b. ASTM E 662 (Smoke Generation) Maximum Specific Optical Density of 450 or less.

1.05 SUBMITTALS

A. Submit shop drawings, seaming plan, coving details, and manufacturer's technical data, installation and maintenance instructions (latest edition of "Armstrong Guaranteed Installation System," F-5061.) for flooring and accessories.

B. Submit the manufacturer's standard samples showing the required colors for flooring, welding rods, and applicable accessories.

C. If required, submit the manufacturer's certification that the flooring has been tested by an independent laboratory and complies with the required fire tests.

1.06 ENVIRONMENTAL CONDITIONS

A. Deliver materials in good condition to the jobsite in the manufacturer's original unopened containers that bear the name and brand of the manufacturer, project identification, and shipping and handling instructions.

B. Store materials in a clean, dry, enclosed space off the ground, and protected from the weather and from extremes of heat and cold. Protect adhesives from freezing. Store flooring, adhesives and accessories in the spaces where they will be installed for at least 48 hours before beginning installation.

C. Maintain a minimum temperature in the spaces to receive the flooring and accessories of

65°F (18°C) and a maximum temperature of 100°F (38°C) [85°F (29°C)] for at least 48 hours before, during, and for not less than 48 hours after installation. Thereafter, maintain a minimum temperature of 55°F (13°C) in areas where work is completed. Protect all materials from the direct flow of heat from hot-air registers, radiators, or other heating fixtures and appliances.

D. Install flooring and accessories after the other finishing operations, including painting, have been completed. Close spaces to traffic during the installation of the flooring. Do not install flooring over concrete slabs until they are sufficiently dry to achieve a bond with the adhesive, in accordance with the manufacturer's recommended bond and moisture tests.

PART 2 PRODUCTS

2.01 RESILIENT SHEET FLOORING MATERIALS

A. Provide MEDINTECH™ Homogeneous Vinyl Sheet Flooring, nonlayered and nonbacked, manufactured by Armstrong World Industries, Inc., in [Almond] [color selected from the range currently available from Armstrong World Industries, Inc.], 72 in. (1.83 m) wide, having a nominal total thickness of 0.080 in. (2.0 mm). The polyurethane-coated wear surface shall be composed of polyvinyl chloride resin, plasticizers, stabilizers, fillers, and pigments comprising a through-grain vinyl chip visual with pattern and color uniformly dispersed throughout the entire thickness. The design shall merge subtle color accents with a detailed, terrazzo-like image providing a monolithic appearance. Vinyl sheet flooring shall meet ASTM F 1913, "Standard Specification for Vinyl Sheet Floor Covering Without Backing."

B. [Provide [solid color] [patterned] vinyl weld rod as produced by Armstrong World Industries, Inc., and intended for heat welding of seams. Color shall be compatible with field color of flooring or as selected by Architect to contrast with field color of flooring. Color selected from the range currently available from Armstrong World Industries, Inc.]

2.02 WALL BASE MATERIALS

A. For integral flash cove base: Provide integral flash cove wall base by extending sheet flooring [4 in. (10.16 cm)] [6 in. (15.24 cm)] [ ] up the wall using adhesive, welding rod, and accessories recommended and approved by the flooring manufacturer.

B. For top set wall base: Provide [0.080 in. (2.0 mm)] [1/8 in. (3.2 mm)] thick, [2 1/2 in. (6.35 cm)] [4 in. (10.16 cm)] [6 in. (15.24 cm)] high Armstrong Color-Integrated Wall Base with a matte finish, conforming to ASTM F 1861, [Type TV - Vinyl, Thermoplastic] [Type TP - Rubber, Thermoplastic], Group 1 - Solid, [Style A – Straight] [Style B – Cove].

2.03 ADHESIVES

A. Provide Armstrong [S-543 Premium Plus Commercial Sheet Flooring Adhesive][S-599 Premium Vinyl-Back Sheet Flooring Adhesive][S-240 High-Performance Epoxy Flooring Adhesive] for field areas and Armstrong [S-580 Flash Cove Adhesive at flash coving][S-725 Wall Base Adhesive at the wall base] as recommended by the flooring manufacturer.

B. [For High-Moisture Installation Warranty, Full Spread: Provide Armstrong S-543 Premium Plus Commercial Sheet Flooring Adhesive for field areas and Armstrong [S-580 Flash Cove Adhesive at flash coving][S-725 Wall Base Adhesive at the wall base] as recommended by the flooring manufacturer].

C. [Provide Armstrong S-761 Seam Adhesive at seams as recommended by the resilient flooring manufacturer].

2.04 ACCESSORIES

A. For patching, smoothing, and leveling monolithic subfloors (concrete, terrazzo, quarry tile, ceramic tile, and certain metals), provide Armstrong [S-183 Fast-Setting Cement-Based Underlayment] [S-184 Fast-Setting Cement-Based Patch and Skim Coat] [S-194 Fast-Setting Cement-Based Patch and Underlayment].

B. For sealing joints between the top of wall base or integral cove cap and irregular wall surfaces such as masonry, provide plastic filler applied according to the manufacturer's recommendations.

C. [Provide top edge trim caps of [plastic] [anodized aluminum] [plastic zero reducer] for integral flash cove as approved by the Architect.]

D. [Provide a fillet support strip for integral cove base with a minimum radius of 1 in. (2.54 cm) of wood or plastic.]

E. Provide transition/reducing strips tapered to meet abutting materials.

F. Provide threshold of thickness and width as shown on the drawings.

G. Provide resilient edge strips of width shown on the drawings, of equal gauge to the flooring, homogeneous vinyl or rubber composition, tapered or bullnose edge, with color to match or contrast with the flooring, or as selected by the Architect from standard colors available.

H. Provide metal edge strips of width shown on the drawings and of required thickness to protect exposed edges of the flooring. Provide units of maximum available length to minimize the number of joints. Use butt-type metal edge strips for concealed anchorage, or overlap-type metal edge strips for exposed anchorage. Unless otherwise shown, provide strips made of extruded aluminum with a mill finish.

PART 3 EXECUTION

3.01 INSPECTION

A. Examine subfloors prior to installation to determine that surfaces are smooth and free from cracks, holes, ridges, and other defects that might prevent adhesive bond or impair durability or appearance of the flooring material.

B. Inspect subfloors prior to installation to determine that surfaces are free from curing, sealing, parting and hardening compounds; residual adhesives; adhesive removers; and other foreign materials that might prevent adhesive bond. Visually inspect for evidence of moisture, alkaline salts, carbonation, dusting, mold, or mildew.

C. Report conditions contrary to contract requirements that would prevent a proper installation. Do not proceed with the installation until unsatisfactory conditions have been corrected.

D. Failure to call attention to defects or imperfections will be construed as acceptance and approval of the subfloor. Installation indicates acceptance of substrates with regard to conditions existing at the time of installation.

3.02 PREPARATION

A. Smooth concrete surfaces, removing rough areas, projections, ridges, and bumps, and filling low spots, control or construction joints, and other defects with Armstrong [S-183 Fast-Setting Cement-Based Underlayment][S-184 Fast-Setting Cement-Based Patch and Skim Coat][S-194 Fast-Setting Cement-Based Patch and Underlayment] as recommended by the flooring manufacturer.

B. Remove paint, varnish, oils, release agents, sealers, and waxes. Remove residual adhesives as recommended by the flooring manufacturer. Remove curing and hardening compounds not compatible with the adhesives used, as indicated by a bond test or by the compound manufacturer's recommendations for flooring. Avoid organic solvents.

C. [Perform subfloor moisture testing in accordance with [ASTM F 2170, "Standard Test Method for Determining Relative Humidity in Concrete Slabs Using in-situ Probes"][ASTM F 1869,"Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride"] and Bond Tests as described in publication F-5061, "Armstrong Guaranteed Installation System," to determine if surfaces are dry; free of curing and hardening compounds, old adhesive, and other coatings; and ready to receive

flooring. [Relative humidity shall not exceed 80%.][MVER shall not exceed 5 lbs./1000 sq. ft./24 hrs.] On installations where both the Percent Relative Humidity and the Moisture Vapor Emission Rate tests are conducted, results for both tests shall comply with the allowable limits listed above. Do not proceed with flooring installation until results of moisture tests are acceptable. All test results shall be documented and retained].

D. [For High-Moisture Installation Warranty, perform subfloor moisture testing in accordance with ASTM F 2170, "Standard Test Method for Determining Relative Humidity in Concrete Slabs Using in-situ Probes" and Bond Tests as described in publication F-5061, "Armstrong Guaranteed Installation System," to determine if surfaces are dry; free of curing and hardening compounds, old adhesive, and other coatings; and ready to receive flooring. Relative humidity of the slab shall not exceed 90%. Do not proceed with flooring installation until results of moisture tests are acceptable. All test results shall be documented and retained].

E. Perform pH tests on concrete floors regardless of their age or grade level. All test results shall be documented and retained.

F. Vacuum or broom-clean surfaces to be covered immediately before the application of flooring. Make subfloor free from dust, dirt, grease, and all foreign materials.

3.03 INSTALLATION OF SHEET FLOORING

A. Install flooring in strict accordance with the latest edition of "Armstrong Guaranteed Installation System", F-5061.

B. Install flooring wall to wall before the installation of floor-set cabinets, casework, furniture, equipment, movable partitions, etc. Extend flooring into toe spaces, door recesses, closets, and similar openings as shown on the drawings.

C. If required, install flooring on pan-type floor access covers. Maintain continuity of color and pattern within pieces of flooring installed on these covers. Adhere flooring to the subfloor around covers and to covers.

D. Scribe, cut, and fit or flash cove to permanent fixtures, columns, walls, partitions, pipes, outlets, and built-in furniture and cabinets.

E. Adhere flooring to the subfloor without cracks, voids, raising and puckering at the seams. Roll with a 100-pound (45.36 kilogram) roller in the field areas. Hand-roll flooring at the perimeter and the seams to assure adhesion. Refer to specific rolling instructions of the flooring manufacturer.

F. Lay flooring to provide a minimum number of seams. Avoid cross seams, filler pieces, and strips. Match edges for color shading and pattern at the seams in compliance with the manufacturer's recommendations.

G. Install flooring with adhesives, tools, and procedures in strict accordance with the manufacturer's written instructions. Observe the recommended adhesive trowel notching, open times, and working times.

H. [Prepare heat-welded seams with special routing tool supplied for this purpose and heat weld with vinyl welding rod in seams.] [Prepare sealed seams with special seam adhesive supplied for this purpose.] Use methods and sequence of work in conformance with written instructions of the flooring manufacturer. Finish all seams flush and free from voids, recesses, and raised areas.

I. [Provide integral flash cove wall base where shown on the drawings, including cove fillet support strip and top edge cap trim. Construct flash cove base in accordance with the flooring manufacturer's instructions. [Heat-weld seams][seam adhesive] as specified for those on the floor].

3.04 INSTALLATION OF ACCESSORIES

A. Apply top set wall base to walls, columns, casework, and other permanent fixtures in areas where top-set base is required. Install base in lengths as long as practical, with inside corners fabricated from base materials that are mitered or coped. Tightly bond base to vertical substrate with continuous contact at horizontal and vertical surfaces.

B. Fill voids with plastic filler along the top edge of the resilient wall base or integral cove cap on masonry surfaces or other similar irregular substrates.

C. Place resilient edge strips tightly butted to flooring, and secure with adhesive recommended by the edge strip manufacturer. Install edge strips at edges of flooring that would otherwise be exposed.

D. Apply [butt-type] [overlap] metal edge strips where shown on the drawings, [before] [after] flooring installation. Secure units to the substrate, complying with the edge strip manufacturer's recommendations.

3.05 CLEANING AND PROTECTION

A. Perform initial maintenance according to the latest edition of "Armstrong Guaranteed Installation System," F-5061.

B. Protect installed flooring as recommended by the flooring manufacturer against damage from rolling loads, other trades, or the placement of fixtures and furnishings. (See Finishing The Job in "Armstrong Guaranteed Installation System," F-5061.)

END OF SECTION

SECTION 09658

RUBBER BASE

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes:

1. Topset coved rubber base for installation with surface flooring.

C. Related Sections:

1. Section 09654: Resilient Sheet Flooring.

2. Section 09681: Carpet

1.02 SUBMITTALS

A. Product Data: Submit manufacturers published technical data describing materials, construction and recommended installation instructions. Submit technical data and installation instructions for each adhesive material.

B. Maintenance Instructions: Submit manufacturer's recommendations for maintenance, care and cleaning of base.

C. Samples: Submit Samples of top set base in each available color. Following color selections, submit Samples, not less than 12 inches long of each selected color and type. Submit pint cans of each type adhesive.

D. Maintenance Materials: Before Substantial Completion, deliver at least 50 lineal feet and 5 outside corner units of each color of rubber base installed. Deliver the materials in unopened factory containers or in sealed cartons with labels identifying the contents, matching installed materials. Include unopened cans of adhesives adequate to install the maintenance materials.

1.03 QUALITY ASSURANCE

A. Qualifications of Installer: Minimum 5 years experience in successfully installing the same or similar flooring materials.

B. Comply with the following as a minimum requirement:

1. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials.

2. ASTM F 1861: Standard Specification for Resilient Wall Base.

3. CHPS Low-Emitting Materials Table: Materials submitted for rubber base assemblies must be listed as low emitting on the CHPS website, www.CHPS.net, or must be tested by an independent laboratory to meet CHPS Section 01350. All components of

an assembly must meet Section 01350 individually or in an assembly. Rubber assemblies include tile and adhesive.

4. All chemically based products such as sealers, primers, fillers, adhesives, etc. must be approved by Owner's Office of Environmental Health and Safety (OEHS).

5. Each selected color and configuration shall be from same dye lot and color.

1.04 DELIVERY, STORAGE AND HANDLING

A. Materials shall be delivered to the Project site in original unopened manufacturer's packaging clearly labeled with manufacturer's name. Store materials at room temperature, but not less than 70 degrees F, for a minimum of 48 hours before installation, unless otherwise indicated in manufacturer's printed instructions..

1.05 PROJECT CONDITIONS

A. Ventilation and Temperature: Verify areas that are to receive rubber base are ventilated to remove fumes from installation materials, and areas are within temperature range recommended by the various material manufactures for site installation conditions.

1.06 WARRANTY

A. Manufacturer shall provide a 5-year material warranty.

B. Installer shall provide a 2-year labor warranty.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Burke/Mercer Wall Base.

B. Roppe, Pinnacle Rubber Base.

C. Flexco Company, Wallflower Premium Rubber Wall Base.

2.02 MATERIALS

A. Rubber base: Conform to ASTM F 1861; Group 2, solid (homogeneous); Type 1, TS, (thermoset) vulcanized rubber, Style A, 4 inch high unless otherwise indicated, integral colors as selected, non-shrinking, 1/8 inch thick, with matching molded outside corners.

B. Base Adhesive: Water based, low odor type, as recommended by manufacturer of rubber base.

PART 3 - EXECUTION

3.01 COORDINATION

A. Coordinate the Work of this section with other sections to provide a level, smooth and clean finish surfaces to receive rubber base.

3.02 EXAMINATION

A. Field verify dimensions and other conditions affecting the Work of this section before commencing the Work of this section.

B. Before Work is started, examine surfaces that are to receive rubber base. Deficiencies shall be corrected before starting the Work of this section.

3.03 PREPARATION

A. Do not start preparation until adjacent concrete floor slabs are at least 90 days old and finish flooring is installed.

B. Install rubber base when ambient temperature is 70 degrees F. or higher.

3.04 INSTALLATION

A. Install top set base at all hard floors, including resilient flooring, concrete and wood, carpet and other soft floors, unless otherwise indicated on drawings.

B. Securely fasten cement base to backing in long lengths in accordance with manufacturer's recommendations. Lay out lengths so that not less than 18 inches long filler pieces are provided. Assure that top and toe continuously contact the wall and floor, and that all joints are tight. Install matching factory formed external corners at all offsets. All inside corners shall be coped; wrapped corners are not acceptable.

C. Use of adhesive gun is prohibited. Apply adhesive directly to substrate using the appropriate notched trowel or spreader according to manufacturer's instructions. Maintain 1/8-inch gap from top of base to prevent adhesive oozing onto adjacent surfaces.

D. Base and outside corners shall be rolled with a seam roller before adhesive sets.

3.05 CLEANING

A. Maintain surfaces of base clean as installation progresses. Clean rubber base when sufficiently seated and remove foreign substances.

B. Clean adjacent surfaces of adhesive or other defacement. Replace damaged and/or defective Work to the specified condition.

3.06 CLEAN UP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

3.07 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 09685

CARPET TILE

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes:

1. Carpet Tile as indicated.

C. Related Sections:

1. Section 03300: Cast-In-Place Concrete.

1.02 SUBMITTALS

A. Shop Drawings: Submit dimensioned layout of carpet tile and details for binder bars.

B. Samples:

1. Submit minimum 3 labeled Carpet Tile actual size with proper backing. Carpet Style and Color as selected by Owner/Architect.

2. Trim and accessories: Submit 12-inch long Samples of each type trim proposed for the Work.

C. Product Data: Submit the following:

1. Carpet Tile manufacturer's published technical data fully describing carpet materials, construction, and recommended installation directions.

2. Technical data and installation instructions for each adhesive and sealer material.

3. Carpet Tile manufacturer's published instructions for maintenance, care, cleaning and repair of carpet

4. MSDS on all Manufacturers recommended adhesives and primers.

D. Certificate:

1. Submit a certificate from carpet tile manufacturer that materials supplied comply with fire hazard resistance standards specified.

2. Submit a manufacturer certification that the installer(s) is approved by the manufacture to install the specified product.

E. Installer's/Subcontractor's Experience Qualifications: Submit list of not less than 5 projects with similar scope of work, extending over period of not less than 5 years, indicating installer's experience record.

1.03 QUALITY ASSURANCE

A. Comply with the following as a minimum requirement:

1. Manufacturer's installation instructions

2. All materials shall comply with the recommendations of the ADA Accessibility Guide.

3. CHPS Low Emitting Materials Table: Materials submitted must be listed as Low Emitting on the following web site: www.CHPS.net. Be compatible with the selected carpet tile and approved by carpet manufacture.

4. All chemically based products such as sealers, primers, fillers, adhesives, etc. must be approved by owner's office of the Environmental Health and Safety (OEHS).

5. Carpet tile must be free of Anti-Microbial Protection.

B. Requirements of Regulatory Agencies: Carpet Tile shall meet requirements of federal, state and local regulatory agencies for flammability, static control, or other properties as specified with testing documentation from the manufacturer by a third party laboratory.

C. Carpet Tile Installation: Comply with CRI 104 - Standard for Installation of Textile Floor Covering Materials.

D. Each color of carpet tile shall be of the same dye lot.

E. Qualifications of Installer: Minimum 5 years experience in successfully installing the same or similar flooring materials.

F. Qualifications of Supervising Installer: In addition to the qualifications of the installer listed above, the flooring installer's supervisor shall have a minimum of 10 hours Cal-OSHA safety training.

G. Pre-Installation and Progress meetings: Prior to start of work of this section and after approval of submittals, schedule an on site Pre-Installation and progress meetings between Contractor, Supervising Installer, OAR and IOR to review construction, drawings and installation procedures in accordance with the requirements of this specification.

1.04 DELIVERY, STORAGE AND HANDLING

A. Full cartons of carpet tile shall be packaged and identified by the flooring manufacturer. Distributor, dealer, or vendor cutting, re-packaging, and re-labeling is not permitted.

B. Store material at least 48 hours at room temperature prior to installation and in accordance to all manufacturers' instructions.

C. Deliver fire-rated materials with testing agency labels and required fire classification numbers attached and legible.

1.05 JOB CONDITIONS

A. Ventilation and Temperature: Verify areas to be carpeted are ventilated to remove any off gassing from installation materials, and areas are within temperature range recommended by the various material manufacturers for Project site installation conditions. The temperature of a concrete slab must be stabilized above 65 degrees both 12 hours prior to and after the installation. The following environmental conditions inside the building are critical for proper installation. Temperature must be between 65 degrees F and 95 degrees F and the humidity between 10% and 65% for at least 72 hours before and 72 hours after installation. In addition, any adhesives and primers should be stored under these conditions for a minimum of 24 hours prior to installation.

B. Protection: Prohibit traffic on carpet for at least 12 hours after installation. Cover carpet with heavy non-staining kraft paper in areas where the Work of other trades is to be performed and/or traffic and passage areas. Protect carpet from damage or soiling. Maintain protection in place until Substantial Completion.

1.06 WARRANTY

A. Contractor shall provide a 2 year labor warranty.

B. Manufacturer shall provide a 30 year material warranty as described below:

1. Delamination Warranty: Carpet tile will not delaminate for a minimum of 30 years from the date of installation.

2. Zippering Warranty: Carpet tile will not zipper or develop continuous pile yarn runners in the body of the carpet for a minimum of 30 years from the date of Substantial Completion.

3. Edge Ravel: Carpet tile will not have continuous pile yarn coming out at seams for a minimum of 30 years from the date of Substantial Completion.

4. Cup, Dish or Dome Warranty: The manufacturer warrants that the carpet tile will not cup, dish or dome for 30 years from the date of Substantial Completion.

5. Dimensional Stability Warranty: The manufacturer warrants that the carpet tile will not lose its dimensional stability (i.e., growth or shrinkage with glue-down installations) for 30 years due to normal variations in atmosphere, temperature, or humidity

6. Wear Warranty: The manufacturer warrants that the carpet tile will lose no more than 10% by weight of the pile fiber during the life of the carpet from the date of Substantial Completion.

C. Manufacturer shall provide a 10 year material warranty for colorfastness and texture retention.

1. Stain and Soil Protection: 10 year stain removal written guarantee.

2. Texture Retention Warranty: The manufacturer warrants that the carpet tile will substantially maintain its physical surface texture against crushing, matting and walking out for 10 years from the date of Substantial Completion.

3. Colorfastness to light: Carpet tile will not fade for 10 years due to exposure to sunlight.

4. Colorfastness to atmospheric contaminants: Carpet tile will not fade for 10 years due to atmospheric contaminants.

1.07 MAINTENANCE

A. Extra Materials: Provide minimum 3 cartons of extra materials for each color, pattern, and dye lot of carpet.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS AND PRODUCTS

A. Modular Carpet Tile - Heavy Commercial Traffic 30 year warranty, Binary, Ultra-Set, Surreal Ecoflex Modular Carpet Tile by Mohawk Commercial Carpet. Scholar II Uni by Shaw Contract Group, Chakra Collection tile by Bentley Prince Street, or equal as approved by the Owner.

B. Approved Products/Systems:

1. Mohawk Commercial Carpet

a. Product: Nubroadlok Pressure Sensitive

Description: Carpet floor adhesive, pressure sensitive

2. Shaw Contract Group

a. Product: Shaw 9000, Shaw 9050

Description: Floor Preparation Primers

b. Product: Shaw 2082, Shaw 4030, Shaw 5000

Description: Carpet floor adhesive, pressure sensitive

3. Mannington Carpets, Inc.

a. Product: Nylon Post-dyed, PVC backing

b. Product: MT711

c. Description: Carpet floor adhesive, pressure sensitive

4. Bentley Prince Street

a. Product: Nylon Solution Dyed, moisture guard

b. Product: Healthbond 1000 adhesive.

2.02 MATERIALS

A. Carpet tile shall meet the following minimum standards:

1. Pile: .195 inch maximum height level loop. No cut pile or cut and loops will be accepted.
2. Dye Method: 85 % Solution Dyed Method. 15% Yarn Dyed.
3. Construction: Maximum 24" x 24" Modular Carpet Tile. Tufted level loop (no cut or cut loop accepted).
4. Pile / Yarn weight: Minimum 24 oz per square yard.
5. Minimum Density: Not less than 5,000
6. Moisture Impervious: Carpet Tile shall be unaffected by water and moisture.
7. Static Protection: The manufacturer warrants that the carpet tile will not static discharge in excess of 3.5 KV or under when tested under the AATCC Test Method 134 for the life of the carpet.
8. Calcium Chloride: Carpet Tile shall be able to be installed with 5 lbs. hydrostatic pressure or better (pounds) per 1000 square feet per 24 hours with a written documentation from manufacturer, per CRI-104.
9. Fluorochemical Treatment: Minimum of 500 parts per million: per CRI-102; after two hot extractions (AATCC171), minimum 400 Parts per Million per CRI TM-102.
10. Traffic Classification: Class III – Extra Heavy Commercial Traffic (more than 1000-foot traffic per day).
11. GSA Certification: All carpet tiles shall meet or exceed the General Services Administration requirements.
12. Flammability:
    a. Flooring Radiant Panel: Class I- per ASTM E 648
    b. NBS Smoke Density: Less than 450 per test ASTM E 662; NFPA-258
    c. Flame Resistant: Shall pass Methenamine pill test ASTM E 662.
    d. All materials shall meet requirements of California Proposition 65. In case of fire, no material shall be used that emit gas and is prohibited by California Proposition 65.
13. Run Resistant Strength: Not less than 25 lbs., in accordance with the Loop Pile Run Resistance test (TP 155-86), wet or dry for a minimum of 30 years.
14. Indoor Air Quality: Carpet tile and adhesion systems shall meet or exceed CRI & EPA guidelines (green label plus certified and labeled) and may not contain any VOC's such as: 4PCH (4 phenulcyclohexeneor, SBR latex (Styrene Butadiene Rubber).
15. Recycling Program: Carpet tile shall be eligible for a recycling program (the carpet tile will be recycled and no part of the reclaimed carpet enters a landfill) either through the carpet tile manufacturer or fiber manufacturer. If project scope included removal and disposal of existing carpet or carpet tile, contractor is responsible for delivery to a certified recycling center. A recycling certificate must be submitted to OAR, with its name and address of location of recycling center, date and weight of carpet recycled. Contractor is responsible for all costs associated with recycling.

B. Carpet tile shall be from one dye lot, unless otherwise authorized by the Architect, or the OAR.

C. Full cartons of carpet tile shall be cut, packaged, and identified by the factory. Distributors, dealers and vendor cutting, re-packaging, and re-labeling are not permitted.

D. Carpet Edge Strips: A-600-SH Silver Clamp Down manufactured by Universal Metals, or equal.

E. Stair Nosing: Universal Moldings # A-544-BA 1 commercial (butt to nosing) type or equal, installed with recommended sized screws.

F. Adhesive: Water-resistant latex-based adhesive recommended by carpet tile manufacturer for re-leasable adhesive carpet tile installation. Where primers or sealers are furnished, verify their compatibility with adhesive.

G. Crack Filler and Leveling Compound: 100% cementitious binder type (as defined b ASTM #C-150), shall be approved by Owner's Office of Environmental Health and Safety (OEHS). The following manufacturers are currently listed as approved by OEHS:

1. Webcrete # 95 as manufactured by Durabond
2. Ardex SD-F as manufactured by Ardex
3. Or as recommended by flooring manufacturer and approved by the Owner's Office of Environmental Health & Safety.
4. Leveling Compound shall meet or exceed 200 pounds when tested in accordance with ASTM 1583.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Before installation is started, examine surfaces to receive carpet tile. Deficiencies shall be corrected before starting Work of this section.

B. Field verify dimensions and other conditions affecting this Work before commencing carpet tile installation.

3.02 PREPARATION

A. Provide concrete moisture vapor emission and pH testing to all concrete specified to be covered with carpet tile. Includes concrete placed below, on and above grade. For replacement projects, concrete slabs not in direct contact with ground may be excluded from this requirement.

B. Testing shall take place after allowing concrete to dry for a minimum of 90 days. Testing to be scheduled no less than 1 or more than 3 weeks prior to scheduled flooring installation.

C. Quantification of Concrete Moisture Vapor Emissions

1. The test site should be maintained at the same temperature and humidity conditions as those anticipated during normal occupancy. These temperature and humidity levels should be maintained for 48 hours prior and during test period. If meeting this criteria is not possible, then minimum conditions should be 75± 10°F and 50± 10% relative humidity. When a building is not under HVAC control, a recording hygrometer or data logger shall be in place recording conditions during the test period. A transcript of this information must be included with the test report.
2. The number of vapor emission test sites is determined by the square footage of the facility. The minimum number of tests to be placed is equal to 3 in the first 1,000 sq.ft. and 1 per each additional 1,000 square feet.
3. Tests sites are to be cleaned of all adhesive residue, curing compounds, paints, sealers, floor coverings, etc. 24 hours prior to the placement of test kits.
4. Weigh test dish on site prior to start of test. Scale must report weight to 0.1 grams. Record weight and start time.
5. Expose Calcium Chloride and set dish on concrete surface.
6. Install test containment dome and allow test to proceed for 72 hours.
7. Retrieve test dish by carefully cutting through containment dome. Close and reseal test dish.

8. Weigh test dish on site recording weight and stop time.

9. Calculate and report results as "pounds of emission per 1,000 sq.ft. per 24 hours"

10. Follow manufacturer's corrective measures accordingly. Moisture vapor emission must meet manufacture's recommendation prior to installation.

D. Quantification of pH Level

1. At each vapor emission test site, after removal of test containment dome, perform pH test.

a. Place several drops of water onto the concrete surface to form a puddle approximately 1" in diameter.

b. Allow the water to set for approximately 60 seconds

c. Dip the pH paper into the water and remove immediately, compare color to chart provided by paper supplier to determine pH reading

d. Acceptable range is pH5 to pH9. Excessive alkalinity shall be neutralized prior to installation of the carpet tile.

e. Record and report results.

f. Follow manufacturer's corrective measures accordingly.

E. Preparation of Subfloors: Any leveling compound used over a vapor or moisture barrier will be warranted to be installed in a wet or moist environment without moisture limitations.

1. Delay application of flooring until sub-floors are sufficiently dry according to flooring manufacturer's recommendations, or perform remedial measures as recommended by flooring materials manufacturer.

F. Cleaning and Drying: Clean concrete floor slabs of all oil, grease, waxes, curing compounds, dust, dirt, debris, paint, and other deleterious substances. Failure to remove or seal old adhesives or other floor coatings may result in installation failure. Provide a commercial vacuum cleaner to remove dust and dirt. Do not furnish oiled or chemical treated sawdust or any similar product for dust removal.

G. Leveling: Verify floor slabs true to level and plane within a tolerance of 3/16 inch in 10-feet. Test floor areas both ways with a 10-foot straightedge and repair all high and low areas exceeding allowable tolerance. Pop ups shall be hammered out and floor filled with an approved cementitious leveling compound. Remove high areas by power sanding, stone rubbing or grinding, chipping off and filling with an approved cementitious leveling compound, or equivalent method. Fill all low areas with an approved cementitious leveling compound. Repair and level the surfaces having abrupt changes in plane, such as trowel marks or ridges, whether or not within the allowable tolerance. Again clean areas where repairs are performed and prime floor using recommended primer by manufacture. Do not sand, stone rub grind or power chip floor adhesives that contain asbestos.

H. Conditioning of Materials: Carpet tile and adhesives shall be conditioned at the Project site at not less than 65 degrees F and relative humidity between 10 percent and 65 percent for 48 hours prior to installation and in accordance to manufacturer's instructions.

J. Floors should be level and sound. Any trowel marks from old adhesives must be sanded smooth, creating a level surface prior to the application of adhesives and/or primers.

3.03 CARPET TILE INSTALLATION

A. General: Install carpet tile in accordance with requirements of CRI 104, except where more stringent requirements are specified herein or recommended by carpet materials manufacturers.

B. Install carpet tiles in each dye lot in the number sequence as furnished by manufacturer. Measure the area to find the best starting point that will utilize a maximum size perimeter tile. After selecting the starting point, snap a chalk line that bisect this point by at right angles. To

achieve a perfect angle form a triangle by measuring 6" up from the center point. Then measure 8" out from the center point. Then, find a 10" angle between these two points. (See manufacturers written instructions for complete details).

C. Color Control: Install dye lot in the number sequence at locations indicated to prevent shading variations. Install only one dye lot for each area of building unless otherwise reviewed. If more than one dye lot is required, obtain prior review of color match between dye lots by Owner and its representative's written approval.

D. Carpet Tile Fit: Refer to the layout Shop Drawings. The corners of the carpet tiles should be flat to assure a proper fit. Install the carpet tiles snuggly. Be careful to not to over tighten the installation.

E. Laying and Seaming: Cut carpet tiles for seams between rows and prevent damage to loops, prevent edge ravels, and preserve uniform row alignment and spacing on both sides and across seams. Install carpet tiles with loop rows in straight lines both ways, free of offsets, waviness, distortion, or misalignment. Cut seam edges straight and square with backing. Trim carpet tiles at walls, columns, and penetrations for a compressed fit.

F. Doorways: Extend carpet tiles into doorways without piecing in and seam to the carpet on other side of door under door centerline except where metal thresholds occur; no small filler pieces of carpet tiles will be permitted at doorways.

G. Adhesive Installation: Provide proper equipment as required by manufacturer. Evenly spread adhesive free of excess or thin areas. Place and lay carpet tile within open time of adhesive.

H. Binder Bars: Provide bars at all edges of carpet tiles not abutting walls or other construction, securely fastened in place by using aluminum drive nails. Precisely align splices and tightly miter angles.

3.04 PROTECTION

A. Protect the Work of this section until Substantial Completion. Limit rolling traffic on carpet tiles for at least 12 hours after installation. Cover carpet tiles with heavy non-staining kraft paper in areas where the Work of other trades is to be performed and/or traffic and passage areas. Protect carpet from damage or soiling. Maintain protection in place until Substantial Completion.

3.05 CLEANING

A. As each carpeted area is completed, clean up all dirt and debris, remove spots and soiling with proper cleaner, trim off loose threads with sharp scissors, and vacuum entire area clean.

3.06 CLEAN-UP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.07 INSTRUCTION

A. Before Substantial Completion of the Work, should the district request and at the districts discretion, provide a 4 hour Owner instruction period for proper maintenance of carpeting. Instructions shall be provided by technical representative of manufacturer.

END OF SECTION 09685

SECTION 09912

INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes surface preparation and the application of paint systems on the following interior substrates:

1. Wood.
2. Gypsum board.

B. These performance specifications represent minimum requirements. The contractor is responsible for the complete analysis, design, documentation, and implementation of Project, including integration and coordination of each aspect of the Project with the Work of this Section. The Work shall comply with scope, Standards, qualities, procedures, performance, materials, and products stipulated in this Section.

C. Related Sections include the following:
1. Division 6 Sections for shop priming carpentry with primers specified in this Section.
2. Division 9 Section "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For each type of topcoat product indicated.

C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat indicated.

1. Submit Samples on rigid backing, 8 inches square.
2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

D. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.4 QUALITY ASSURANCE

A. MPI Standards:

1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

B. Mockups: Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

a. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft..
b. Other Items: Architect will designate items or areas required.

2. Apply benchmark samples after permanent lighting and other environmental services have been activated.
3. Final approval of color selections will be based on benchmark samples. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.6 PROJECT CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents. Quantity: Furnish an additional 5 percent, but not less than 1 gal. of each material and color applied.

PART 2 - PRODUCTS

2.1 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. VOC Content of Field-Applied Interior Paints and Coatings: Provide products that comply with requirements of authorities having jurisdiction for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:

2.2 BLOCK FILLERS

A. Interior/Exterior Latex Block Filler: MPI #4.

2.3 PRIMERS/SEALERS

A. Interior Latex Primer/Sealer: MPI #50.

B. Interior Alkyd Primer/Sealer: MPI #45.

C. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for use in paint systems indicated.

2.4 METAL PRIMERS

A. Quick-Drying Alkyd Metal Primer: MPI #76.

B. Rust-Inhibitive Primer (Water Based): MPI #107.

C. Cementitious Galvanized-Metal Primer: MPI #26.

D. Waterborne Galvanized-Metal Primer: MPI #134.

E. Vinyl Wash Primer: MPI #80.

2.5 WOOD PRIMERS

A. Interior Latex-Based Wood Primer: MPI #39.

2.6 LATEX PAINTS

A. Interior Latex (Flat): MPI #53 (Gloss Level 1).

B. Interior Latex (Low Sheen): MPI #44 (Gloss Level 2).

C. Interior Latex (Eggshell): MPI #52 (Gloss Level 3).

D. Interior Latex (Satin): MPI #43 (Gloss Level 4).

E. Interior Latex (Semigloss): MPI #54 (Gloss Level 5).

F. Interior Latex (Gloss): MPI #114 (Gloss Level 6, except minimum gloss of 65 units at 60 deg).

2.7 ALKYD PAINTS

A. Interior Alkyd (Flat): MPI #49 (Gloss Level 1).

B. Interior Alkyd (Eggshell): MPI #51 (Gloss Level 3).

C. Interior Alkyd (Semigloss): MPI #47 (Gloss Level 5).

D. Interior Alkyd (Gloss): MPI #48 (Gloss Level 6).

2.8 QUICK-DRYING ENAMELS

A. Quick-Drying Enamel (Semigloss): MPI #81 (Gloss Level 5).

B. Quick-Drying Enamel (High Gloss): MPI #96 (Gloss Level 7).

2.9 DRY FOG/FALL COATINGS

A. Latex Dry Fog/Fall: MPI #118.

B. Waterborne Dry Fall: MPI #133.

C. Interior Alkyd Dry Fog/Fall: MPI #55.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Wood: 15 percent.
2. Gypsum Board: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

C. Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

D. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:

1. Mechanical Work:

    a. Uninsulated metal piping.
    b. Uninsulated plastic piping.
    c. Pipe hangers and supports.
    d. Tanks that do not have factory-applied final finishes.
    e. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
    f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
    g. Mechanical equipment that is indicated to have a factory-primed finish for field painting.

2. Electrical Work:

    a. Switchgear.
    b. Panelboards.
    c. Electrical equipment that is indicated to have a factory-primed finish for field painting.

3.4 FIELD QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:

1. Owner will engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

END OF SECTION 09912

SECTION 10442

FIRE EXTINGUISHERS

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 portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

B. Related Sections include Division 10 Section "Fire Extinguisher Cabinets."

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.

B. Product Schedule: For fire extinguishers. Coordinate final fire extinguisher schedule with fire protection cabinet schedule to ensure proper fit and function. Use same designations indicated on Drawings.

C. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

D. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction. Provide fire extinguishers approved, listed, and labeled by FMG.

1.5 COORDINATION

A. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure fit and function.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure of hydrostatic test according to NFPA 10.
b. Faulty operation of valves or release levers.

2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each mounting bracket indicated.

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. Ansul Incorporated; Tyco International Ltd.
b. Buckeye Fire Equipment Company.
c. J. L. Industries, Inc.; a division of Activar Construction Products Group.
d. Kidde Residential and Commercial Division; Subsidiary of Kidde plc.
e. Larsen's Manufacturing Company.
f. Potter Roemer LLC.

2. Valves: Manufacturer's standard.
3. Handles and Levers: Manufacturer's standard.
4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.

B. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 4-A:80-B:C, 10-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

2.2 MOUNTING BRACKETS

A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish. 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. Ansul Incorporated; Tyco International Ltd.
2. Buckeye Fire Equipment Company.
3. J. L. Industries, Inc.; a division of Activar Construction Products Group.
4. Larsen's Manufacturing Company.
5. Potter Roemer LLC.

B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface. Orientation: Vertical.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fire extinguishers for proper charging and tagging. Remove and replace damaged, defective, or undercharged fire extinguishers.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction. Mounting Brackets: 54 inches above finished floor to top of fire extinguisher.

B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 10442

SECTION 10522

FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes fire protection cabinets for portable fire extinguishers.

B. These performance specifications represent minimum requirements. The contractor is responsible for the complete analysis, design, documentation, and implementation of Project, including integration and coordination of each aspect of the Project with the Work of this Section. The Work shall comply with scope, Standards, qualities, procedures, performance, materials, and products stipulated in this Section.

C. Related Sections: Division 10 Section "Fire Extinguishers."

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire protection cabinets.

B. Samples for Verification: For each type of exposed finish required.

C. Maintenance Data: For fire protection cabinets to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Fire-Rated, Fire Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.

1.5 COORDINATION

A. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

B. Coordinate sizes and locations of fire protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

B. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:

1. Sheet: ASTM B 209 (ASTM B 209M).
2. Extruded Shapes: ASTM B 221 (ASTM B 221M).

C. Stainless-Steel Sheet: ASTM A 666, Type 304.

D. Clear Float Glass: ASTM C 1036, Type I, Class 1, Quality q3, 3 mm thick.

E. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

F. Break Glass: Clear annealed float glass, ASTM C 1036, Type I, Class 1, Quality q3, 1.5 mm thick, single strength.

G. Tempered Break Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 1.5 mm thick.

2.2 FIRE PROTECTION CABINET

A. Cabinet Type: Suitable for fire extinguisher.

B. Cabinet Material: Steel sheet.

C. Recessed Cabinet: Cabinet box recessed in walls of sufficient depth to suit style of trim indicated. Trimless with Hidden Flange: Flange of same metal and finish as box overlaps surrounding wall finish and is concealed from view by an overlapping door.

D. Semirecessed Cabinet: Cabinet box partially recessed in walls of sufficient depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend). Provide where walls are of insufficient depth for recessed cabinets but are of sufficient depth to accommodate semirecessed cabinet installation.

E. Surface-Mounted Cabinet: Cabinet box fully exposed and mounted directly on wall with no trim. Provide where walls are of insufficient depth for semirecessed cabinet installation.

F. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

G. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.

2. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Identify fire extinguisher in fire protection cabinet with the words "FIRE EXTINGUISHER."

   a. Location: Applied to cabinet door.
   b. Application Process: Silk-screened or pressure-sensitive vinyl letters.
   c. Lettering Color: Red.
   d. Orientation: Vertical.

H. Finishes: Manufacturer's standard baked-enamel paint.

2.3 FABRICATION

A. Fire Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

1. Weld joints and grind smooth.
2. Provide factory-drilled mounting holes.
3. Prepare doors and frames to receive locks.
4. Install door locks at factory.

B. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.4 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces of fire protection cabinets from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire protection cabinets after assembly.

D. 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.

2.5 STEEL FINISHES

A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning". After cleaning, apply a conversion coating suited to the organic coating to be applied over it.

B. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for cabinets to verify actual locations of piping connections before cabinet installation. Examine walls and partitions for suitable framing depth and blocking where cabinets will be installed. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install fire protection cabinets in locations and at mounting heights indicated as acceptable to authorities having jurisdiction.

B. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.

3.3 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire protection cabinet and mounting bracket manufacturers.

E. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10522

SECTION 12345 – LABORATORY CASEWORK, FIXTURES, ACCESSORIES AND FUME HOODS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Work Included.

1. Furnish and install a laboratory cabinets and casework, including laboratory countertops, laboratory sinks, ledges, supporting structures fume hoods, laboratory service fittings, cyanoacrylate (superglue) cabinets, and miscellaneous items of equipment as listed below and in these specifications or equipment schedules including delivery to the building, setting in place, leveling, scribing to walls and floors as required. Furnishing and installing all filler panels, knee space panels and scribes as indicated by drawings. Divisions 15 and 16 shall be responsible for final connections of the laboratory sinks, laboratory fixtures, fume hoods and accessories specified herein.
    a) Fixed Modular Laboratory Casework with Wood Doors
    b) Laboratory Work Surfaces, Countertops, Tabletops & Backsplashes
    c) Laboratory Casework & Countertop Accessories
    d) Adjustable Height Mobile Tables
    e) Butcher Paper Dispensers
    f) Laboratory Plumbing & Electrical Fittings
    g) Cyanoacrylate (Superglue) Unit
    h) Chemical Fume Hoods (Including ADA Compliant Hoods)

2. Provide all utility service outlet accessory fittings as listed in these specifications, equipment schedules or as indicated by drawings as mounted on the laboratory furniture.

3. Provide all drains, drain troughs, overflows and sink outlets with integral tailpieces, which occur above the floor, and where these items are part of the equipment or listing in the specifications, equipment schedules or indicated by the drawings. Integral tailpieces when required shall be in accordance with the manufacturer's standards. All tailpieces shall be furnished less the couplings required to connect them to the drain piping system.

4. Removal of all debris, dirt, and rubbish accumulated as a result of the installation of the laboratory furniture, leaving the premises clean and orderly.

5. Provide holes in counters for data lines, power lines, or water fixtures provided by divisions 15 and 16.

B. Work Not Included In This Section

1. Equipment, materials, and labor which are the responsibility of other subcontractors, as determined by the General Contractor, may include the following:
    a) Electrical receptacles, pulling of wire and connecting of electrical fittings in service chases and countertop pedestal outlets.
    b) Plumbing fittings not included in this section, vacuum breakers (except in-line vacuum breakers specified in this section), piping or other plumbing features, as required meeting local code authority requirements.
    c) Furnishing, installing, and connecting of ducts from fume hoods duct collar to fans and from fans to the atmosphere.
    d) Furnishing, installing, and connecting of fume hood fans and fume hood controls.

1.2 RELATED DOCUMENTS:

The completion of the work described in this Section may require work in or coordination with other Sections of these specifications. These related sections include, but are not limited to the following:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions, including division 1 specifications, apply to this Section.

B. Refer to Divisions 15 and 16 and the mechanical and electrical drawings for related plumbing, mechanical and electrical work.

C. Division 9 - Blocking and backing in walls for anchorage of cabinetry and fume hoods.

D. Division 9 - Base molding and flooring.

E. Section 11600, Laboratory Equipment.

F. Division 15 sections related to Laboratory Temperature and Airflow Control Systems – **MEP Coordination Required.**

G. Systems **System commissioning is a part of the construction process. Documentation and testing of systems, as well as training of the Owner's operation and maintenance personnel, is required in cooperation with the Commissioning Consultant. Substantial Completion is dependent on successful completion of all commissioning procedures, documentation, and issue closure. Refer to Commissioning Specification Section for detailed commissioning requirements.**

1.3 REFERENCES

A. Laboratory Casework:

1. SAMA Standard Performance Requirements.
2. AWI – Architectural Woodwork Institute.
3. SEFA Standard Performance Requirements

B. Flammable Storage Cabinets:

1. OSHA Section 1910.106, General Industry Standard.
2. NFPA 30, Flammable and Combustible Liquids Code.
3. UL 1275 Flammable Liquid Storage Cabinets

C. Emergency Eyewash and Shower

1. ANSI Z-358.1
2. American's With Disabilities Act (ADA)

D. Forensic Cyanoacrylate (Superglue) Unit:

1. ASHRAE 110-1995

E. Chemical Fume Hoods:

1. UL 1805 – Standard for Laboratory Fume Hoods and Cabinets

2. ANSI/ASHRAE 110-1995 –Method of testing Performance of Laboratory Fume Hoods

3. CSA Z316.5-04 – Fume Hoods and Associated Exhaust Systems

1.4 SUBMITTALS

A. Shop Drawings: Provide 1 original reproducible set, 1/2"=1'- 0" scale elevations and 1/4"=1'- 0" plans of casework, fume hoods and equipment locations, showing cross sections, details, rough-in and anchor placement dimensions and tolerances and clearances required. Indicate relation to surrounding walls, ceilings, windows, doors and other building components. Show rough-in requirements. Show locations of all required framing, bucks, metal grounds, or reinforcements in walls, floors and ceilings to adequately support the laboratory casework, equipment and for proper anchoring and support. Additionally, provide a keying schedule for all cabinet locks . Provide an additional 3 sets of copies, over and above the required number of copies for review by the Architect, Construction Manager, and the Owner.

B. Product Data: Provide manufacturer's technical data for each component and item of laboratory casework and equipment specified, including equipment dimensions and construction, configurations, color selection charts, attachment and anchorage details, equipment capacities, physical dimensions, construction details, utility and service requirements and locations, point loads and factory finishes.

   1. Seismic Restraints: The lab casework and fume hood manufacturer / installer shall install the casework and fume hoods to resist seismic loading as required by the local governing codes. Submit detailed seismic anchorage and attachment drawings and calculations provided by a structural engineer licensed in the state / province of the project, complying with all building code requirements and regulations for seismic restraint.

   2. Instruction: Submit for review and approval written approval instructions in booklet form providing additional details on safe operation and maintenance.

C. Samples: Provide the following samples:

1. Finish Samples: Submit 5 sets of samples of each color of finish for casework, fume hoods, work surfaces and other prefinished work as well as accessories for selection by Architect.

D. Instructions: Submit for review and approval:
   1. Instructions to be inscribed on the instruction plate to be attached to fume hoods, as specified in Part 2 of this section.

   2. Written instructions in booklet form providing additional details on safe and proper field-testing, operation and maintenance of fume hoods and other equipment.

   3. Professional quality video - minimum 15 minutes in length on proper hood usage.

   4. As itemized at below at individual equipment or components listings.

1.5 QUALITY ASSURANCE

A. Single source responsibility: Laboratory furniture system, casework, work surfaces, fume hoods, laboratory equipment and accessories shall be manufactured or furnished by a single laboratory furniture company.

B. Coordination drawings: The supplier / installer shall coordinate the installation of all products under this section, including mechanical, plumbing and electrical items provided by the supplier and installed by other contractors. Laboratory casework/fume hood manufacturer shall be responsible for generating layout drawings and distributing them to the mechanical, electrical and plumbing contractors for coordination and accurate locations of cutouts and service connections required by each discipline, prior to generating final shop drawings.

C. Installer's shall be factory certified by the laboratory casework manufacturer.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, protect and handle products on the site in such a manner as to prevent damage, decay, deterioration or loss from theft.

1.7 WARRANTY

A. Except where noted otherwise in this specification, provide a one (1) year warranty for all equipment and casework in this section.

1.8 EXTRA STOCK AND SPARE PARTS

A. Provide one (1) change of light bulb and ballast for each size of lights in all fume hoods and in each of the superglue chambers.

PART 2 - PRODUCTS

2.1 ACCEPTABLE PRODUCTS

A. Subject to compliance with these specifications, acceptable products include, but are not limited to, those manufactured and provided by the companies listed herein. Substitutions to any product listed in this specification must be submitted for review and consideration by the Architect prior to submission of a bid for the project. Only after the Architect's issuance of a written acceptance of the specific product being substituted, is a substitution valid. The following is a list of acceptable manufacturers:

1. Fixed Wood Lab Casework System: Radius Lipped.
    a) Jamestown Metal Products, LLC (Dimension Series, basis of design)
    b) Kewaunee Scientific Corporation
    c) Peterson Corporation
    d) Bedcolab
    e) Mott/Advanced Lab Concepts Corporation

2. Adjustable height mobile tables:
    a) Bostontec, Midland, Michigan (basis of design)

3. Epoxy resin countertops and sinks:
    a) Durcon

4. Laboratory Casework and Countertop Accessories:
    a) Rocklem

5. Emergency eyewash-shower:
    a) Watersaver Faucet Company (basis of design)

b) T & S Brass
c) Chicago Faucet
d) Haws

6. Cyanoacrylate Unit (Superglue Unit:)
    a) Fisher-Hamilton

7. Chemical fume hoods:
    a) Jamestown Metal Products, LLC. (basis of design)

2.2 FIXED LABORATORY CASEWORK:

A. Materials: Jamestown Metal Products, Dimension Series (basis of design)

1. Woods: All woods shall be thoroughly air-dried, then kiln dried in humidity-controlled kilns to a moisture content of 4-1/2%. Kiln dried lumber shall be tempered to moisture content of 6% before use. This moisture content shall be maintained throughout production.

2. Exposed Surfaces: All exterior casework surfaces exposed to view after installation, and the exposed interior ends, top and bottom of open cases or case having glazed doors, shall be Grade A plain sliced Red Oak selected in the golden wheat to light pink color range, in color and finish selected by architect from manufacturer's standard range of colors. The solid woods used for all surfaces exposed to view after completion of installation shall be clear, with color and graining in conformance with the normally accepted standards required of the Scientific Laboratory Equipment Industry.

    a. Exposed Plywood: Plywood used for exterior surfaces exposed to view after installation, and the exposed interior ends, top and bottom of open cases, or cases having glazed doors, shall have an Oak face, veneer, or solid wood core. Plywood used for all case and cabinet exposed exterior finished ends shall be 3/4" thick, with exterior face, of plain sliced Select Grade A Oak, selected for narrow hearts. Non-exposed ends shall be hardwood plywood. Plywood used for doors under 48" high shall be 3/4" thick hardwood core with cross-bands of 1/20" poplar, exterior face of 1/32" thick plain sliced Select Grade 1 Oak and back face of 1/32" thick Sound Oak. Doors 48" high and over shall be 1" thick and the same construction

as door under 48" high. Softwoods such as Fir or Pine and / or particleboard are not permitted.

b. Interior Plywood: All interior plywood used in cabinets and cases, unexposed, shall be clear hardwood Grade A veneer face, Grade 2, back. All interior plywood shall have high grade, clear veneers, and assembled with poly-vinyl emulsion glue. All interior unexposed shelves shall be 8-ply hardwood Grade 1 Red Oak with 1/8" or 3mm hardwood edge-band.

c. Tempered Hardboard: Tempered hardboard shall be a wood fiber/resinous combination formed with heat and pressure into sheets providing a hard, smooth surface.

d. Glass: Glass used for framed doors (swinging or sliding) shall be 1/4" tempered glass; glass for unframed doors (sliding, wall-hung) shall be 1/4" thick tempered glass.

B. Hardware & Trim:

1. Woods: All woods shall be thoroughly air-dried, then kiln dried in humidity-controlled kilns to a moisture content of 4-1/2%. Kiln dried lumber shall be tempered to moisture content of 6% before use. This moisture content shall be maintained throughout production.

2. Drawer and Door Pulls: Drawer and door pulls shall be securely fastened to doors and drawers. Two pulls shall be required on all drawers over 24" long. Pull to be 5/16" stainless steel wire style, 4" wide.

3. Flush Pulls: Flush pulls for sliding doors shall be satin finish stainless steel, providing a recessed finger grip. Finger holes or slots machined into doors will not be acceptable.

4. Hinges: Hinges shall be the five (5) knuckle institutional, offset type for all swinging doors. Hinges shall be 2-3/4" long, one (1) pair for doors less than 4 ft. in height and 1-1/2 pair on doors over 4 ft. in height. Hinges are mounted with flathead screws, so applied to door and cabinet to withstand a weight load of 150 lbs. minimum. Concealed European style hinges will not be acceptable. All hinges shall be satin finish stainless steel.

5. Locks: Where locks are shown on drawings, shall be National Lock Remove-A-Core 5-disc tumbler, heavy-duty cylinder type. Exposed lock noses shall be

dull nickel (satin) plated and stamped with identifying numbers. Locks shall have capacity for 225 primary key changes. Master key one level with the potential of 40 different, non-interchangeable master key groups. General Contractor shall prepare a keying schedule based on the Owner's requirements for all cabinetry locks. The keying schedule shall incorporate the following general requirements:

a. Lab spaces: Each cabinet with a lock shall be uniquely keyed and master keyed by laboratory unit. (Multiple locking drawers and doors within a single cabinet should be keyed alike.)

6. Roller Catches: Roller catches shall be used on all swinging cabinet doors. Catches shall have a spring-loaded polyethylene roller and provided with a steel strike plate. Double doors without locks shall have a catch on each door. Full height cases shall have latching devices located on the structurally fixed center shelf. The left-hand door shall have a positive catch and the right hand door shall have the roller type catch. Magnetic type catches will not be acceptable.

7. Elbow Catches: When locks are specified, elbow catches shall be utilized. Elbow catches and strike plates shall be used on left hand doors of double door cases and are to be case aluminum with bronze finish.

8. Leg Shoes: Leg shoes shall be provided on all table legs, unless otherwise specified, to conceal leveling device. Shoes shall be 1-1/2" high and a pliable, black vinyl material. Use of a leg shoe (which does not conceal leveling device) will not be acceptable.

9. Floor Glides: Floor glides, where specified for movable open-leg tables, shall be a non-marring material at least 1" dia. to prevent indenting composition flooring and shall have at least a 5/8" height adjustment. Use of metal buttons will not be acceptable.

10. Dowels used to join frames and panels shall be fluted hardwood not less than 3/8" in diameter.

11. Shelf Support Clips: Shelf Support Clips shall be double pin type for mounting on interior of cabinetwork. Clips shall be corrosion resistant and shall retain shelves from accidental removal. Shelves are adjustable on 32mm centers. Surface mounted metal support strips and clips subject to corrosion will not be acceptable.

12. Drawer suspension: Mechanical slides shall be as made by Accuride or approved equal with a standard clear zinc finish:
    a. 24" wide or less: Accuride 3834 all ball bearing, rail mount, full extension + 1" over travel slides, hold open detent with a 100 lb./ pair load rating.
    b. 33.5" wide or less: Accuride 7434 all ball bearing, rail mount, full extension + 1" over travel slides, hold open detent with a 100 lb./ pair load rating and progressive movement.
    c. 42" wide or less: Accuride 3640 all ball bearing, rail mount, full extension + 1" over travel slides, hold open detent with a 200 lb./ pair load rating and sequential movement.
    d. File drawers: Accuride 4034 with full extension with over-travel 150 lb. dynamic zinc plated series.

13. Seismic Lips: Furnish 3/16" x 2" clear acrylic sheet (Plexiglas) lips at all open shelves.

C. Construction:

1. Open-leg Tables or Benches: Legs shall be oak hardwood construction, 2-1/2" square with all corners having 1/4" radii. Legs shall be secured to the apron frame by a heavy-duty corner bolt and a 14-gauge metal corner brace. Corner braces shall be locked into apron rails by accurately located grooves and shall be securely fastened with screws. This construction shall guarantee equal tension on all wood and metal parts. All apron rails shall be 3/4" thick 5-ply Oak veneer lumber core plywood. Top edge shall be grooved for securing top fasteners. Leg stretchers, where required, shall be 1-5/16" x 1-1/2", utilizing a mortise and tenon joint with legs and secured with a 4" long through bolt.

2. Base Cabinets (Swinging Door and Drawer): All cabinet end panels shall be 3/4" thick, 7-ply hardwood plywood and 3/4" x 1/8" thick oak facing. End panels shall be multiple doweled, glued, and/or screwed to top frame members, intermediate rails, and bottoms. Cabinet backs shall be 1/4" thick tempered hardboard and shall be removable unless cabinet has multiple drawers. Cupboard bottoms shall be 3/4" thick, 7-ply hardwood plywood with 3/4" x 1/8" oak facing on front edge. All cupboard base units shall have full-width and full depth adjustable shelves, 3/4" thick, 7-ply oak plywood with oak facing on exposed edge. Integrally joined parts shall result in a totally enclosed cabinet. The following frame sizes and material shall be considered a basic construction.

3. Intermediate rails shall be 3-1/4" x 3/4", 7-ply oak plywood with 3/4" x 1/8" thick oak facing on exposed edge. Rails shall be multiple doweled and glued to end panels. Intermediate rails will be mounted at the front between the drawers and between all drawers and doors.
    a) Top Horizontal Frame: Front top rail shall be two pieces of hardwood grooved and glued together. The exposed member will be 1-1/4" x 7/16" oak. The unexposed member shall be 2-1/2" x 3/4" hardwood. Side members shall be 1-3/4" x 3/4" hardwood. Rear member shall be 2-1/2" x 3/4" hardwood.

4. Full Height Swinging Doors: All swinging doors to have a four-sided solid oak hardwood frame. Swinging doors shall overlap opening four sides; astragal applied to left-hand door shall provide further dust proofing. Construction shall be of 1" thick overall, with 3/4" thickness exposed beyond cabinet face. All four edges have radii to match drawer heads.

5. Drawers: Drawer shall be four sided box construction with 13/16"solid oak hardwood removable drawer front. Drawer sides and back and front shall be 7/16" thick 7-ply oak plywood. A glue and dovetail type joint shall be used on all four corners of the drawer. Drawer bottoms shall be 1/4" thick tempered hardboard, set and glued into 1/4" groove, four sides.

D. Finish and Performance Requirements:

1. Wood Finish: Hardwood (species to be selected by Architect) - Prior to application of the wood finish, case and cabinet surfaces shall be smoothly sanded to remove loose fibers, scratch marks, and abrasions, with all dust thoroughly removed by compressed air. Finish shall meet LEED II standards and VOC s must be less than 150 grams per liter and finish must pass SEFA 8 standards.

2. Wood Finish Application: Finishes shall be applied under controlled atmospheric conditions, and shall be cured after application in a modern humidified oven at 140º F. and 30% relative humidity.

3. Wood Casework Finish (all surfaces): Case and cabinet exposed exterior surfaces, including interiors of glazed cases and open shelving, shall be provided with an acid, alkali, solvent, water, and abrasion resistant finish. Surfaces shall be first coated with a non-fiber lifting stain, or toner to secure the desire color. The color coat shall be thoroughly dried. The first sealer

coat shall be applied, thoroughly dried, sanded and carefully dusted. A second sealer coat shall be applied and thoroughly dried. A double pass coat of chemical resistant synthetic varnish shall then be applied and thoroughly dried, providing a semi-gloss finish.

E. Acid Storage Cabinets & Base Storage Cabinets:

1. Acid or Base storage cabinets will be of the same construction than the standard base cabinets, with a one piece white chemical resistant polyethylene (HDPE) interior box and doors lined with the same material ¼" (6 mm) thick. Three integral shelf position supports are located on each side of the box. The bottom is equipped with an integral ¼" high edge to prevent leakage to the exterior of the cabinet.

2. Air grills are provided at top and bottom of each door for air circulation.

3. Each unit comes with an adjustable white chemical resistant polyethylene (HDPE) perforated shelf.

4. Each unit is labelled "ACIDS – DANGER" or "BASES – DANGER" for clear identification.

5. All interior hardware is made of stainless steel.

6. Acid, Base cabinets Factory Mutual (FM) approved.

7. Acid cabinets located under fume hoods shall be equipped with ventilation kits providing positive ventilation from the cabinet, bypassing the interior of the fume hood between the liner and the steel housing, and connecting directly to the exhaust duct transition piece above the fume hood or where indicated by the mechanical drawings. Acid storage cabinets installed independent of fume hoods shall be provided with individual exhaust vents to be run to the exterior through the roof of the building to an exhaust fan. Ductwork and fan shall be by HVAC ductwork installer (division 15).

F. Flammable Solvents/Chemicals storage cabinets:

1. Construction shall meet O.S.H.A. Standard 1910-106(d)(3), comply with the NFPA Flammable and Combustible Liquids Code No. 30 and be UL 1275 certified.

2. Flammable Chemical Storage Cabinets: Cabinets shall be specifically designed for the storage of flammable and combustible liquids. Construction shall be based upon the requirements listed by UFC, 18 gauge steel and shall be all double panel construction with a 1-1/2" air space between panels. All joints shall be welded, or screwed, to provide a rigid enclosure. The right hand door shall be equipped with a three point latching device and the left-hand door shall have a full height astragal. The doors are self-closing and synchronized so that both doors will always fully close. The right hand door is equipped with at three-point latching system that automatically engages when the doors close. Each door is equipped with a fusible-link hold-open feature that will ensure the door closes should the temperature outside the cabinet exceed 165 degrees Fahrenheit. Units 24" long have only one door, self-closing, and equipped with a three point latching system and hold-open feature. A 2" deep liquid tight pan that covers the entire bottom of the cabinet shall be furnished to contain liquid leaks and spills. Provide a full-depth adjustable shelf. The shelf shall be perforated to allow air circulation within the cabinet. The cabinet shall have interior finish same as exterior. The unit shall be UL listed.

3. Flammable Solvent/Chemicals Storage Cabinet Performance Requirements:

    a) Maximum internal temperature: 325 degrees F., when subjected to a 10 minute fire test using standard time-temperature curve per ASTM E152-72 (Article 42, NFPA No. 30).
    b) They shall be made of 18G (1.2 mm) thick Cold Rolled Steel with double wall construction with fire proof insulation. The floor shall be made of galvanized steel and be recessed 2" (51 mm) below the front opening of the cabinet. The four corners will be welded to form a liquid-tight well.
    c) The cabinets shall be equipped with four 5/16" (8 mm) diameter threaded bolt type steel levelers as on the standard base cabinets.
    d) The back of each cabinet shall be supplied with two 1/2" (38 mm) fire baffle vents.
    e) Each cabinet shall be equipped with an adjustable galvanized 16G (1.5 mm) steel shelf.
    f) Each cabinet shall be clearly identified as such with the inscription:
        FLAMMABLE - KEEP FIRE AWAY

    g) Doors shall overlap cabinet frame and have a full-length piano hinge. Handle shall have a two point locking mechanism.
    h) Flammable cabinets Factory Mutual (FM) approved.

i) Upper and lower arrester vents with spark screens: Factory Mutual approved vents located so that they can be plugged both internally and externally to assure isolation of stored fluid, but can be opened for ventilation means as required by applicable local codes.
j) Cabinet grounding attachment: Screw at base of cabinet for firm attachment of grounding wire.
k) Cabinet markings shall be selected from the manufacturer's standard colors.
l) Mark with Factory Mutual approval.
m) Label cabinet: "FLAMMABLE - KEEP FIRE AWAY".

n) Flammable chemical storage cabinets indicated to be ventilated or vented shall be exhausted as follows:

    i. Ventilated Flammable chemical storage cabinets installed under fume hoods or independent of fume hoods shall be provided with individual exhaust vents to be run to the exterior through the roof of the building to an exhaust fan. Ductwork and fan shall be by HVAC ductwork installer. Vent piping and its connection to the solvent storage cabinet shall comply with requirements of NFPA30 and NFPA45 and shall be provided by Division 15.

o) Shelving: Provide with two 18 inch (460 mm) deep, full width adjustable shelves.
p) Grounding: All cabinets shall be grounded.
q) Finish: match adjacent lab cabinetry

r) Sizes:
    i. Undercounter Flammable Chemical Cabinets: Width per drawings; height to be the manufacturer's standard for undercounter applications.
    ii. Tall Flammable Chemical Cabinets: Refer to lab drawings and Laboratory Casework Report SCL7401.
    iii. Tall Acid or Base Cabinets: Refer to lab drawings and Laboratory Casework Report SCL7401.

2.3 LABORATORY WORK SURFACES, COUNTERTOPS, TABLE TOPS & BACKSPLASHES

A. Provide and install epoxy resin, hardwood and stainless steel work surfaces, countertops, tabletops as indicated shown on the drawings and schedules. Countertop fabricator shall drill all holes and make all cuts in countertop materials as required for the proper installation of all plumbing and electrical work.

1. Corner Radii: All outside corners of all countertops shall have a finished 1/2" radius in plan.

2. Drip Groove: Provide continuous drip groove on underside of all countertops, 1/4" to ½" inboard of the front edges.

3. Backsplashes shall match countertops in material and color.

B. Epoxy Resin Countertop and Sinks (ID Lab and Alternative Light Lab)

1. Subject to compliance with these specifications, acceptable products include, but are not limited to, those manufactured by Durcon, Duratop, or approved equivalent.

2. Material: Chemical and abrasion resistant, durable top of one-inch thick cast material of epoxy resins and inert fillers, cast flat, with a uniform color and low-sheen surface at all surfaces (tops, sides and ends), forming a thermosetting material with the following properties:
   a) Tensile strength: ASTM D651-48, 8,000 psi.
   b) Compressive strength: ASTM D695-61T, 28,000 to 30,000 psi.
   c) Flexural strength: ASTM D790-61, 17,000 to 18,000 psi.
   d) Flexural modulus: ASTM D790-61, 2.2 x 10 to the 6^{th} power psi.
   e) Hardness: ASTM D785-60T, Rockwell M, 107 to110.
   f) Density: ASTM D792-50, 1.92g/cc.
   g) Water absorption: ASTM D570-59, 0.02% in 24 hours.
   h) Heat distortion temperature: 350 degrees F.
   i) Thermal expansion coef: 2.02 x 10 to the minus 5th power in/in/º F.

3. Backsplashes shall match countertops in material and color.

4. Backsplashes: Same material as top, at heights as shown on the drawings, butt jointed and cemented to top. Provide where indicated on drawings. Include end curb where top abuts end wall.
5. Epoxy edge: All edges shall be beveled with a 3/16" bevel, and polished to match the finish of the epoxy top.

6. Epoxy Color: Shall be selected by the Architect from the manufacturer's complete line of colors, including light gray, and other color options manufactured by Durcon or approved equivalent.

7. Epoxy Resin Sinks: Under-counter Mount Epoxy Resin sinks shall be provided as shown and scheduled. Color to match adjacent countertops.
    a) (1) one sink shall be: 14" W X 10" L X 6" D (ADA unit) corner or center drain.
    b) (1) one sink shall be: 18" W X 15" L X 11" D corner or center drain.

C. Hardwood Solid Core Countertop (Butcher-block)

1. Edge grain maple top (butcher-block): 1-3/4" thick top with edge grain exposed, composed of solid hard maple strips not more than 1-3/4" wide, glued with water resistant resin under heavy pressure side to side and end to end. Round top edges and corners and sand smooth.

2. Apply two coats of mineral oil, well rubbed into all surfaces.

D. Stainless Steel Work Surfaces, Countertops & Tabletops:

1. Material: 14 gauge, type 304 stainless steel with No. 4 polished finish on all exposed surfaces and edges. Form tops with one-inch lip and 1/2" return flange, and provide 16 gauge stainless steel reinforcing channels applied to underside as required for rigidity and sound dampening. Form edges, flanges and curbs integrally with top from one sheet of metal.

2. Tops: Form tops with 1" lip and 1/2" return flange. Form edges, flanges and curbs integrally with top, from one sheet of metal.

3. Sink tops: Provide seamless, die formed 3/16" high integral marine edges at sink tops. Unless otherwise noted, provide plain edges at all other tops. Coat underside of all with sound dampening material.

4. Sink bowls: All sink bowls are made from 16 gauge Type 304 stainless steel. Electrically weld stainless steel bowls to opening in top. Grind welds flush and polish to a satin finish to produce an integral unit with invisible joint line. Cover underside of sink bowls with sound dampening material.

5. Joints: Electrically weld all shop joints; grind smooth and polish. Design field joints to be mechanically bolted and supported full length, resulting in a hair line seam with flat, level surfaces each side of joint.

6. Sound dampening material: Material shall be waterborne and non-flammable in its liquid state. Material to contain clay, which will act as a flame retardant. Material shall contain no volatile organic compounds (VOC). Film thickness of spray-applied product shall be approximately 20 mil.

2.4 LABORATORY CASEWORK AND COUNTERTOP ACCESSORIES

A. Cord Hole Grommet:

1. Provide cord grommet, having a flange projecting 1/4" onto surrounding counter surfaces, at all cored holes at work surfaces, countertops & tabletops.
    a) Manufacturer: Rocklem
    b) Model: 91017, Black
    c) Size: Overall size: 3" diameter; hole size: 2 1/2"; slot size: 7/8"; depth: 5/8"

2.5 ADJUSTABLE HEIGHT MOBILE TABLES:

A. Manufacturer: Basis of design product, Bostontec, 2700 James Savage Road, Midland, Michigan 48642 (989) 496-9510 or approved equivalent.

B. Materials:

1. Dual Drive "Midland 1200" Table:
    a) Midland 1200 table available in a variety of sizes.
        i. Heights: variable from 28.8 to 44.6 inches to top of frame.
        ii. Depths: 24", 30" and 36".
        iii. Widths: 48", 60", 72" and 84".
    b) Power Table:
        i. Flat steel parts are laser cut ensuring a high quality edge, component fit and finish.
        ii. Joints are tight fitting and welded construction.
        iii. All exterior and exposed surfaces are finished in a powder-coated finish.

iv. Height adjustment is accomplished using a two synchronized linear actuators that are mounted to the inside surface of the table frame system. Total range of adjustment is 15.75".

v. Linear actuators are mounted in such a way to allow service to be performed, including removal, by simply removing the decorative cover that surrounds the actuator and the two mounting bolts that attach the actuator. The remainder of the table stays useable and functional. Table systems that require disassembly of the table structure for actuator service are not acceptable.

vi. The following load rating is for static loads that are evenly distributed over the entire area of the table. The entire area encompasses loads applied to the work surface, weight of hanging cabinets and loads placed within the cabinets, load rating is not to exceed 1200 lbs.

c) Table Feet:

i. **[Casters will be leveling swivel type and shall be a 4 1/32" nominal height with a 2 ½" diameter wheel. They must have a minimum load rating of 500 lbs per caster. It shall be ball bearing with 360° swivel. It shall have a threaded type drop down stabilizer foot that allows leveling of the table and immobilizes the rolling action of the table. The drop-down type feet will consist of a structural outer decorative shell, side drop foot panels and two inner "U" shaped support channels that are all welded together. The drop style foot allows the use of casters while still maintaining the original nominal height range of the table as if using leveler glides. Caster attachment is done using a hex nut, which is welded to the inner "U" section. Casters have a threaded stem for mounting to the foot].**

d) Top Deck Frame:

i. Constructed of 1 ½"-14 gauge square steel tubing for table widths of 48" to 72". 84" and greater widths will use 1 ½"-11ga square tubing. Corner braces and gussets are 11-gauge cold rolled steel. All corners are welded along with braces and gussets to ensure rigidity and strength. Bolted corner joints and gussets are not acceptable. Exceptions are deck structures too large for shipment or travel into the building.

e) Floor Lag Plates:

i. Nominal 4" x 4" square plate with ½-13 x 1 ½" threaded stem to allow fit into the typical leveling glide threaded hole in the

table foot. Lag plate to have four 5/8" diameter mounting holes to allow table to be bolted to building floor.

f) Actuator System:
   i. Model #LA31 series linear actuator or equivalent. 24 V DC permanent magnet motor with 3.9amp maximum draw on 4000n lift capacity unit. Synchronization feature on each actuator for accurate control of height range and balance between both actuators. Travel length of 400mm (15.75"). Built-in brake to hold position. Noise level of 45 dB (A); measuring method DSIEN ISO 3746, actuator not loaded. Duty cycle of 5% or one minute continuous use followed by 19 minutes of not in use time. Built in limit switches (non-adjustable). Color is black.

g) Desk Panel (up/down switch):
   i. Two button plastic housed switch with imprinted arrows indicating the up and down directions. Color is black.

h) Power Transformer Control Box:
   i. Input voltage of 120v and output voltage of 24v. UL and C US listed power supply source. Color is black.

i) Work surfaces, as indicated on the drawings, shall be:
   i. Work surface thickness shall be:
      1) Epoxy Resin (ER:) 1" thick.
      2) Stainless Steel (SS:) 14 gauge, type 304 stainless steel with No. 4 polished finish on all exposed surfaces and edges. Form tops with one-inch lip and 1/2" return flange and provide 16 gauge stainless steel reinforcing channels applied to underside as required for rigidity and sound dampening. Form edges, flanges and curbs integrally with top from one sheet of metal.

j) Suspended Cabinets:
   i. Allow movement the full range under the table (left to right) and cabinets can be removed and installed without the use of tools.

2.6 BUTCHER PAPER DISPENSERS

A. Provide and install under-counter and wall mounted butcher paper dispensers where shown on the drawings. Dispensers shall accommodate a roll of standard white butcher paper. Provide dispenser size (width) as called for on the drawings. Dispenser shall be all steel construction and shall include paper roll rod and steel

cutting edge across the full width of the dispenser. Cutting edge shall be spring loaded, keeping the cutting edge in contact with the butcher paper roll regardless of the amount of paper on the roll. Provide 2 rolls of paper with each dispenser.

B. Manufacturer: Bulman , model # A-520, or equal manufacturer. Provide units for under-counter mounting applications shown including but not limited to under-counter mounting at mobile tables and fixed counters, or wall mounted on 16" wide x 48" long plastic laminate covered 3/4" plywood base where indicated in drawings.

2.7 LABORATORY PLUMBING & ELECTRICAL FITTINGS

A. General:

1. Products shall be Watersaver - Colortech series or other or approved equivalent.

2. All fixtures shall be warranted for a period of two (2) years after date of occupancy. All laboratory service fixtures shall be the product of one service fixture manufacturer to ensure uniform appearance and ease of maintenance.

3. All service fittings shall be factory assembled (including the assembly of valves and shanks to turrets, flanges and other mounting accessories), and each fixture shall be individually factory tested. All fixtures shall be designed to minimize exposed surfaces on which dust, dirt and airborne contaminants may collect, and to facilitate cleaning and maintenance of the service fixture. Faucet and valve handles shall be hooded to cover the valve stem and top surface of the packing nut or bonnet. The valve stem shall not be exposed to view as the faucet or valve is opened and closed.

4. Installation: Lab casework contractor shall furnish all laboratory plumbing and electrical fittings specified, but these shall be turned over to the division 15 or 16 contractor for installation.

B. Finish:

1. Chrome: All laboratory service fittings (except fittings inside fume hoods) and emergency eyewash and shower equipment shall be furnished with a

chrome-plated finish with clear epoxy coating. All exposed surfaces shall be polished and buffed, then electroplated with one layer of nickel and one layer of chrome. Following plating, clear epoxy coating shall be applied to all exposed surfaces and then baked to permit curing. Surfaces shall have a minimum thickness of 2 mils.

C. Water Service Fittings: Provide deck mounted plumbing service fittings at laboratory sinks as follows:

1. Provide deck mounted mixing faucet with deck mounted 4" blade handles and 8" goosenecks with vacuum breakers. Provide model # CT22248VB with integral vacuum breaker as manufactured by Watersaver-Colortech ,or other manufacturers. Provide standard aerator type of fitting on each faucet. The water faucets and valves shall be fully assembled and individually tested at the factory. Fixtures shall be factory tested at 100 psi to withstand 80-psi working pressure. Water service faucets and valves shall have renewable unit containing all working parts subject to wear, including replaceable stainless steel seat. All water service fixtures shall meet the requirements of ANSI/ASME A112.18.1M-1989 and be certified by CSA under standard CAN/CSA B.125.M89.

2. Goosenecks shall have a separate outlet coupling with a 3/8" IPS female thread securely brazed to the gooseneck for attachment of serrated hose ends, aspirators and other outlet fittings. Provide each rigid gooseneck with standard aerator type of fitting installed on each faucet. Additionally, provide 1-loose 3/8" IPS male inlet thread that the Owner can use in the future to be threaded directly into the faucet.

3. Provide vacuum breakers integral with the gooseneck. Vacuum breakers shall have a forged brass body, a renewable seat and an ultra-light float cup with a silicone gasket for fine flow control. Vacuum breakers shall not spill over at low water volume. Vacuum breakers shall be certified by ASSE under standard 1001.

4. Handles: All water service fittings shall be provided with separate deck mounted faucets with horizontal acting wrist blade handles conforming to ADA and Uniform Federal Accessibility Standards. Faucet design shall be compatible with the foot pedal water delivery system specified in this section.

5. Hands-free fittings shall also be provided at all lab sinks using foot pedal operated devices. Foot pedal operated faucets: Provide model # CT2224TWI-

8VBL3001LP with integral vacuum breaker as manufactured by Watersaver-Colortech or approved equivalent. All sinks with hands-free devices shall also have standard faucets to enable persons to manually adjust hot and cold-water temperature. Lab casework manufacturer shall coordinate and prep all casework as required for the installation of foot pedal fittings and plumbing. Deck mounted water fittings with the foot pedal operation shall match the appearance of those at other locations. Provide with deck mounted 4" blade handles and 8" goosenecks with vacuum breakers and standard aerator.

D. Combination emergency eyewash/shower units:

1. Floor mounted eye wash and emergency showers (ESEW-1): Watersaver model # SSBF909PCC, all polished chrome plated brass construction, barrier free unit. Use at all locations except where swing down units are specifically called for on the drawings or schedules.

2. ~~Swing Down~~ Recessed eye wash and emergency showers with eyewash drain pan (ESEW-2): ~~Watersaver model # SSBF2170, where swing down units are called for.~~

3. All units and installation shall comply with the requirements of the Americans with Disabilities Act. Provide all signage required by ANSI and OSHA. Water flow from units shall comply with ANSI Z358.1. Unit shall be capable of being operated by both hand and foot devices.

4. Shower component of the combination shower / eyewash shall provide sufficient flow with correct dispersion. The operating system is to be a stay – open – ball - valve with rod operation. The ball valve is to be replaceable without dismantling the entire shower. Each shower shall be provided with the internationally approved "Emergency Symbol," for easy identification as required by the Federal Occupational Safety and Health Administration. Showers to be tested at a minimum pressure of 100 psi before leaving the factory. The base floor flange shall have 3 holes for secure mounting. Provide tailpiece assembly for the eyewash drain outlet, sized and configured to drain into the floor drain.

5. Eyewash component of the combination shower/eyewash unit shall have a self-regulating flow control, a filter to remove debris from the water, and an integral flip-top dust cover. The operating system is to be a hand activated

push 'stay-open-ball-valve'. Eye washes to have a built-in ball valve or to be provided with a loose ball valve for correct flow regulation.

6. All mixing / tempering valves shall be provided by division 15. Locate water-tempering system in a concealed location as directed by the Architect.

MEP Coordinate water tempering at all emergency eyewash and shower units per code

E. Deck mounted drench hose eyewash units:

1. Watersaver Model # CTEW1022VB. Locate on the right side of the sink unless otherwise shown on the drawings. Provide deck mounted drench hose eyewash units with in-line vacuum breaker. Unit shall have 2 gentle spray outlet heads. Provide all signage required by ANSI and OSHA. The design of these units and their water flow, shall comply with ANSI Z358.1 for dedicated eyewash equipment.

2. All mixing / tempering valves shall be provided by Division 22.

MECHANICAL ENGINEER: TEMPERING VALVES TO BE RECESSED WITH LOCATION COORDINATED ON ARCHITECTS INTERIOR ELEVATIONS

F. Electrical fixtures and fittings: Lab casework manufacturer shall coordinate location of and prep all casework for installation of multi-outlet assemblies and other electrical work specified under Division 16. Material and installation shall be in strict adherence with the current edition of the National Electric Code of the National Fire Protection Association, and with requirements of all local regulatory authorities.

1. Pedestal housings: Provide 8-plex units, Watersaver multiplex power/data pedestal box, # CTE800WS which can accommodate power, voice and data outlets in a single box. Material shall be heavy "lustre-brite" corrosion resistant aluminum alloy, polished to a chrome like color, with matching cover plates and epoxy coated. Provide with integral bases; low design for use on either single or double faces. Lab casework manufacturer shall coordinate and prep all casework for installation of pedestal housings. Electric pedestal boxes shall be UL listed under standard UL514A. The receptacles, which go inside the pedestal housings, are to be provided by Division 16.

2. Task Lights: Provide, Phillips Lightolier "Pristine Task Light" or approved equivalent, under-shelf T-2 fluorescent task lights where under-cabinet task lights are indicated on the drawings or elsewhere in the project documents. Task lights shall be hard-wired by the Electrical Contractor with concealed wiring and local switching at the work area being served. Task lights shall be sized to match the width of wall cabinets or the spacing of vertical support structures. **MEP COORDINATE ELECTRICAL FIXTURES. WARNING! DO NOT USE LED TYPE LIGHTING OVER STAINLESS STEEL WORK SURFACES, AS UNUSUAL VISUAL EFFECTS MAY OCCUR.**

2.8 CYANOACRYLATE (SUPERGLUE) UNIT

A. Manufacturer: Thermo Scientific or approved equivalent. Provide one (1) countertop forensic cabinet model # 950P201GY.

1. Forensic Cabinet must comply with ASHRAE 110-1995 and provide containment 4.0 AAM 0.05 PPM or better.

2.9 CHEMICAL FUME HOODS

A. Fume Hood General Design Requirements

1. All fume hoods covered in this section are based on **Isolator Series** by Jamestown Metal Products, LLC. with a top and bottom airfoil and aerodynamically shaped fascia posts to minimize turbulence.
   a) VAV (Variable Air Volume) type: Design uses a "restricted by-pass design. Maximum air is exhausted when the sash is open, minimum air is exhausted when the sash is closed. A minimum flow of 25 CFM/sq ft of surface area, as stated by NFPA 45, should be maintained to achieve optimum containment and satisfactory dilution when the sash is closed.

2. Fume hoods shall be designed for consistent and safe airflow through the hood face. Negative variations of face velocity shall not exceed 20% of the average face velocity at any designated measuring point as defined in this section.

3. Average illumination of work area: minimum 80 foot-candles. Work area shall be defined as the area inside the superstructure from side to side and from face of baffle to the inside face of the sash, and from the working surface to a height of 48 inches.

4. Fume hood shall be designed to minimize static pressure loss with stainless steel round duct collar configuration. Maximum average static pressure loss readings taken three diameters above the hood outlet from four points, 90 degrees apart, shall not exceed the following maximums:

   Face Velocity at sash full open- CAV design - measured S.P.L. (W.G.)

75 F.P.M.	.30 inches
100 F.P.M.	.50 inches
125 F.P.M.	.80 inches
150 F.P.M.	1.16 inches

5. Fume hood shall maintain essentially constant exhaust volume at any baffle position for safety. Maximum variation in exhaust CFM, static pressure and average face velocity as a result of baffle adjustment shall not exceed 5% for any baffle position at the specified face velocity.

B. Submittals

1. Submit manufacturer's test data and installation instructions for each type of fume hood. Provide data indicating compliance with ANSI/ASHRAE Standard 110-1995.

2. Provide samples of the following:
   a. 6" x 6" section of the interior fume hood liner material.
   b. 12" x 12" section of countertops with dish formation.
   c. Color samples of manufacturer's finish.
   d. Hardware and accessories including sample sash handle and/or pulls, chains, axles, and sprockets.

3. Provide submittal drawings for fume hoods showing plans, elevations, sections and service run spaces. Details shall include notation of all specified items.
   e. Provide location and type of service fittings as related to the fume hood when required.
   f. Provide roughing-in drawings for mechanical and electrical services as related to the fume hood when required.
   g. Provide face opening, air volume and static pressure drop data.

C. Fume Hood Performance Requirements – See APPENDIX A

1. Metal Finish Performance Requirements: Coatings on Fume Hood components have been tested in conformance with the full requirements of SEFA 8 M-2007 Recommended Practice. See Section 2.07 for test procedures, acceptance levels and results for each criteria listed below from SEFA 8 M-2007 Section 10:
    a) Chemical Spot Test – Section 10.1
    b) Hot Water Test – Section 10.2
    c) Finish Impact Test – Section 10.3
    d) Paint Adhesion on Steel – Section 10.4
    e) Paint Hardness on Steel – Section 10.5

D. Manufacturer

1. "American Made" – Laboratory Fume Hoods and related equipment wholly manufactured and assembled in USA by: Jamestown Metal Products, LLC, 178 Blackstone Avenue, Jamestown, New York, 14701.
2. The following manufacturers are approved with the condition that design and materials as specified are adhered to;
    a. Labconco: Model XL
    b. Kewaunee Scientific Corporation: Supreme Air

E. Materials

1. Typical sheet steel used in the construction of fume hoods:
    a) Mild carbon, cold rolled and leveled unfinished steel, ASTM A 1008
    b) Type 304 or 316 stainless steel, #4 finish one side, ASTM A 666
    c) Mild carbon, cold rolled and hot dipped galvanized steel

2. Typical gauges:
    a) Stainless steel: 12, 14, 16, 18 and 20 GA
    b) Mild Steel: 18 GA
    c) Galvanized steel: 18 GA

3. Sash glass:
    a) ¼" Tempered Glass per ASTM C 1048 (standard)

4. Sash tracks: Corrosion-resistant polyvinyl chloride (PVC).

5. Fastening Devices:
    a) Interior surfaces: Nylon bolts, PVC fasteners, PVC-capped 410 stainless screws

b) Exterior structural members: 410 stainless steel screws
c) Exterior panel members: #8-32 zinc plated screws

6. Interior liners: The liner consists of all interior surfaces, including sides, top, back and baffles. See **APPENDIX B** for liner performance requirements.
   a) Standard: Fiberglass reinforced polyester material (polyglass,) 3/16" nominal Thickness, white.

F. Fume Hood Construction – Bench Hoods

1. Superstructure: Shall consist of 18 GA mild steel side pans, painted neutral color grey, maximum 4-3/4" thick, holding side and rear liner panels, and fastened together with pinions and screws so that the entire structure is secure and rigid. Any framing system not providing structural support is unacceptable. Front and both sides of the superstructure are aligned and precision fit, eliminating the need for exterior gaskets.

2. Airfoils:
   1. Lower airfoil shall be constructed of:
      i. 16 GA Type 304 stainless steel, with #4 finish and be equipped with a 3-inch square power cord/tube pass-through near each side post. The typical pass-through shall allow the sash handle to seal against the airfoil without running any cords or tubes under the airfoil. It shall accommodate the simple resting of cords and tubes into the pass-through cavity. It shall also be flush with the work surface and have an integral drip trough.
   2. Upper airfoil:
      i. 18 GA Type 304 stainless steel, #4 finish

3. Sash:
   1. Provide a frameless vertical sash containing a 1/4" (6 mm) tempered glass panel and a full width painted steel sash handle (stainless steel optional) connected to a steel rear-hung counterweight system insuring non-tilting, non-binding, and non-creeping sash performance. Rear-mounted counterweight shall be connected to a #35 case-hardened steel chain engaging a twin sprocket axle system with positive master link connection points both front and rear. Sash systems utilizing cables and pulleys are not acceptable. Painted steel parts in the sash are not acceptable. ***Note:*** Sash interlock system utilized on double-sided pass-through hoods.

4. Baffles: Control air vectors into and through the fume hood, and shall be fabricated of the same material as the liner. Provide three fixed baffles and one adjustable baffle at bottom.

5. Baffle attachment: Baffles are secured to the superstructure using non-metallic, corrosion resistant baffle stand-offs.

6. Bypass: Isolator Viewpass system consisting of a ¼" thick tempered glass panel allowing complete visual display of fume hood interior.
    1. Clear (standard)
7. Duct collars: Standard 10" or 12" round exhaust outlet collar(s), fabricated of 20 gauge Type 304 stainless steel. Coated steel collars are not acceptable.

8. Fascia posts
    1. 18 GA mild steel and painted

9. Exterior end panels
    1. 18 GA mild steel and painted (standard)

10. Interior clearance: All bench type fume hoods are designed to have an interior vertical clearance of not less than 47" in the front twelve inches of the hood depth. Internal dimensions may be affected by accessories or options.

11. Interior lighting: Standard configurations for fluorescent light fixtures are: 36" hood (1-24" fixture); 48" hood (1-36" fixture); 60" hood (1-48" fixture); 72" hood (1-48" fixture); 96" hood (2-36" fixtures).
    1. Standard non-hinged fluorescent light fixture with chemical resistant finish, configured for T-8 lamp tubes shall be provided and installed on the exterior of the fume hood roof. A tempered glass panel is provided and has a vapor-tight seal to isolate the fluorescent fixture from the hood interior. The largest possible double tube UL approved fixture is provided for each hood.

12. Fluorescent Tubes or Incandescent Bulbs
    1. Included with fixture.

13. Electrical services;
    1. Specified electrical services are prewired to a junction box located on the roof of the fume hood for field connection by the electrical contractor. All electrical receptacles are 3-wire, 20-amp duplex, 120/277VAC or as specified. Light switch shall be 3-wire polarized grounded, 15 amp, 125VAC or as

specified. Faceplates are stainless steel.

14. Fire Extinguisher:
    1. Provide fume hoods with UL listed dry chemical fire extinguisher, ADX Model 1131. Unit shall contain 8 lbs. of ABC dry chemical in stainless steel cylinder mounted on top of hood. Unit shall have spray head projecting through ceiling of hood to interior and shall have fusible link designed to activate unit when interior temperature of hood reaches 200° degrees F. 1 unit for hoods 6' or less in width, 2 units for 8' wide hoods. Provide pressure activated switch and contacts as required to permit fire extinguisher system to be tied into the building fire alarm system.

    (Mechanical /Electrical Engineers: Show fume hoods in fire alarm control panel riser)

15. Work surfaces:
    1. Epoxy resin, 1-1/4" thick, molded top made in the form of a watertight pan, not less than 1/4" deep to contain spillage. Work surfaces are non-glaring finish and black, grey or white in color.

16. Instruction Plate: Corrosion resistant or plastic plate attached to the fume hood exterior with condensed information covering recommended locations for apparatus and accessories, use of sash and recommended safe operating procedures.

17. Velocity alarm: Fume hoods shall be equipped with Jamestown-Tel fume hood velocity alarm to detect low hood face velocities. The units are surface-mounted on the hood's fascia panel. No control module, when mounted, shall be thicker than 1-1/2". The UL approved velocity alarm signals an unsafe operating condition when the fume hood face velocity falls below a preset amount. The alarm set-point calibration is performed by the user/owner once a proper face velocity has been set and measured. The alarm system consists of the following:
    a. LCD digital display that registers face velocities between 0 and 1000 FPM plus a safety reference display that actuates in low velocity conditions.
    b. Programmable alarm set point.
    c. Audible alarm of at least 80 dB.
    d. Flashing red warning light in synchronization with the audible alarm.
    e. Silencer button for the audible alarm; flashing red light will continue to flash.
    f. Optional 0-10VDC available to signal BAC.

g. Alarm system is furnished with velocity detector, 110V/12VDC power supply, and detector mounting hardware. The system operation at 110V, 60 Hz power.

18. Metal Finish:

a) Preparation: Metal shall be treated with a heated alkaline-based acid solution, rinsed with water, and a coat of epoxy-link applied; immediately dried in heated ovens, then gradually cool prior to application of finish.

b) Application: Electro-statically apply epoxy powder coat of selected color and bake in controlled high temperature oven to assure a smooth, hard satin finish. Surfaces shall have a chemical resistant, high grade laboratory furniture quality finish of the following thicknesses:

I. Exterior and interior surfaces exposed to view: 1.8 – 3 mils.

II. Backs of cabinets and other surfaces not exposed to view: 1.8 mils minimum.

c) Chemical Spot Test :

I. Test procedure: Place test panel on a flat surface, clean with soap and water and blot dry. Condition the test panel for 48 hours at 73°F ± 3°F and 50% ± 5% relative humidity. Panel will be subjected to chemical reagents according to SEFA 8 M-2007 Recommended Practice using one of the following two test methods:

1. Method A – Test volatile chemicals by placing a cotton ball saturated with reagent in the mouth of a 1-oz. bottle and inverting the bottle on the surface of the panel.
2. Method B – Test non-volatile chemicals by placing five drops of the reagent on the surface of the panel and covering with a 24 mm watch glass, convex side down.
3. For both test methods, leave the reagents on the panel for a period of one hour. Wash off the panel with water, clean with detergent and naphtha, and rinse with de-ionized water. Dry with a towel and evaluate after 24 hours at 73°F ± 3°F and 50% ± 5% relative humidity using the following rating system.

II. Evaluation ratings:

1. Level 0 – No detectable change.

2. Level 1 – Slight change in color or gloss.
3. Level 2 – Slight surface etching or severe staining.
4. Level 3 – Pitting, cratering, swelling, or erosion of coating. Obvious and significant deterioration.

III. Acceptance level: No more than four (4) level 3 conditions, and the sum of all ratings not to exceed twelve (12).

IV. Test results: Zero level 3 conditions exist, and sum of all ratings is ten (10). See data below.

REAGENT	METHOD	RATING
Acetate, Amyl	A	0
Acetate, Ethyl	A	0
Acetic Acid, 98%	B	0
Acetone	A	0
Acid Dichromate, 5%	B	0
Alcohol, Butyl	A	0
Alcohol, Ethyl	A	0
Alcohol, Methyl	A	0
Ammonium Hydroxide, 28%	B	0
Benzene	A	0
Carbon Tetrachloride	A	0
Chloroform	A	0
Chromic Acid, 60%	B	0
Cresol	A	1
Dichlor Acetic Acid	A	0
Dimethylformanide	A	0
Dioxane	A	0
Ethyl Ether	A	0
Formaldehyde, 37%	A	0
Formic Acid, 90%	B	0
Furfural	A	0
Gasoline	A	0
Hydrochloric Acid, 37%	B	0
Hydrofluoric Acid, 48%	B	1
Hydrogen Peroxide, 28%	B	0
Iodine, Tincture of	B	2
Methyl Ethyl Ketone	A	0
Methylene Chloride	A	0
Mono Chlorobenzene	A	0

Naphthalene		A		0
Nitric Acid, 20%		B		0
Nitric Acid, 30%		B		0
Nitric Acid, 70%		B		2
Phenol, 90%		A		0
Phosphoric Acid, 85%	B		0	
Silver Nitrate, Saturated		B		0
Sodium Hydroxide, 10%		B		0
Sodium Hydroxide, 20%		B		0
Sodium Hydroxide, 40%		B		0
Sodium Hydroxide, Flake		B		0
Sodium Sulfide, Saturated		B		0
Sulfuric Acid, 25%		B		0
Sulfuric Acid, 77%		B		0
Sulfuric Acid, 96%		B		2
Sulfuric Acid (77%) & Nitric Acid (70%), (equal parts)		B		2
Toluene		A		0
Trichloroethylene		A		0
Xylene	A		0	
Zinc Chloride, Saturated		B		0

D. Hot Water Test

1. Test procedure: Hot water (100°C±3%) shall be allowed to trickle (with a steady stream and at a rate of not less than 6 ounces [177.44cc] per minute) on a finished surface, which shall be set at an angle of 45-degrees, for a period of five minutes.
2. Acceptance level: After cooling and wiping dry, the finish shall show no visible effects from the hot water.
3. Test results: The finish shows no visible effect due to the hot water.

E. Finish Impact Test:

1. Test procedure: Position the 18 GA CRS test panel with nominal paint thickness of 3 mils on a smooth concrete floor. A one-pound ball (approximately 2" in diameter) shall be dropped from a distance of 12" onto a flat horizontal surface.
2. Acceptance level: There shall be no visual evidence to the naked eye of cracks or checks in the finish due to impact.
3. Test results: There is no visual evidence of any cracks or checks due to impact.

F. Paint Adhesion on Steel:

1. Test procedure: Two sets of six parallel lines 2mm apart shall be cut with a razor blade to intersect at right angles thus forming a grid of 25 squares. The cuts shall be made just deep enough to go through the coating, but not into the substrate. Brush the grid area lightly with a soft brush, and then place a piece of tape over the grid. Rub the tape firmly with the eraser of a pencil to ensure good contact. Remove the tape by rapidly pulling it back upon itself as close to an angle of 180° as possible.
2. Acceptance level: A 4B rating or better (ninety-five percent or more of the grid area shall show finish intact.
3. Test results: 100% of the squares remained intact after the test.

G. Paint Hardness on Steel:

1. Test procedure: Clip a corner of the sample at 45° exposing a raw metal edge. Place the sample on a raw metal base plate so that the exposed metal edge of the sample makes contact with the turned up side of the base plate. Remove approximately 6mm of wood from a 4H pencil, being careful to leave an undisturbed smooth cylinder of lead. Holding the pencil at an angle of 90° to an abrasive paper, rub the lead against the paper maintaining an exact angle of 90° section until a flat smooth and circular cross section is obtained. On the other end of the pencil remove approximately 13mm of wood from on half of the pencil. Install the pencil into a Sheen model 720N Pencil Scratch Hardness Tester. Follow the manufacturer's instructions for conducting the test.
2. Acceptance level: The paint finish shall withstand the abrasion of a 4H pencil without penetrating through to the substrate and completing a continuous circuit.
3. Test results: The 4H pencil did not penetrate the substrate during the test.

Note: manufacturer shall provide independent certified test report on chemical resistance of finish if requested.

19. Quality Assurance:

a) All laboratory fume hoods specified herein will be the product of one manufacturer and will be based on the specifications of the product line described in Part 2. All manufacturers other than those of the specified products will provide evidence of expertise in the manufacture of fume hoods and be willing to have their manufacturing facility scrutinized by the customer.

b) All manufacturers desiring approval for this project must maintain a fume hood test facility at their factory location. This facility must provide for variable exhaust and make-up air control. In addition, any facility that provides for fume hood make-up air by using floor-to-ceiling wall diffusers is unacceptable. All qualified test facilities must contain, as part of their permanent equipment, ANSI/ASHRAE 110-1995 testing hardware as specified in that standard. In addition, all data readings shall be computer-recorded and the raw data submitted in disc format.
    1) "American Made" – Laboratory Fume Hoods wholly manufactured and assembled in USA.

c) The manufacturer shall provide certification that fume hoods shall meet the performance requirements described under Appendix A "Fume Hood Performance Testing Requirements".
    1) "American Made" – Laboratory Fume Hoods wholly manufactured and assembled in USA.

d) The manufacturer shall warrant the sash counterweight system, excluding glass, against defects in materials and workmanship for the life of the fume hood. Any material or manufacturing defect in these components will be repaired without charge by the manufacturer.
    1) "American Made" – Laboratory Fume Hoods wholly manufactured and assembled in USA.

e) The manufacturer shall, for a period of one (1) year from date of shipment, warrant that furnished products shall be free from defects in material and workmanship. The manufacturer shall also warrant the products to be as represented and will repair or replace any part, under normal use, if examination discloses it to have been defective within the warranty period.
    1) "American Made" – Laboratory Fume Hoods wholly manufactured and assembled in USA.

f) UL 1805 Specification: Fume hoods must be UL 1805 approved. This standard covers electrical and mechanical hazards, investigates the flammability of materials and measures the effectiveness of airflow characteristics. Proper labeling must be affixed to the face of each fume hood indicating classification to UL 1805. UL listings covering electrical components only or other listings that do not encompass all elements of UL 1805 are insufficient.

20. Installation-Refer to Instruction and Installation Manual:

a) Install fume hoods and equipment in accordance with manufacturer's instructions.

b) Install equipment plumb, square, and straight with no distortion and securely anchored as required.

c) Secure work surfaces to casework and equipment components with material and procedures recommended by the manufacturer.

d) Accessory installation: Install accessories and fittings in accordance with manufacturer's recommendations.

21. Field Quality Control Testing of Fume Hoods:

a) Have all fume hoods static tested for three (3) minutes using ANSI/ASHRAE 110-1995. All hoods shall pass with an average rating of AI 0.05 or less.

b) Have all fume hoods tested using SEFA 1.1 - 2002. All units tested shall pass using the specified criteria.

22. Adjusting:

a) Repair (or remove and replace) defective work, as directed by Owner's Representative upon completion of installation.

b) Adjust sash and other moving or operating parts to ensure smooth, near silent and accurate sash operation with one hand and with uniform contact of rubber bumpers. Ensure counterweights operate without interference.

c) Adjust fixtures and accessories to function smoothly.

23. Cleaning:

a) Clean equipment, touch up as required.

24. Protection of Finished Work:

a) Take protective measures to prevent exposure of casework and equipment from exposure to other construction activity.

b) Advise contractor of procedures and precautions for protection of material, installed laboratory casework and fixtures from damage by work of other trades.

25. Delivery, Storage & Handling:

a) Schedule delivery of casework and equipment so that spaces are sufficiently complete that material can be installed immediately following delivery.

b) Protect finished surfaces from soiling or damage during handling and installation. Keep covered with polyethylene film or other protective coating.

c) Protect all work surfaces throughout construction period with 1/4" corrugated cardboard completely covering the top and securely taped to edges. Mark cardboard in large lettering "NO STANDING".

26. Project Conditions:

d) Schedule delivery of casework and equipment so that spaces are sufficiently complete that material can be installed immediately following delivery.

e) Do not deliver or install equipment until the following conditions have been met:

1. Windows and doors are installed and the building is secure and weather tight.

APPENDIX A – FUME HOOD PERFORMANCE TESTING REQUIREMENTS

A. General:

1. One (1) hood of the same design as specified herein will be successfully tested as detailed below. Production of the hoods specified herein will not commence until the "Performance Test" has been successfully performed by the manufacturer. In general, the below detailed "Performance Test" will consist of the ANSI/ASHRAE 110-1995 test procedure using a five-minute tracer gas challenge at a rate of four (4) liters per minute. The PPM concentration outside the hood of a tracer gas released inside the hood will be measured utilizing a MIRAN 203 Gas Analyzer, or equivalent.

B. Test Procedure:
   1. Tracer gas orifice and ejector as specified in ANSI/ASHRAE 110- 1995.
   2. Tracer gas is sulfur hexafluoride supplied from a cylinder capable of maintaining 30-PSI pressure at the test flow rate for at least five minutes. The test flow rate is four (4) liters per minute.
   3. Detector is a MIRAN 203 Infrared Spectrophotometer capable of indicating or recording concentrations of tracer gas in the range of 0.001 PPM, with an accuracy of ± 10% and a response time not to exceed ten (10) seconds to 90% indication of actual concentration.
   4. "Dummy" will be a manikin such as used in clothing display. The height of the manikin will be 67 inches with a shoulder height of 55" to 57", and otherwise represent normal proportions of the human body. Hairless dummies or torsos are unacceptable.
   5. The detector is calibrated with a known concentration of tracer gas within 24 hours preceding a test, using the methods furnished or specified by the detector manufacturer.

C. Test conditions:
   1. Hood is tested with ceiling-supplied make-up air in a test area where face velocity, temperature, and room airflow can be monitored and documented.

D. Hood Condition:
   1. The sash or sashes shall be located in the design position or positions.
   2. If the hood has an auxiliary air supply, the supply shall be in operation.

E. Quantitative Test Procedure:
   1. Turn on detector, allow time to reach equilibrium.
   2. Insert orifice in test diffuser to give (4) liter per minute release rate.
   3. Install diffuser to a central test position. This position is equidistant from the inside side walls, six inches behind the sash plane.
   4. Install manikin standing 3" from the plane of the sash.
   5. Turn on tracer gas block valve. Position the detector probe between the nose and lip of the manikin.
   6. Observe and record the detector readings automatically. Background readings are to be taken before each test and subtracted from the actual test readings. The tests are run for five (5) minutes. An average heading above 0.07 PPM constitutes unsatisfactory performance under the conditions that exist for that test.
   7. During the sixth and seventh minute of testing, the sash is closed completely. Then, at 420 seconds elapsed time, the sash is re-opened.

8. Between 450 and 510 seconds elapsed time, the hood perimeter is tested at a distance of 1" outside the plane of the sash.
9. During all these procedures, breathing zone gas concentration shall not exceed 0.05 PPM.

F. Qualitative Test Procedure:

1. Excerpt from SEFA 1.1 2002 (formerly SAMA Standard LF10-1981): It is recommended that the user make provisions to have the following tests performed on all laboratory fume hoods. These tests should be performed by qualified personnel to verify proper operation of the fume hoods before they are put to use. The tests of the fume hoods should be performed after the installation is complete, the building ventilation system has been balanced and all connections made. Any unsafe conditions disclosed by these tests should be corrected before using the hood.

7.1 Test Conditions

7.1.1 Verify that building make-up air system is in operation, the doors and windows are in normal operating position, and that all other hoods and exhaust devices are operating at design conditions.

7.2 Test Procedure

7.2.1 Equipment List

a. A properly calibrated hot-wire thermal anemometer.
b. A supply of 2 -minute smoke candles.
c. A bottle of titanium tetrachloride and supply of cotton swabs or other recognized device for producing smoke.

7.2.2 Room Conditions

a. Check room conditions in front of the fume hood using a thermal anemometer and a smoke source to verify that the velocity of cross drafts does not exceed 20 percent of the specified average fume hood face velocity. Any cross drafts that exceed these values shall be eliminated before proceeding with fume hood test.
b. Caution: Titanium Tetrachloride fumes are toxic and corrosive. Use sparingly; avoid inhalation and exposure to body, clothing and equipment that might be affected by corrosive fumes.
c. Note: It must be recognized that no fume hood can operate properly if excessive cross drafts are present.

7.2.3 Face Velocity

a. Determine specified average face velocity for fume hood being tested. Perform the following test to determine if fume hood velocities conform to specifications or to the designated fume hood class. With the sash(es) positioned, turn on the exhaust blower. The face velocity shall be determined by averaging the velocity readings taken at the open fume hood face. Note: If not in accordance with specified face velocity, refer to Appendix A (Troubleshooting Guide) of the complete SEFA document for aid in determining the cause of variation in airflow. If face velocity cannot be corrected to that specified, reclassify fume hood to conform to actual face velocity.

7.2.4 Sash Operation

a. Check operation by moving sash(es) through its (their) full travel. Sash operation shall be smooth and easy. Vertical rising sashes shall hold at any height without creeping up or down, unless designed otherwise.

7.2.5 Verification of Proper Air Flow and Patterns

7.2.5.1 Fume Hoods without Auxiliary Air

a. Turn fume hood exhaust blower on.
b. With sash(es) in full open position, check air flow into the fume hood using a cotton swab dipped in titanium tetrachloride or other smoke source. Note: On fume hoods with horizontal sliding sash(es), check airflow with sash(es) at various full open positions. A complete traverse of the fume hood face should verify that airflow is into the fume hood over the entire face area. A reverse flow of smoke indicates unsafe fume hood operation.
c. Move a lighted smoke candle throughout the fume hood work area, directing smoke across the work surface and against the sidewalls and baffle. Smoke should be contained within the fume hood and be rapidly exhausted. (Fume hoods with horizontal sliding sash(es) will show reverse flow and turbulence behind sash panel, but no outflow of smoke shall be evident.)

7.2.5.2 Fume Hoods with Auxiliary Air

a. Turn exhaust blower on and determine face velocity in accordance with 7.2.3. Note: Face velocity and exhaust volumes shall be determined with the auxiliary air blower off.
b. Calculate exhaust volume from face velocity data.
c. Turn on auxiliary air, verify that auxiliary air volume is as specified. Locate a straight section of the supply air duct and drill two holes of a size appropriate for the pilot tubes to be used, 90 degrees apart, on a plane through the duct, at the downstream end of the straight section. Measure the air velocity and calculate the air volume. Compare volumes determined with the specified volume of auxiliary air and with exhaust volume, to determine if proper ratio exists. Deviations of plus or minus five percent are acceptable. If deviations of more than five percent are noted, corrective measures should be taken. Seal holes in duct with duct tape or suitable sealant.
d. With sash(es) in the open position, check air flow into the fume hood using a cotton swab dipped in titanium tetrachloride or other smoke source. A complete traverse of the fume hood face should verify that airflow is into the fume hood over the entire face area. A reverse flow of air indicates unsafe fume hood operation.
e. Move a lighted smoke candle throughout the fume hood work area, directing smoke across the work surface and against the sidewalls and baffle. Smoke should be contained within the fume hood and be rapidly exhausted. Fume hoods with horizontal sliding sash(es) will show reverse flow and turbulence behind sash panel, but no outflow of smoke shall be evident.

7.2.6 Evaluation of Low Air Flow Monitor

a. On fume hoods with low flow warning devices, verify that monitor functions properly and indicates unsafe conditions.

APPENDIX B **– LINER PERFORMANCE REQUIREMENTS**

	POLYGLASS	PVC	POLYPROPYLENE	EPOXY RESIN	304 SS	316 SS
HYDROCHLORIC ACID 35%	0	0	0	0	4	4
HYDROFLUORIC ACID	1	0	0	3	4	4
PHOSPHORIC ACID 80%	0	0	0	0	1	1
NITRIC ACID 35%	0	0	0	0	0	0
SULFURIC 70%	0	0	0	0	2	3
ACETIC ACID	1	0	0	0	1	1
SODIUM HYDROXIDE 20%	0	0	0	2	0	0
ACETONE	0	1	1	0	0	0
ETHANOL	0	0	0	0	0	0
METHANOL	0	0	0	0	0	0
MEK	0	1	1	0	0	0
GASOLINE	0	0	0	0	0	0
CARBON TETRACHLORIDE	0	0	1	0	0	0
FORMALIN 35%	0	1	0	0	0	0
XYLENE	1	1	1	0	0	0

0 = NO EFFECT 1 = EXCELLENT 2 = GOOD 3 = FAIR 4 = FAILURE

No effect: No detectable change in working surface material.

Excellent: Slight detectable change in color or gloss, but no change to the function or life of the working surface material.

Good: A clearly discernable change in color or gloss, but no significant impairment of working surface function or life.

Fair: Objectionable change in appearance due to surface discoloration or etch, possibly resulting in deterioration of function over a period of time.

Failure: Pitting, cratering or erosion of working surface material. Obvious and significant deterioration.

APPENDIX C – WORK SURFACE PERFORMANCE REQUIREMENTS

A. CHEMICAL RESISTANCE OF EPOXY RESIN WORKTOP (BLACK):

Reagent	Results
Acetate, Ethyl	Excellent
Acetic Acid, 5%	No Effect
Acetic Acid, Glacial	No Effect
Acetone	Excellent
Alcohol, Ethyl, 95%	No Effect
Alcohol, Methyl	No Effect
Ammonium Hydroxide, 10%	No Effect
Aniline	No Effect
Benzene	Excellent
Carbon Tetrachloride	No Effect
Chromic Acid, 40%	Good
Citric Acid, 1%	No Effect
Diethyl Ether	Excellent
Dimethylformanide	No Effect
Ethylene Dichloride	Excellent
Heptane	No Effect
Hydrochloric Acid, 10%	No Effect
Hydrochloric Acid, 37%	No Effect
Isooctane	No Effect
Kerosene	No Effect
Mineral Oil	No Effect
Nitric Acid, 40%	No Effect
Nitric Acid, 70%	No Effect
Oleic Acid	No Effect
Olive Oil	No Effect
Phenol Solution, 5%	Excellent
Soap Solution, 1%	No Effect
Sodium Carbonate Solution, 20%	No Effect
Sodium Hydroxide Solution, 60%	No Effect
Sodium Hypochlorite Solution, 4%	No Effect

Sulfuric Acid, 60%	Excellent
Sulfuric Acid, 96%	Failure
Toluene	No Effect
Transformer Oil	No Effect
Turpentine	No Effect

Test results above are for black material. Other colors of epoxy resin may have slightly different results.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify all equipment rough-in conditions and requirements.

B. Coordinate with other trades for the proper and correct installation of plumbing and electrical rough-in, structural backing for items attached to walls, and for rough opening dimensions required for the installation of products in this section.

C. Examine substrate surfaces and associated work and conditions under which work will be installed. Do not proceed until unsatisfactory conditions have been corrected in a manner complying with the Contract Documents and acceptable to the Installer. Starting of work within a particular area will be construed as installer's acceptance of surface conditions.

3.2 INSTALLATION

A. General Requirements

1. Install in accordance with manufacturer's instructions and in accordance with standards required by the governing codes.

2. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

3. Touch-up minor damaged surfaces caused during installation. Replace damaged components as directed by Architect.

4. Equipment in this section shall be installed with all necessary fittings mounted for final connection by Divisions 15 and 16.

B. Casework Installation

1. Install plumb, level, true and straight with no distortions. Shim as required, using concealed shims. Where laboratory casework abuts other finished work, scribe and apply filler strips for accurate fit with fasteners concealed where practicable.
2. Base cabinets: Set cabinets straight, plumb, and level. Adjust set tops within 1/16" of a single plane. Fasten each individual cabinet to floor at toe space, with fasteners spaced 24" O.C. Bolt continuous cabinets together with joints flush, tight and uniform, and with alignment of adjacent units within 1/16" tolerances. Secure individual cabinets with not less than 2 fasteners into floor, where they do not adjoin other cabinets.

C. Countertop Installation

1. Where required due to field conditions, scribe to abutting surfaces.

2. Field jointing: Only factory prepared field joints, located per approved shop drawings, shall be permitted. Secure joints in field, where practicable, in same manner as in factory, with dowels, splines, adhesives, or fasteners recommended by manufacturer. Locate field joints as shown on accepted shop-drawings, factory prepared so there is no jobsite processing of top and edge surfaces.

3. Secure work surfaces to casework and equipment components with material and procedures recommended by the manufacturer.

4. Fastenings: Use concealed clamping devices for field joints, except for natural stone, composition stone, and epoxy tops, located within 6" of front, at back edges and at intervals not exceeding 24". Tighten in accordance with manufacturer's instructions to exert a constant, heavy clamping pressure at joints. Except for natural stone, composition stone and epoxy tops, secure tops to cabinets with "Z" type fasteners or equivalent, using 2 or more fasteners at each front, end, and back.
    a. For epoxy tops, secure to cabinets with epoxy cement applied at each corner and along perimeter edges of not more than 48" O.C.

5. Workmanship: Abut top and edge surfaces in one true plane, with internal

supports placed to prevent any deflection. Provide flush hairline joints in top units using clamping devices. At joints, use manufacturer's recommended adhesives and holding devices to provide joint widths not more than 1/16" wide at any location, completely field and flush with abutting edges. .

a. Where necessary to penetrate tops with fasteners, countersink heads approximately 1/8" and plugholes flush with material equal in chemical resistance, color, hardness, and texture to top surface.
b. After installation, carefully dress joints smooth, remove any surface scratches, clean and polish entire surface.
c. Provide holes and cutouts as required for mechanical and electrical service fixtures.
d. Provide scribe mountings for closures at junctures of top, curb and splash with walls as recommended by manufacturer for materials involved. Use chemical resistant, permanently elastic sealing compound where recommended by manufacturer.

3.3 ADJUSTING

A. Adjust operating equipment, with the exception of air-moving equipment, to efficient operation for its intended use, and as required by the manufacturer.

B. Make final adjustments to laboratory casework, including doors, drawer hardware, fixtures and other moving or operating parts to ensure proper and smooth operation.

C. Adjust fume hood sashes, fixtures, accessories and other moving or operating parts to function smoothly

3.4 CLEANING

A. Clean equipment, casework, countertops and all other surfaces as recommended by the manufacturer to a new and unused appearance. Touch up as required.

B. Clean adjacent construction and all surfaces soiled in the course of installation of work in this section.

C. Clean countertops with diluted dishwashing liquid and water leaving tops free of all grease and streaks. Use no wax or oils.

3.5 PROTECTION OF FINISHED WORK

A. Provide all necessary protective measures to prevent exposure of equipment and surfaces to other construction activity and all other sources of potential damage.

3.3 DEMONSTRATION

A. Provide systems training and demonstration of all equipment operations, functions and calibration process for at least 8 hours.

B. Fume hoods: Following successful field testing of fume hoods, fully demonstrate fume hood operation, including sash operation, plumbing and electrical service fixture and fitting operation, and operation of the fume hood warning and alarm system.

C. Training of the Owner's operation and maintenance personnel is required in cooperation with the Commissioning Consultant. A training agenda shall be prepared by the Contractor and approved by the Owner prior to training performance

END OF SECTION 12345

SECTION 11600

LABORATORY EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The provisions of the Contract Documents apply to this Section.

1.2 SUMMARIES

A. Provide all laboratory equipment as indicated.

B. Equipment items specified in this section include the following:

1. Task Exhaust Units – Ceiling Mounted
2. Safety Supply Cabinet
3. First Aid Kit
4. Burn Kit
5. Laboratory Coat Hooks
6. Fire Blanket
7. Overhead Ceiling Mounted Light and Camera Track
8. Overhead Blackout Curtain and Track
9. Biological Drying Cabinets

1.3 RELATED DOCUMENTS

A. Section 12345: Laboratory Casework, Fixtures, Fume Hoods and Accessories

B. Division 6: Blocking and backing in walls for anchorage of equipment.

C. Refer to Divisions 15 and 16 and the mechanical and electrical drawings for related plumbing, mechanical and electrical work.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.

1.5 SUBMITTALS

A. Submit under provisions Division 1, General Requirements.

B. Product Data: Provide manufacturer's technical data, including equipment dimensions and construction, equipment capacities, physical dimensions, utility and service requirements and locations, point loads and factory finishes.

C. Manufacturer's Installation Instructions: Indicate special installation requirements.

D. Shop Drawings: Indicate equipment locations, large-scale plans, elevations, cross sections, details, plumbing and electrical rough in and anchor placement dimensions and tolerances and clearances required.

E. Coordination drawings: Equipment shall be fully coordinated with lab casework and other lab equipment. Prepare a coordination drawing showing locations of surrounding casework and equipment, and required clearances between them.

1.6 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

1.7 QUALITY ASSURANCE

A. Installers: Installation of the equipment specified under this section shall be undertaken by the manufacturer's crew of installers, or a crew of installers who are approved in writing by the manufacturer. In either case, the installation of equipment specified under this section shall remain the responsibility of the manufacturer as a subcontractor to the general contractor.

1.8 CLOSEOUT SUBMITTALS: OPERATION AND MAINTENANCE DATA

A. Submit information in bound manual form, typed or computer word processed on 8-1/2" x 11" paper.

B. Operation Data: Include description of equipment operation, adjusting and testing required.

C. Maintenance Data: Identify system maintenance requirements, servicing cycles and spare part sources.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products on the in such a manner as to prevent damage, decay, deterioration or loss from theft.

B. All products shall be delivered to the job site in manufacturer's original unopened containers, crates or protective wrappings with the manufacturer's name and address clearly labeled.

C. Accept products on site and inspect for damage on arrival.

1.10 WARRANTY

A. Provide minimum one (1) year warranty or Manufacturer's standard warranty, whichever is greater, for products specified.

PART 2 - PRODUCTS

2.1 ACCEPTABLE PRODUCTS

A. Subject to compliance with these specifications, acceptable products include, but are not limited to, those items indicated in Section 2.2, under each individual product. Products by other manufacturers submitted as equivalents will be reviewed for conformance with the specifications.

2.2 LABORATORY EQUIPMENT

A. General Requirements

1. All material and equipment specified under this section shall be designed and constructed specifically for use in laboratory environments. Manufactured equipment units must meet or exceed applicable performance, reference and certification standards.

2. Dimensions, capacities and specific requirements are nominal, and may vary depending on the manufacturer.

B. Articulating Task Exhaust Units (100CFM)- Ceiling mounted, local extractor with articulating joints, Terfu, by Movex, Inc., Bath, PA, or approved equivalent.

1. General: Provide and install units as shown on the drawings. Diameter of sections shall be 4". Total reach of flexible arms shall be to a point 34" above finished floor. Provide appropriate MTI-125 and/or MTI CT-125 ceiling brackets to suit for the task exhaust mounting height of 84" (88") above finished floor (Verify in field.). Flat screen hood shall be movable around the work surface, and may be placed stationary at any location. Units shall include a damper control mechanism. Exact location of ceiling mount shall be located and coordinated by the Architect and laboratory equipment subcontractor.

2. Equipment supplier shall be responsible for all interfacing steel above the ceiling for the support and anchorage of the task exhaust unit.

3. Materials: Arm pipes shall be manufactured of Anodized Aluminum (SS4104).

4. Exhaust system: Task exhaust units shall be ducted to the building exhaust system as indicated in the mechanical drawings or as recommended by the manufacturer. Extend duct, concealed above ceiling to the laboratory exhaust system as indicated in mechanical drawings. Laboratory equipment subcontractor shall provide a coordination drawing showing optimum ducting arrangements. Exhaust airflow at hood shall be 75 to 100 CFM.

5. Local controls: Each unit shall be provided with a damper to control exhaust rates individually.

6. Electrical: Light fixture Movex model, MB250, hardwired to building electrical system in a concealed fashion. Provide ample wiring (minimum of 6') with units to enable unit to be hardwired in a concealed fashion to a junction box above the ceiling.

7. Accessories: Provide each task exhaust unit with two hood units, funnel head of powder-coated aluminum. These hoods are to be easily interchanged by lab staff to suit their particular needs. Additionally, provide ceiling bracket and all other required mounting devices for a complete and operational installation.

8. Task exhaust unit shall be seismically anchored as required by local codes.

9. Interfacing Steel: The manufacturer shall provide all interfacing steel for the proper support and anchorage of the task exhaust systems to the building structure above. Provide as part of shop drawings a coordination drawing showing all required blocking and interfacing steel, concealed in ceiling and walls, for the support and anchorage of all studio lighting systems and related components.

10. Ceiling bracket: 40" standard mounting bracket. Also, provide escutcheon plate at the ceiling penetration. Installation shall have all duct connections located above ceiling with no flex duct visible in the room.

C. Safety Supply Cabinet - Basis of specification: Karp Associates Inc. Products of Acudor or Bobrick, provided they comply with features listed below, will be considered acceptable.

1. Model: Customized version of Karp KRVB Valve Box

2. Features:
   a) Size: Inside box dimensions: 12"h x 12" w x 8" d
   b) Style: fully recessed, with overlapping trim, door flush with trim.
   c) Single flat door.
      1. Door material: solid panel, 14 gauge stainless steel, satin finished.
      2. Flush mounted paddle handle, finished to match door
      3. Hinge: concealed piano hinge
   d) Trim: Same material and finish as door, arc welded and ground smooth.
   e) Signage shall read: Safety Supply Cabinet
   f) Box interior finish: Stainless steel sheet, satin finish.
   g) Provide 1/4" diameter holes inside box on 4 sides for mounting in laboratory casework.
   h) Install one (1) first aid kit and one (1) burn kit in each safety supply cabinet.
   i) Quantity of safety supply cabinets: One (1) in Chemical Lab, One and as indicated on drawings and schedules.

D. First Aid Kit - Manufacturer: Johnson & Johnson, or equivalent products of Lab Safety Supply or Fisher Scientific. Product: Small Industrial First Aid Kit Product No. 1A- 3115 -3. Supplier: Lab Safety Supply 800-356-0783; website: LSS.com. Size 7.625" x 10.5" x 2.125." This is to be placed inside the Safety Supply Cabinet.

E. Burn Kit - Manufacturer: WATERJEL Technologies, , or equivalent products of Lab Safety Supply or Fisher Scientific. Product: Food Service Kit. Product No. 1A-30938. Supplier: Lab Safety Supply 800-356-0783; website: LSS.com. Size: 10" x 7" x 3". This is to be placed inside the Safety Supply Cabinet.

F. Laboratory Coat Hook Strips - Manufacturer: Bobrick Washroom Equipment, or equal products by America Specialties or Bradley Corporation.

1. Coat Hook: Model No. B-232 x 36 Hook Strip.
   a) Stainless steel with bright polish finish
   b) Quantity: where shown on drawings

G. Fire Blanket - Provide one (1) wall mounted fire blanket in a vertical steel cabinet, 6"W x 6" FB x 60"H beside all emergency eyewash / shower units. Full front of cabinet shall be hinged on one side. Fire blanket shall be installed in cabinet, hanging full-length such that the blanket can be easily pulled fully open from the cabinet.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify equipment rough in before proceeding with the work in this section.

B. Coordinate with other trades for the proper and correct installation of plumbing, mechanical and electrical rough in, and for rough opening dimensions required for the installation of products in this section.

C. Examine substrate surfaces and associated work and conditions under which work will be installed. Do not proceed until unsatisfactory conditions have been corrected in a manner complying with the Contract Documents and acceptable to the installer. Starting of work within a particular area will be construed as installer's acceptance of surface conditions.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with standards required by authority having jurisdiction.

C. Anchor equipment securely in place where required.

D. Touch-up minor damaged surfaces caused during installation. Replace damaged components as directed by Architect.

E. Equipment in this section shall be installed with all necessary fittings mounted for final connection by Divisions 15 and 16.

3.3 ADJUSTING

A. Adjust operating equipment to efficient operation for its intended use, and as required by the manufacturer.

3.4 DEMONSTRATION

A. Provide systems training and demonstration video for operation of task exhauster.

END OF SECTION 11600

SECTION 15010

BASIC MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section

B. Section Includes:

1. This section provides the basic mechanical requirements that apply to the Work of Division 15.

C. Related Sections:

1. Division 16: Electrical.

1.02 REGULATORY REQUIREMENTS

A. Current federal Safe Drinking Water Act (SDWA) regulations and AB 1953 require the furnishing of lead-free pipe, solder, and flux in the installation or repair of plumbing in non-residential facilities connected to public drinking water systems.

1. Provide lead-free water pipe, solder, and flux materials that meet the standards as outlined by the federal SDWA regulations and AB 1953.

2. Collect pipe, solder, and flux material samples as required by the IOR. Test samples shall be delivered to an Owner designated testing laboratory for testing of lead content.

a. Test samples for lead content by the atomic absorption spectrophotometry method.

3. Materials found not conforming to SDWA regulations and AB 1953 shall be deemed defective Work and shall be replaced with lead-free materials.

4. Comprehensive testing of the remaining materials for their lead content shall be performed as required by the IOR.

B. Workmanship, materials, equipment, and installation shall comply with industry standards and code requirements. Where manufacturer's recommendations exceed industry standards, the manufacturer's recommendation shall establish the minimum standard. As a minimum, standards from the following organizations shall apply:

1. AMCA - Air Moving and Conditioning Association.

2. ANSI - American National Standards Institute.

3. ASME - American Society of Mechanical Engineers.

a. Boiler and Pressure Codes.

b. Code for Pressure Piping.

4. ARI - Air Conditioning Refrigeration Institute.

5. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers.

6. ASTM - American Society for Testing and Materials.

a. ASTM A53 Specification for Welded and Seamless Pipe.

7. AWA - American Waterworks Association.

8. FMG - Factory Mutual Global.

9. IAPMO - International Association of Plumbing and Mechanical Officials.

10. NFPA - National Fire Protection Association.

11. OSHA - Occupational Safety and Health Administration.

12. SMACNA - Sheet Metal and Air Conditioning Contractors National Association, Inc.

13. UL - Underwriters Laboratories.

C. Workmanship, materials, equipment, and installation shall comply with federal, state, and local codes including, but not limited to, the following:

1. UBC, CMC, and CPC - latest edition as adopted by the City of Los Angeles, the County of Los Angeles, and the State of California including amendments effective on the Effective Date of the Contract.

2. California Code of Regulations, Title 8, Industrial Relations, Division 1, Chapter 4, Division of Industrial Safety.

3. California Building Code (CBC).

4. OSHA - Occupational Safety and Health Administration.

5. Department of Health.

6. South Coast Air Quality Management District.

D. Specifications or Drawings shall not be construed to permit deviation from the requirements of governing codes unless approval has been obtained from legally constituted authorities having jurisdiction, and the Architect. The Contract Documents may contain more stringent requirements than those legally required.

E. Permits and Fees: Refer to the General and Supplementary Conditions.

1.03 SUBMITTALS

A. Provide submittals in accordance with Section 01300 and with specific requirements of Division 15 sections, as applicable.

B. Submit materials for potable water systems as required by the IOR.

C. Submit the following:

1. Complete materials list of items to be furnished and installed under this Division.

2. Shop Drawings, as required.

3. Manufacturer's specifications and other Product Data to demonstrate compliance with specified requirements.

4. Manufacturer's printed installation instructions.

5. Catalog cut sheets.

D. After Architect's approval, the above information shall become the basis for inspecting and testing materials and actual installation procedures performed in the Work.

E. Shop Drawings: Submit one additional copy when control diagrams having line voltage connections are indicated. Shop Drawings shall be specifically prepared for the Work of this Project. Drawings prepared in AutoCAD Release 2000 format may be provided by the Architect to serve as a background for the Shop Drawings. Shop Drawings shall be in AutoCAD, shall comply with the requirements of Section 01100 Coordination and Section 01300 Submittals and shall indicate at a minimum:

1. Complete system layout of equipment, components, ductwork, and piping, indicating service clearances, duct and pipe sizes, fitting types and sizes, top or bottom of duct and pipe elevations, distances of ducts, pipes and equipment from building reference points and hanger / support locations. All the above items shall be coordinated on the shop drawings according to the requirements of Section 01100.

2. Schedule and description of equipment, ductwork, piping, fittings, valves, dampers, and controllers.

1.04 PROJECT RECORD DOCUMENTS

A. Comply with provisions of Section 01700: Contract Closeout.

B. Project Record Drawings:

1. Provide a complete set mechanical, plumbing, fire protection and control system drawings in AutoCAD Release 2000 or higher format, complete with external reference drawings, fonts, blocks and plotter pen color/line thickness settings on CD-ROM. Also submit one set of full size reproducible plots on vellum and 3 sets of prints.

2. Before Contract Completion, deliver corrected and completed prints to the OAR. Delivery of project record documents to the OAR does not relinquish responsibility of furnishing required information omitted from project record documents.

C. Operation and Maintenance Manuals:

1. Submit 2 copies of operation and maintenance manuals in required form and content. If no revisions are required, furnish one additional copy. If revisions are required, one copy shall be returned with instructions for changes; perform such changes and return 3 copies of manuals. Manuals shall be bound in hardback, 3-ring, loose-leaf binders. Deliver manuals to the OAR. Submit an electronic copy of the entire manual in Adobe Acrobat (PDF file) format.

2. Contents of Manual:

   a. Title sheet with Project name, including names, addresses and telephone number of Contractor, installer, and related equipment suppliers.

   b. Manufacturer's operating instructions including, but not limited to, the following:

      1) Identification of components and controls.

      2) Pre-start checklist and start-up procedures.

      3) Normal operation settings and checklists.

      4) Pre-shut down checklist and shut down procedures.

      5) Trouble shooting checklist and guidelines.

      6) Recommendations for optimum performance.

      7) Warnings and safety precautions on improper or hazardous operational procedures or conditions

   c. Manufacturer's product data and parts and maintenance booklet for each item of equipment furnished under Division 15 that includes the following as a minimum:

      1) Manufacturer's model, identification and serial numbers.

      2) Exploded view of assembly drawings identifying each component or part with the relevant part number.

      3) Directory of manufacturer's representatives, service contractors and part distributors.

      4) Maintenance and trouble-shooting instructions, including schedule for preventive maintenance, periodic inspection and cleaning criteria.

   d. Project Record Drawings: Complete set of mechanical, plumbing, fire protection and control system drawings in 50 percent reduced print format shall be furnished with the manual. Submit the above record drawings on CD-ROM in AutoCAD Release 2000 or higher format, complete with external reference drawings, fonts, blocks, and plotter pen color/line thickness settings.

   e. Test and balance reports: Submit as specified in Section 01450.

f. South Coast Air Quality Management District (SCAQMD) permits to install and operate boilers, water heaters and other fuel burning equipment and third-party source test reports as required by SCAQMD to allow start-up and operation of equipment.

g. Los Angeles County industrial waste permits.

h. Valve directory complete with location, function, size, and model of each valve with reference to the project record drawings.

i. Equipment and component identification chart complete with location, function, size, and model of each equipment or component with reference to the project record drawings.

1.05 PROTECTION, CARE AND CLEANING

A. In addition to storage criteria of the General Conditions, and provisions under Section 01500: Construction Facilities and Temporary Controls, the following shall be provided:

1. Provide for the safety and good condition of materials and equipment until Substantial Completion. Protect materials and equipment from damage.

2. Protect installed Work.

3. Replacements: In case of damage, immediately provide repairs and/or replacements as required.

4. Protect covering for bearings, open connections to tanks, pipe coils, pumps, compressors and similar equipment.

5. Interior of ductwork shall be maintained free of dirt, grit, dust, loose insulation, and other foreign materials.

6. Air handling equipment shall not be operated until building is cleaned and air filters are installed.

7. Fixtures, piping, finished brass or bronze, and equipment shall have grease, adhesive, labels, and foreign materials removed. Chromium, nickel plate, polished bronze or brass Work shall be polished. Glass shall be cleaned inside and out.

8. Before initial start-up and again before Substantial Completion, piping shall be drained and flushed to completely remove grease and foreign matter. Pressure regulating assemblies, traps, strainers, boilers, flush valves, and similar items shall be thoroughly cleaned. Tag system with an information tag listing responsible party and date of element, before initial start-up and again before Substantial Completion. Compressed air, oil, and gas piping shall be blown out with oil-free compressed air or inert gas. Refrigerant piping shall be cleaned as specified.

1.06 COORDINATION

A. Contract Documents indicate extent and general arrangement of Work under Division 15. Contractor shall coordinate work in accordance with Section 01100 requirements and make adjustments as required to provide maximum headroom, a neat arrangement to keep passageways and openings clear to provide accessibility and provisions for maintenance, and to meet code requirements without further instructions or extra cost to the Owner.

B. Refer to Section 01100 to coordinate mechanical Work with Work of other Divisions.

C. Check with other divisions of the work so that no interferences shall occur and in order that grade lines may be established for the work. No extras will be allowed for changes made necessary by interference with the work of other trades.

D. For purposes of clarity and legibility, the drawings are essentially diagrammatic and although size and location or equipment is drawn to scale wherever possible, Contractor shall make use of all data in all of the contract documents and verify this information at building site. Contractor shall fully inform himself regarding the peculiarities and limitations of the spaces available for the installation of work and materials furnished under this Division. Drawings indicate required size and termination of pipes and ducts and suggest proper routes of piping and duct to conform to the structure, to avoid obstructions and to preserve clearance. However, it is not the intention to indicate all necessary offsets and it shall be the responsibility under this section to install ductwork and piping in such a manner as to conform to structure, avoid obstructions, preserve headroom. Keep openings and passageways clear and make all equipment requiring inspection, maintenance and repair, accessible without further instructions or extra cost to the Owner.

1.07 DELIVERY, STORAGE AND HANDLING

A. Delivery and Storage: Deliver materials to Project site in their original unopened containers with labels intact and legible at time of delivery. Store in strict accordance with manufacturer's recommendations.

B. Do not store plastic pipe or materials in direct sunlight.

1.08 PRELIMINARY OPERATION

A. OAR may require any portion of mechanical Work to be operated before Substantial Completion. Such operation shall be in addition to regular tests, demonstrations and instructions required under the Contract Documents, and shall be performed as required.

B. Notify the IOR at least 24 hours in advance of lighting or re-lighting pilots.

1.09 TRAINING OF OWNER PERSONNEL

A. Training of Owner's personnel shall include:

1. A minimum of 4 hours of on-site overview of the overall Mechanical System.

2. Refer to Division 15 sections for specific training on each of the components of the Mechanical System.

B. Contract shall include the cost of training Owner operation and maintenance personnel in operating, adjusting, maintenance, trouble-shooting, and Project site repair of each component, equipment, or system provided under this Contract as indicated in each section of Division 15.

C. Operational and maintenance training shall be conducted on the Project site, unless indicated otherwise.

D. Upon completion of Owner training, a completion certificate indicating the nature of the training and a description of the systems, complete with equipment and component lists shall be issued to each trainee. The certificate should be issued in duplicate with one copy retained by OAR. Submit attendance sheet to Owner listing all personnel trained.

1.10 GUARANTEES AND DAMAGE RESPONSIBILITY

A. Sound of water flowing in piping shall not be transmitted to building structure. Operation of mechanical system shall not produce operational sounds that can be heard outside of rooms enclosing apparatus or equipment.

B. Unit heaters, unit ventilators, unit air conditioners and fans, and distribution systems shall be warranted by their manufacturers to operate without undue noise of more than 50 decibels on the A scale, measured 10 feet away from the unit unless otherwise specified. Perform adjustments or required corrective actions to meet these standards without reducing flow quantities specified in the Contract Documents.

PART 2 – PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Unless otherwise specified, materials and equipment shall be new, in good and clean condition. Equipment, materials, and components shall be of the make; type and model number noted on Drawings or specified. Pieces of equipment of the same type shall be by the same manufacturer.

B. Whenever an item is listed by a single proprietary name, with or without model number and type, it shall be for purpose of design only, to indicate characteristics and quality desired. Proprietary designation listed on Drawings, or listed first in Specifications, is used as a basis for design to establish a standard for quality and performance and space requirements.

C. HVAC equipment products from different manufacturers are never identical. Equipment approved as being equal is interpreted as being equivalent in capacity, performance and quality. The dimensions, weight, configuration and utility requirements could be quite different from the equipment used as the basis of design. Due to these differences, additional coordination and adjustments by the Contractor are required. For the equipment to be deemed truly equal, the additional coordination and adjustments by the Contractor should not incur any additional cost to the Owner and any additional labor to the design team.

D. Equipment and materials indicated or required to be installed outdoors shall be of the type that is designed, manufactured, listed or approved by authorities having jurisdiction for outdoor installation by being resistant to the adverse effects of weather. All the additional protective measures against outdoor weather required by the manufacturers' installation instructions and prevalent practice shall be provided.

E. For substitution of materials or products, refer to the General Conditions.

PART 3 – EXECUTION

3.01 SERVICE INTERRUPTIONS, OFF-SITE, GAS AND WATER

A. Schedule Work so there shall be no service interruptions of existing systems or systems during normal hours of operation of affected systems and/or facilities.

B. When service interruptions are mandatory, arrange in advance with the OAR as to time and date of such interruptions.

C. Systems, which are interrupted, shall be returned back into operation in such manner that they will function as originally intended.

3.02 CUTTING, NOTCHING AND BACKING

A. Where pipes or ducts pass through, or are located within one inch of any construction element, install a resilient pad, 1/2 inch thick minimum, to prevent contact.

B. Furnish all necessary provisions for recesses, chases, accesses, and provide blocking and backing as necessary for proper reception and installation of mechanical Work.

3.03 LOCATION OF PIPING AND EQUIPMENT

A. Location of piping, apparatus, and equipment as indicated on Drawings is approximate and shall be altered to avoid obstructions, preserve headroom and provide free and clear openings and passageways.

B. Place equipment in locations and spaces indicated, disassemble and/or reassemble equipment as required by Project conditions.

3.04 TESTS AND TESTING

A. Tests shall be as required under the applicable sections of Division 15, including this section.

B. Tests required by other sections of the Contract Documents include the following:

1. Test and balance of mechanical equipment and systems: Refer to Section 01450: Test and Balance

2. Hydrostatic test of boilers: Refer to Section 01450: Test and Balance

3. Test of smoke and fire detectors: Refer to Division 16: Electrical

C. Additional tests may be required in the case of products, materials, and equipment if:

1. Submitted items are altered, changed, or cannot be determined as exactly conforming to the Contract Documents.

2. Performance testing and results may also be required on certain items which are as specified, including fan, and pump performance.

D. Piping Tests:

1. Perform tests required to demonstrate that operation of mechanical systems and their parts are in accordance with Specifications covering each item or system, and furnish materials, instruments and equipment necessary to conduct such tests. Tests shall be performed in presence of the IOR, and representatives of any governmental agency having jurisdiction. Work shall not be concealed or covered until required results are provided.

2. If required tests are not performed, Owner may provide in accordance with the Contract Documents.

3. Pressure gauges furnished in testing shall comply with CPC. Air shall be bled from lines requiring hydrostatic or water tests.

4. Systems shall be pressure-tested in accordance with pipe testing schedule below. Pipe test shall indicate no loss in pressure after a minimum duration of 4 hours at test pressures indicated. Where local codes require higher test pressures than specified herein for fire sprinkler systems, local codes shall govern.

5. Fuel gas lines shall be first tested with piping exposed, before backfilling trenches or lathing; second with piping in finished arrangement, backfilled and paved where required, and walls finished.

6. Refrigerant piping may be tested with a halide detector or calibrated electronic testing equipment.

7. Piping systems may be tested as a unit or in sections, but entire system shall successfully meet requirements specified herein, before final testing by the IOR.

8. Repair of damage to pipes and their appurtenances or to any other structures resulting from or caused by these tests, shall be provided.

F. Equipment Performance Assurance Tests:

1. Before operating any equipment or systems, a thorough check shall be performed to determine that systems have been flushed and cleaned as required and that equipment has been properly installed, aligned, lubricated, and serviced. Factory instructions shall be checked to verify installations have been completed; recommended lubricants have been installed in bearings, gearboxes, crankcases, and similar equipment. Particular care shall be furnished in lubricating bearings to avoid damage by over-lubrication and blowing out seals. Equipment shall also be checked for damage that may have occurred during shipment, after delivery, or during installation. Damaged equipment, products, and/or materials shall be replaced or repaired as required.

2. Upon completion of the above, adjust the system settings to within normal operating conditions to prevent the system from being damaged upon start-up.

3. Run-test the equipment after start-up for five consecutive days. Tests shall include operation of heating, ventilating, and air conditioning equipment and systems for a period of not less than two 8 hour periods at 90 percent of the full specified heating and

cooling capacities. If equipment passes, install new filters. If equipment fails, it shall be adjusted and retested until system meets all applicable codes.

4. Equipment Start-up Reports: For each equipment or system on which start-up is performed, submit 8 copies of start-up report for review by the Architect.

   a. The start-up report shall include the manufacturer's standard start-up form completed and signed by the start-up technician.

5. Provide, maintain, and pay costs for equipment, instruments, and operating personnel as required for specified tests.

6. Provide electric energy and fuel required for tests.

7. Final adjustment to equipment or systems shall meet specified performance requirements.

8. Equipment, systems, or Work deemed defective during testing shall be replaced or corrected as required. Test until satisfactory results are provided.

G. Specific Coordinated Plan for Test & Balance:

1. Provide a narrative of the operational intent that clearly describes the function and sequence of operation of each component, equipment, or system installed. Instruct designated Owner personnel in the operation of the installed systems.

2. Prior to final test and balance, mechanical equipment and systems shall be operated and tested as indicated in Article F above to demonstrate satisfactory overall operation of the installed systems.

3. Tests shall commence after preliminary balancing, adjustments to equipment and systems have been completed, and operating equipment has been checked and thoroughly lubricated.

4. Immediately before starting tests, air filter media shall be cleaned or renewed. Roll-type filters shall be advanced to provide new clean media. Cleanable type media shall be thoroughly cleaned and re-oiled with new, clean oil as recommended by manufacturer if they are of viscous impingement type. Disposable type filters shall be replaced with new filters. Replaceable media shall be replaced with new media.

5. An accurate means of measuring air flow and temperatures shall be furnished to balance air supply, return, and exhaust systems so uniform temperatures occur in every room and design airflow is obtained through registers, diffusers, and grilles.

6. Systems shall be adjusted to provide airflows indicated including maximum fresh air and maximum return air. Dampers shall be checked for proper settings and operation. Air and water inlet and leaving temperatures at coils shall be checked. Complete operational data including airflows, room temperatures, fan speeds, motor currents, plenum, and duct static pressures shall be tabulated.

7. Welding performed as part of this Division may be subject to radiographic inspections at random in accordance with requirements specified in Section 15050: Basic Mechanical Materials and Methods.

3.05 NOISE AND VIBRATION REDUCTION

A. Correct noise or vibration caused by mechanical systems. Provide all necessary adjustments to specified and installed equipment and accessories to reduce noise to the lowest possible level

B. Correct noise or vibration problems caused by failure to install work in accordance with Contract Documents. Include all labor and materials required as a result of such failure. Pay for re-testing of corrected noise or vibration problems by the project acoustical consultant including travel, lodging, test equipment expenses, etc.

END OF SECTION

SECTION 15050
BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section

B. Section Includes:

1. This Section prescribes basic materials and methods generally common to the Work of Division 15.

C. Related Sections:

1. Section 01000: General Requirements

2. Division 15: Mechanical.

3. Division 16: Electrical.

1.02 SUBMITTALS

A. Provide in accordance with Division 01, Section 15010 and specific requirements of each section of Division 15.

1.03 QUALITY ASSURANCE

A. Standards: Comply with applicable national, state, and local codes and standards: ASTM, ASME, ANSI. Federal Specifications, AWWA, SISPI, NFPA, FM, UL, CPC California Plumbing Code, CMC, CSA.

B. Qualifications 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 as reviewed by the Architect.

C. No pipe, pipe fittings, or any other fitting or fixture intended to convey or dispense water for human consumption by drinking or cooking is allowed in the domestic plumbing system, if they do not meet the low lead definition of AB 1953. Weighted average lead content of the wetted surface area of pipes, fittings and fixtures may not exceed 0.25%.

1.04 COORDINATION

A. Coordinate related Work in accordance with provisions of Section 01100: Coordination.

PART 2 - PRODUCTS

2.01 GENERAL

A. Provide the following products if they are indicated in the Contract Documents or if they are required for the proper installation, function or operation of equipment, systems or components indicated in the Contract Document.

B. Provide the following products as a complete assembly with required accessories for a complete and functioning entity in compliance with governing codes and applicable standards as specified in Section 15010, manufacturer's instructions or as required.

1. Omission of minor details in the Contract Documents does not waive and/or otherwise relinquish compliance with the above requirements.

2.02 MANUFACTURERS AND MATERIALS

A. Ball Valves: Bronze, 2 inches and smaller:

BV-1 Class 150, 600 psi, CWP, 2 piece construction reinforced Teflon seats, Full port, adjustable packing gland, stainless ball and stem, threaded ends.

Hammond 8303A, Nibco T585-7066, Milwaukee BA400S or equal.

APPLICATION: Shut-off and isolation of small pipe application for compressed air, chilled water and condenser water systems. Recommended for frequent operation readily adaptable to automation, ideal for installation where space is limited. Provide at air compressor discharge line, discharge side of air receiver, compressed air outlets in shop buildings.

BV-1A Class 150, 600 psi, CWP 2 piece construction with reinforced TFE seats, full port, adjustable packing gland, (no threaded stem designs allowed), threaded ends.

NIBCO T-685-80-LF, Hammond UP-8303A, Mailwaukee UPBA-400 or equal.

NIBCO T585 S6R66 (Stainless Steel), Milwaukee BA-260 (Stainless Steel).

APPLICATION: BV-1A shall be used on domestic hot and cold water systems

BV-2 Class 150, 600 psi CWP, 2-piece construction, bronze body, reinforced Teflon seats, adjustable packing gland, (no threaded stem designs allowed), threaded ends.

Hammond 8301A, NIBCO T-585-70, Mailwaukee BA-400 or equal.

Ball Valves in Insulated Piping: Use extended operating handle of non-thermal conducive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation and memory stops that are fully adjustable after insulation is applied. NIBCO Nib-Seal Handle.

B. Butterfly Valves:

NOTE: Butterfly Valves in a domestic plumbing system intended to convey water for human consumption shall comply with Quality Assurance, article 1.03 of this specifications.

BFV-1 Centerline Series A, 200 psi CWP tight shut-off.

1. Body: Lug type ductile iron. Suitable for bi-directional dead-end service at rated pressure without use of downstream flange.

2. Disc: Bronze, or aluminum bronze.

3. Stem: One or two-piece, 400 series stainless steel.

4. Seat and O-Rings: EPDM.

5. Upper and Lower Stem Bearings: Copper alloy or non-metallic material..

6. Operators: Valves 6 inches and smaller, with lever handle. Valves 8" and larger, with manual gear operator and disc position indicator.

7. Manufacturers:

a) Valves 2.5" – 6": NIBCO, Milwaukee ML-233E, Hammond 6411-01 or equal.

b) Valves 8" and larger: Milwaukee ML 333E, Hammond 6411-03 or equal. .

8. Grooved ends: Valves 6 inches and smaller, Victaulic No. 700 or NIBCO No. GD-4765-3 with lever handles. Valves 8 inches and larger, Victaulic No. 701 or NIBCO No. GD-4765-5 with manual gear operator and disc position indicator.

APPLICATION: Shut-off and isolation of large pipe application for chilled water, condenser water and space heating hot water system. Recommended for frequent operation and adaptable to automation where space is limited.

C. Check Valves:

1. Bronze, 2 inches and smaller:

CHV-1 Class 125, 200 CWP swing check, Teflon disc, threaded ends. .

NIBCO T-413-Y, Milwaukee 509-T, Hammond IB-940 or equal.

APPLICATION: Provide where backflow prevention is required for chilled water and condenser water system and space heating hot water system. Usually recommended for lines where flow velocities are low and should not be used on lines with pulsating flow. Recommended for horizontal installation or in vertical lines only where flow is upward. Provide at multiple hot and chilled water pump discharge lines, make up water lines.

CHV-1A 200 psi, CWP horizontal swing, Y pattern, renewable seat and disc, threaded ends.

NIBCO T-413-Y-LF, Milwaukee UP-509, Hammond UP-904 or equal.

Application: Use on domestic hot and cold water systems.

CHV-2 Class 125 200 psi,, swing check, bronze body ,teflon disc, soldered ends.

Stockham B-310TY, Crane 1340, NIBCO S-413-Y, Milwaukee 1509-T, Hammond IB-912 or equal.

APPLICATION: Same as CHV-1. Provide on junior fire sprinkler systems less than 3 fire sprinkler heads .

CHV-2A 200 psi, CWP, bronze body, horizontal swing, Y pattern, renewable seat and disc, solder ends.

Nibco S-413-Y-LF, Milwaukee UP 1509-T, Hammond Up-946 or equal.

APPLICATION: Use on domestic hot and cold water systems.

CHV-3 Class 150, 300 psi, CWP , swing check, bronze, teflon disc, threaded ends:

Stockham B-321; Crane 11TF, NIBCO T-433, Milwaukee 510-T, Hammond IB-946 or equal.

APPLICATION: Same as CHV-1 except for medium pressure system such as condenser water system, chilled water system, space heating hot water system, low-pressure steam system. Provide on multiple chilled water and condenser water pump discharge lines, low pressure steam boiler return lines from steam traps.

2. Cast Iron 2-1/2 and larger:

CHV-4 Class 125, 200 psi, CWP,, IBBM, renewable seat and disc, bolted cap, threaded ends:

Crane 372, Stockham G-927, NIBCO T-918-B or equal.

APPLICATION: Same as CHV-1 except for larger sizes. Provide on multiple domestic hot and chilled water pump systems, multiple steam boiler return lines from steam trap.

CHV-5 Class 125, 200 psi, CWP,, IBBM, renewable seat, bronze or cast iron disc, bolted cap, flanged ends:

Stockham G-931, Crane 373, NIBCO F-918 B, Milwaukee F-2974-M, Hammond IR-1124-HI or equal.

APPLICATION: Same as CHV-4.

CHV-6 Class 250, 500 psi, CWP, iron body, renewable bronze seat and disc, bolted cap, flanged ends:

Stockham F-947, Crane 39E, NIBCO F-968B, Milwaukee F-2970-M, Hammond IR-322-HI or equal.
APPLICATION: same as CHV-4, except for high and medium pressure system.

CHV-7 On pump discharge, Class 250, 400 psi, CWP, wafer check, center guided disc, spring actuated:

Stockham WG-970, NIBCO W-960B or equal.

APPLICATION: same as CHV-6

CHV-8 Special low-pressure check valve for installation in gas lines.

Circle Seal Products Co.
119B-PP-0-15 psi; #1:1/8 inch IPS; #2:1/4 inch IPS #3:3/8 inch IPS.
APPLICATION: For low pressure gas in chemistry laboratory systems.

CHV-9 300 psi, ASTM A395 and A536 ductile iron body, stainless steel shaft and spring, grooved end:

Victaulic Series 716, or series 779 with Venturi-like taps Or equal.
APPLICATION: same as CHV-7, except for high pressure system.

G. Earthquake Valve:

EQV-1 Mechanically triggered by seismic movement, complying with state of California seismic response specifications, UL listed and certified.by D.S.A. Size and pressure as required or indicated on Drawings. (**Minimum 1/4 psi, maximum 10 psi**). Earthquake valve shall shut off gas automatically during an earthquake to prevent an explosion or fire. Valve shall be Koso California seismic valve, or equal.

1. Not sensitive to vibrations caused by passing trucks or accidental bumping.

2. Sensitive to wide amplitude G's only. Preset at factory for the correct G-rating.

3. Positive sealing from -10 degrees F. to 150 degrees F.

4. Visual open-close indicator.

5. Manual reset.

6. Plumb line for mounting.

7. Tripping mechanism has non-creeping rolling latch.

8. Install valve per manufacturer's recommendations only.

APPLICATION: Automatic shut-off for gas systems during earthquake at gas meter.

H. Compression or Expansion Tank:

ET-1 Pressurized, vertical, steel expansion tank for non-potable water systems with a replaceable, heavy duty, Butyl rubber bladder, 1 inch or 1-1/2 inches NPT system connection, 3/4 inch drain, 0.302 inch-32 standard automobile tire valve type charging connection, lifting rings and a floor mounting skirt for vertical installation. The tank must be constructed in accordance with Section VIII of the ASME Boiler and Pressure Vessel Code and stamped for 125 psi working pressure. The tank must be also rated for a continuous working temperature of 240 degrees F. Provide weather and rust resistant coating.

Bell and Gossett, Wheatley, Taco, Amtrol or equal.

APPLICATION: Pressurized non-potable water system applications such as chilled water system, space heating hot water system and domestic hot water systems. Provide at each chilled water or heating hot water system.

ET-2 Pressurized, vertical, steel expansion tank for potable water systems with FDA approved, replaceable, heavy duty, butyl rubber blend diaphragm, polypropylene lined dome, 1/2 inch, 3/4 inch, 1 inch or 1-1/2 inches NPT system connection, 1/2 inch or 3/4 inch drain, 0.302 inch-32 standard automobile tire valve type charging connection, lifting rings and a floor mounting skirt for vertical installation. The tank must be constructed in accordance with Section VII of the ASME Boiler and Pressure Vessel Code and stamped for 125 psi working pressure. The tank must be also rated for a continuous working temperature of 240 degrees F. Provide weather and rust resistant coating.

Bell and Gossett, Wheatley, Taco, Amtrol or equal.

APPLICATION: Same as ET-2 except for potable water system such as domestic hot water system. Provide at each domestic hot water heater or system.

I. Flow Control Valve; Automatic:

FC-1 To control flow rates with plus 5 percent accuracy. Device shall consist of inline pipe section with internal stainless steel variable self-positioning orifice assembly with built-in strainer. Device shall be factory set, tamper-proof and require no external adjustment. Provide 2 body pressure taps suitable for differential pressure connections. Body material shall conform to system piping material. The flow rate and pressure drop shall be stamped on a tag, which shall be chained and riveted to the device.

Griswold Controls, or equal.

APPLICATION: Flow control application for heating or cooling coils for chilled water system and space heating hot water system. Provide at each heating or cooling coil.

J. Flow Control Valve – Manual:

FC-2 Flow control valves: Bell and Gossett Series CB circuit setter balancing valve, line size, with integral pointer (to register degree of valve opening), differential pressure meter connections with built-in check valves and lockable memory stops. Armstrong Series CBV circuit-balancing valves, Illinois Series 6000, or Victaulic/TA Hydronics.

APPLICATION: Balancing and controlling of flow for different circuits at chilled water system, space heating hot water system. Provide at each pump and air handling unit heating or cooling coil.

K. Venturi Flow Measuring Device:

FMD-1 Preso B-plus series, or equal by Victaulic "Style 733", venturi type flow measuring device. Provide on the main heating hot water and chilled water lines and other locations as required for balancing, as indicated, between straight sections of pipe. Upstream pipe section shall be not less than 5 diameters in length and downstream section shall be not less than 2 diameters in length. Venturis shall be furnished complete with quick disconnect valves, safety shut-off with memory valves and attached metal identification tag.

1. 2 inch or smaller shall be furnished with threaded connections.

2. 2-1/2 inches or larger shall be furnished with flanged or grooved connections.

APPLICATION: Flow measuring application for chilled water system, space heating hot water system.

L. Electronic Flow Readout Meter:

FM-1 Flow meter shall combine the functions and ranges of several gages into a single board range meter. Meter shall function as a compound pressure gauge measuring the high side and low side pressure simultaneously and display each reading in sequence. Meter shall be furnished complete with a shut-off, bypass, and blow down valve network installed on a portable meter panel. A carrying case shall be provided with storage for accessories. Meter shall automatically select the proper range, compensate for temperature, and reset itself. Memory function shall store up to 90 sets of pressure and/or temperature. Pressure reading shall be accurate to plus or minus 2 percent of reading from 0.01 to 150 psi. Temperature readings shall be accurate to plus or minus 0.5 degrees F. and plus or minus 1.0 degree F. from minus 65 degrees F. to 250 degrees F. The flow metering device shall be Hydrodata Multimeter HDM 300 as manufactured by Shortridge Instruments Inc., or equal, and shall be

furnished with pressure gauge, portable meter panel and with valve network, carrying case, battery charger, instruction manual and certificate of calibration, two 6 feet long by 1/2 inch OD pressure hoses with quick disconnects, two 8 foot by 1/4 inch OD drain hoses, and a set of adapters.

APPLICATION: Same as FMD-1.

M. Gate Valves:

1. Bronze, 2 inches and smaller:

GV-1 Class 125,, 200 psi CWP, bronze body and bonnet non-rising stem, inside screw, screw-in bonnet, solid disc, threaded ends:

Hammond IB645, Crane 1701, Walworth Fig. 7, Milwaukee 105, American 3F, NIBCO T-113 or equal.

APPLICATION: Shut-off and isolation of equipment and device for condenser water, chilled water and space heating hot water systems and gas system .

GV-1A Class 125, 200 psi, CWP, bronze body and bonnet, non-rising stem, inside screw, screw-in bonnet, solid disc, threaded ends:

NIBCO T-113-LF, Milwaukee UP 105, Hammond UP 645 or equal.

APPLICATION: Use on domestic hot and cold water systems.

GV-2 Same as GV-1, except solder ends:

NIBCO S 113, Milwaukee 115, Hammond IB 647 or equal.

APPLICATION: Same as GV-1. Provide in yard box, to each group of fixtures behind access panels, where valves are located near ceiling and beams.

GV-2A Class 125, 200 psi, CWP, bronze body and bonnet, non-rising stem, inside screw, screw-in bonnet, solid disc, threaded ends:

NIBCO T-113-LF, Milwaukee UP 105, Hammond UP 645 or equal.

APPLICATION: Use on domestic hot and cold water systems.

GV-3 Class 125, 200 psi WOG, rising stem, inside screw, screw-in bonnet, solid disc, threaded ends:

Stockham B-100, Crane 428, NIBCO T-111, Milwaukee 148, Hammond IB-640 or equal.
APPLICATION: Same as GV-2 except where clearance is not an issue. Adequate clearance for operation must be provided because hand wheel and stem rise. Provide inlet and outlet connections to water heaters and pumps, make up water lines to HVAC equipment, expansion tanks, at water cooled condensers, etc.

GV-4 Same as GV-3 except solder ends:

NIBCO S-111, Milwaukee 149, Hammond IB-635 or equal.

APPLICATION: Same as GV-3. Provide at chillers and at water cooled condensers, etc.

GV-5 Class 125, 200 psi CWP, rising stem, union bonnet, solid disc, threaded ends:

Stockham B-105, Crane 428 UB, NIBCO T-124 Milwaukke 1152, Hammond IB-617 or equal.

APPLICATION: Same as GV-3. . Provide at hot water heating boilers, hot water heating coils, low pressure steam traps, low pressure steam boiler supply headers, etc.

GV-6 Class 150, 300 psi CWP, rising steam, union bonnet, solid wedge, threaded ends:

Crane 431 UB, Stockham B-120, NIBCO T-134, Milwaukee 1151, Hammond IB-629 or equal.

APPLICATION: Same as GV-5 except for medium pressure system such as condenser water, chilled water system, space heating hot water system and low pressure steam system and gas system. Provide at low pressure steam boiler supply headers, low pressure steam traps, pumps, chillers, condensers, etc.

2. Iron Body Gate Valves; 2 1/2 inches and larger:

GV-7 Class 125, O S and Y, IBBM, bolted bonnet, solid disc, flanged ends:

Hammond IR1140HI, Stockham G623, Crane 465-1/2, NIBCO F-617-0, Milwaukee F 2885M or equal.

APPLICATION: Shut off and isolation of equipment with large pipe sizes for space heating hot water system, compressed air and low pressure steam systems. This type offers a visual indication of whether the valve is closed or open. Provide at heating hot water boilers and low pressure steam boiler supply headers, compressed air outlets, receiver tanks, hot water storage tanks etc.

GV-7A Class 125, 250 psi, CWP, O S & Y or non-rising stem valves, epoxy coated, resilient wedge, flanged ends:

NIBCO F-607-RW, Kennedy 8068A, Mueller R2360-06 or equal.

These epoxy coated valves are recommended in the domestic cold water system where corrosives in the water lines might cause damage to the inside of the valve. Not recommended when operating temperature exceeds 160F/71C.

GV-8 Class 250, 500 psi, CWP, O S and Y, IBBM, bolted bonnet, solid wedge flanged ends:

Crane 7-1/2E, NIBCO F-667-0, Hammond IR 1138 Hi, Milwaukee F 2894 M or equal.

APPLICATION: Same as GV-7 except for medium pressure steam system with higher PSI requirements. Provide for medium pressure steam supply header, at medium pressure steam return header, at medium pressure steam trap, etc.

GV-8A Class 250, 250 psi, CWP, O S and Y, IBBM, resilient seat gate valve, flanged ends.

Watts 408-OSY-RW, Kennedy 7168 or equal.

The epoxy coated valves are recommended in the domestic cold water system where corrosives in the water line might cause damage to the inside of valve and where pressure rating in excess of 200 psi is required.

GV-9 Class 125 250 psi CWP iron body, flanged ends, bolted bonnet with wheel handle, resilient wedge, non-rising stem.

APPLICATION: (For use in walls for cold water system pipe sizes 2 ½" and larger)
NIBCO F-619-RW or equal.

GV-10 Class 125, 250 psi CWP iron body, flanged ends, bolted bonnet with 2" operating nut, resilient wedge, non-rising stem, fusion bonded epoxy coated.

APPLICATION: (For use below grade for cold water system pipe sizes 2 ½" and larger)
NIBCO F-619-RW-SON or equal.

N. Globe Valves: Bronze, 2 inches and smaller:

GLV-1 Class 125, 200 psi, CWP, screw-in bonnet, Teflon disc, threaded ends:

Hammond IB440, Milwaukee 502, Stockham B-13-T, NIBCO T-211-Y, Crane 5TF or equal.

APPLICATION: Combination of balancing and shut-off application for condenser water and chilled water systems and space heating hot water system. The seat must be compatible with the fluid in service. Provide on bypass line for water pressure reducing valve arrangement, on thermostatic mixing valve arrangement.

GLV-1A Class 125, 200 psi, CWP, screw-in bonnet, Teflon disc, threaded ends:

Milwaukee UP 502, Hammond UP 440 or equal.

APPLICATION: Use on domestic hot and cold water systems.

GGLV-2 : Class 125, 200 psi, CWP, screw in bonnet, Teflon disc, solder ends.

Hammond IB-418, Milwaukee 1502, NIBCO S-211-Y or equal.

GLV-3

APPLICATION: Combination of balancing and shut-off application, condenser water and chilled water systems and space heating hot water system. Provide on bypass line for water pressure reducing valve arrangement, on thermostatic mixing valve arrangement.

LV-2A: Class 125, 200 psi, CWP, screw in bonnet, Teflon disc, soldered ends.

Milwaukee UP 1502, Hammond UP 418 or equal.

APPLICATION: Use on domestic hot and cold water systems.

GLV-3: Class 150, 300 psi, CWP,, union bonnet, Teflon disc, threaded ends:

Hammond IB413T, Stockham B-22T, Milwaukee 590T, NIBCO T-235-Y or equal.

APPLICATION: Same as GLV-1 except for medium pressure application such as space heating hot water, compressed air, condenser water, chilled water and low pressure steam systems. Provide on bypass line for boiler water feeder, at strainer for PRV, at heating hot water strainer.

GLV-4 Class 150, 300 psi, CWP,, union bonnet, Teflon disc, soldered ends

Hammond IB423, Stockham B-24T, Milwaukee 1590T, NIBCO S-235-Y or equal.

APPLICATION: Same as GLV-3. Provide on bypass line for low pressure steam modulating valve to heat exchanger, on bypass line for boiler, water feeder, etc.

Iron Globe Valves, 2-1/2 inches and larger:

GLV-5 Class 125, 200 psi, CWP, , OS&Y, IBBM, renewable seat and disc, bolted bonnet, flanged ends:

Hammond IR116 HI, Stockham G-512, Crane 351, Milwaukee F2981 M, NIBCO F-718-B or equal.

APPLICATION: Same as GLV-1 except for larger pipe and low pressure steam system. Provide on bypass line for low pressure steam modulating valve to heat exchanger, on bypass line for steam trap, etc.

GLV-6 Class 250#, OS&Y, IBBM, bolted bonnet, flanged ends:

Hammond IR 330 HI, Stockham F-532, Crane 21E, Milwaukee F2983M, NIBCO F-768-B or equal.
APPLICATION: Same as GLV-5 except for medium and low pressure steam systems. Provide on bypass line for low pressure steam modulating valve to heat exchanger, on bypass line for steam trap, etc.

O. Heater Vent Pipe:

1. Schedule Number:

HVP-1 Shall be UL approved for service specified. Concealed heater vent pipe, including pipe in or through attic spaces, shall be Los Angeles City approved double wall metal vent pipe. For recessed wall heaters, furnish B.W. type. All others may be Type B, or B.W. Clearances must comply with Los Angeles City code and conditions of UL listing.

American Metal Products Co., Inc., Dura-Vent Corp., Ameri-Vent, Duravent, Hart and Cooley Mfg. Co., Metalbestos or equal.

P. Liquid Level Gauge:

LLG-1 Refrigerant type, carbon steel with stainless steel trim or all forged steel construction, back-seating standard design. Upper and lower valve furnished with ball check valves; 1/2 inch diameter glass on center. Four 3/16 inch diameter gage glass guard rods or slotted steel guard.

Peneberthy, Henry, Conbraco or equal.

Q. Magnetic Lever Valves:

MLV-1 Bronze, stainless steel and bronze trim, 2-way, packless normally closed, metal seat.

General Controls, K-10AA2030 or equal.

APPLICATION: Can washing system. Provide for can washing installation.

R. Piping:

1. Piping shall be continuously and permanently marked with manufacturer's name, type of material, size, pressure rating, and the applicable ASTM, ANSI, UL, or NSF listing. On plastic pipe, date of extrusion must also be marked.

2. Underground non-ferrous pressure pipes shall be installed with proper color tracer wires. Refer to color code provisions in Section 15075: Mechanical Identification.

3. Refer to Heating and Air Conditioning Piping Systems: Section 15180 for heating and chilled water piping and fittings.

4. Schedule Number: Description

P-1 Cast iron – Hubless, service weight, . ASTM A888, CISPI 301, conforming to CISPI 310 and installed in accordance to IAPMO 1S 06. American Foundry, Tyler, or AB & I or equal.

P-2 Galvanized steel, Schedule 40, ASTM A53., US Steel or equal.

P-3 Copper drainage tube, underground, type L hard, ASTM B 88, Mueller, Cerro Brass or equal.

P-4 Copper drainage tube, inside structure and above grade. Type DWV hard temper, ASTM B 306, Mueller, Anaconda, Cerro Brass, Cambridge-Lee, Halstead or equal.

P-5 Purple pipe, PVC, schedule 40 for reclaimed or recycled water (below ground only for non-potable irrigation systems), type 1, grade 1, PVC-1120, Cell Class 12454 B.

P-6 Copper water tube, Type L hard, ASTM B88. Mueller, Cambridge-Lee, Halstead or equal. (when used above ground only)

P-7 Copper water tube, Type K hard, ASTM B88, by Mueller, Cerro Brass, Cambridge-Lee, Halstead or equal.

P-8 Polyethylene plastic pipe, ASTM D 2513, standard dimension ratio. 11, rated at 80 psi working pressure at 73 degrees Fahrenheit (F). for 3 inches and smaller, SDR 11.5 rated at 76 psi at 73 degrees F. for 4 inches and above, butt or socket type fittings, joined by heat fusion, orange or yellow color.

CPCHEM (Chevron Phillips Chemical Company LP) PE 2406, or equal.

(Furnished for natural gas below grade only) Transition to anodeless steel riser at meter, regulator, or building wall.

P-9 Red seamless brass, 85-5-5-5, iron pipe size (IPS), threaded pipe, ASTM B43

Mueller, Cerro Brass, Cambridge-Lee, Halstead or equal.

P-10 Black steel pipe, Schedule 40, ASTM A53, Type E, ERW by US Steel, or equal.

P-11 Seamless copper tubing, tempered drawn, Type M, ASTM B88 by Mueller, Cerro Brass or equal.

P-12 High Silicon Iron Casting, 1-1/2 inches and 2 inches, threaded for Science Room Vents when ferrous waste piping is provided, ANSI-A21.10, WWP-356-36, ASTM D1784-699, by Duriron or equal.

P-13 PVDF (Polyvinylidene Fluoride) schedule 40 pipe, conforming to ASTM F1673, ASTM D3222 and complying with UL723 (ASTM E84). The joints may be no-hub or electro-fusion type. Installer shall be certified by manufacturer for joint installation. Orion, Fuseal or equal

This type shall not be used for underground installations but where the corrosive waste piping passes through air plenums as defined by California Mechanical Code (CMC).

P-14 Polypropylene chemical waste , flame retardant pipe, conforming to ASTM F1412 and ASTM D4101. The joints may be no-hub or electro-fusion type. Installer shall be certified by the manufacturer for joint installation. Orion, Fuseal or equal.

Provide fireproof wrapping where the corrosive waste piping passes through air plenums as defined by CMC.

P-15 PVC, thick wall, cast-iron OD sized, UL listed, AWWA listed, NSF listed, Class 200 with tracer wire, Blue Brute, or equal.

APPLICATION: Domestic water, Irrigation and main fire line below ground only (4" inch and over).

P-16 Type 316L Stainless steel chemical waste pipe, marked with manufacturer's identification and fittings. Mechanical press fit joints with EPDM seals Manufacturer's representative shall instruct installers and certify them for joint installation. Piping system shall be provided with a 5- year manufacturer's material warranty.

Blucher-Josam or equal. .

(This type shall not be used for underground installations. Only where the corrosive waste piping passes through air plenums as defined by CMC.

P-17 304 / 304L Stainless Steel, .049 wall, ASTM A312. Pipe must be certified for use with the Vic-Press 304TM piping system. By Trent Tube, Victaulic Or equal.

(This type shall not be used for underground installations. Only where the corrosive waste piping passes through air plenums as defined by CMC.

P-18 CPVC (Chlorinated polyvinyl Chloride) schedule 40 pipe, conforming to ASTM D1784 and complying with UL723 (ASTM E84). The joints shall be of solvent cement

type conforming to ASTM F493. Installer shall be certified by the manufacturer for this type of joint installation. Spears, Corzan or equal.

(This type may be used for underground installations and also where the corrosive waste piping passes through air plenums as defined by CMC.

P-19 PVC, schedule 40, extruded from 100 percent virgin Polyvinyl Chloride (PVC) compound, meeting requirements of class 1254-13 of ASTM D1784.

S. Pipe Fittings:

PF-1 Cast iron, soil or waste no-hub coupling with neoprene gaskets, stainless steel corrugated shields and stainless steel clamps. 2 bands for size 1 ½" thru 4", IAPMO, ASTM C 564 and CISPI 310.

American Foundry, Tyler, or equal.

PF-2 Cast iron, soil or waste, Heavy-duty no-hub coupling with neoprene gaskets, stainless steel corrugated shields and stainless steel clamps. 4 bands for size 5" thru 10". IAPMO, ASTM C564 and CISPI 310.

American Foundry, Tyler, or equal.

Provide with P-1 and as Required By Engineer due to site specific conditions

PF-3 Malleable iron, Class 150, threaded, galvanized, beaded, ANSI B 16.3. P-2

Stockham, Stanley Flagg, Grinnell Or eual.

Provide with P-2

PF-4 Cast brass drainage fittings ASA B 16.23, ASTM B 42. Provide with copper drainage tube.

Mueller Brass, Nibco, Stanley Flagg, Lee Brass Or equal.
Provide with P-3 and P-4.

PF-5 Wrought copper - solder type ANSI B 16.22

Mueller Brass, Nibco, Lee Brass or equal.

Provide with P-6

PF-6 Polyethylene plastic fittings, ASTM D 3261 and D 2683, standard dimension ratio 11, rated at 80 psi working pressure at 73 degrees F. for 3 inches and smaller, SDR 11.5 rated at 76 psi at 73 degrees F. for 4 inches and above, butt or socket type fittings, joined by heat fusion, color orange or yellow,

CPCHEM, (Chevron Phillips Chemical Company LP) or equal.

(Provide with P-8)

PF-7 Polyethylene transition risers, for Pf-6 above, Transition fitting must have a minimum vertical height of 36" from the horizontal connection which will allow for a 6" steel riser above ground. Polyethylene transition risers shall be anodeless

Central Plastics Company or equal.

APPLICATION: installed in a gas piping system for the purpose of providing a transition from horizontal below ground (polyethylene) to a vertical above ground

(steel). Transition must be made on the horizontal side of the gas piping system and meet ASTM standards for Polyethylene plastic pipe and fittings

PF-8 Bronze and brass, 250 psi, threaded, ASA B16.17 and F S WW-P-460

Provide with P-9.
Mueller Brass, Lee Brass Or equal.

PF-9 Malleable iron, Class 125, ANSI B 16.3, threaded or welded Schedule 40 black steel for 2 inches and below and welded for 2-1/2 inches and above, by Stockham or equal.

Provide with P-10.

PF-10 Cast iron, threaded, Class 125, ANSI B 16.1

Provide with P-12.
Stockham or equal.

PF-11 Cast-iron OD sized, bell and spigot gasket joints.

PF-12 Steel butt weld type, ASTM A 234WPB.

Provide with P-10.

PF-13a No-hub couplings for factory grooved PVDF or polypropylene, schedule 40 piping. The coupling shall be of the same material and gauge as the pipe. Each coupling shall have 300 series stainless steel outer band and 5/16" bolts, nuts and washers plated to meet a 100- hour salt spray test per ASTM B117. Installer shall be certified by the manufacturer for this type of joint installation. Orion, Fuseal or equal.

Provide with P-13.

PF-13b The pipe and fitting shall be joined using the socket fusion system conforming to ASTM 2657. Installer shall be certified by the manufacturer for this kind of joint installation. Orion, Fuseal or equal.

Provide with P-14.

PF-13c CPVC (Chlorinated Polyvinyl Chloride) schedule 40 pipe and fittings, conforming to ASTM D1784 and complying with UL723 (ASTM E84), shall be joined using solvent cement conforming to ASTM F493. Installer shall be certified by the manufacturer for this kind of joint installation. Spears, Corzan or equal.

Provide with P-18.

PF-14a Drains, bottle traps and similar devices for CPVC, PVDF or polypropylene, schedule 40 piping, shall be of same material and gauge as the pipe with mechanical joints. Installer shall be certified by the manufacturer for this kind of joint installation. Orion, Fuseal or equal.

Furnish with matching pipe only. Provide fireproof wrapping where the polypropylene piping passes through air plenums as defined by CMC.

PF-14b Type 316L Stainless steel joint for chemical waste piping systems including drain or bottle traps . Blucher-Josam or equal.

Furnish when used with matching pipe only. This type shall not be used for underground installations and only where the corrosive waste piping passes through

air plenums and the available space is not sufficient for fire proof wrapping of polyethylene piping.

PF-15 Precision cold drawn austenitic 304/304L stainless steel, with elastomer O-rings

Grade to suit intended service. Provide with piping schedule P-16
Victaulic Vic Press 304TM or equal.

PF-16 Grooved end type– ASTM A395 and A536 ductile iron; ASTM A234 WPB forged steel; fabricated from ASTM A53 carbon steel. Couplings shall be supplied with angle-pattern bolt pads for rigidity, except in locations where flexibility is desired. Gaskets shall be pre- lubricated. Galvanized or painted, by Victaulic or equal.

Grade to suit the intended service. Provide with piping schedule number P-2 or P-10

PF-17 Grooved end type– ASTM B75 or B152 and ANSI B16.22 wrought copper, bronze sand casting per ASTM B584-87 copper alloy CDA 836 per ANSIbB16.18. Couplings shall be CTS style 606 supplied with angle pattern bolt pads for rigidity, coated with copper coated alkyd enamel. Gaskets shall be pre-lubricated Flush seal type by Victaulic or equal.

(For domestic Hot and cold water 2 ½" and larger copper applications). Provide with piping schedule number P-6.

PF-18 CPVC fittings must conform to ASTM D2846 specification for chlorinated polyvinylchloride (CPVC) plastic for hot and cold water distribution system.

PF-19 Plastic fittings, schedule 40 molded from PVC type I compound, conforming to the requirements of specification ASTM D2466.

T. Pipe Isolators:

PLA-1 Absorption pad shall be not less than 1/2 inch thick, unloaded. Pad shall completely encompass pipe.

(Used for copper piping)
Holdrite, LSP, Stoneman, Potter-Roemer, Trisolator, PR-Isolator or equal.

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PLA-2 Plastic cushion to form an insulating liner and eliminate metal to metal contact when securing copper tubes and pipes in air conditioning and refrigeration insulation preventing galvanic erosion. (Acoustical Type For Sound Absorbtion)
Hydra-Zorb Cushion Clamps, Acousto-Clamp or equal.

U. Pressure Gauge: Aluminum or steel case, minimum 4-1/4 inches dial; pressure type or combination vacuum-pressure type, with provisions for field calibration. Dial indicator to indicate pressure in psi with accuracy to within plus or minus 0.5 percent of maximum dial reading. Furnish gages with restriction screw, size 60, to eliminate vibration impulses. Black case and ring, bourdon tube of seamless copper alloy with brass tip and socket. Three way gauge cock, constructed of brass with stuffing box, 1/2 inch couplings, with fixed or movable cap nut to shut off pressure gauge.

PG-1 Pressure type, black drawn steel case, 4-1/2 inches glass dial, range approximately twice line pressure.

Marsh KeckleyTrerice Weksler Weiss

V. Plug Valves:

PV-1 2 inches and smaller: Rockwell No.114, lubricated plug type, 200 lb., water operating gauge pressure iron body and plug, regular pattern, threaded, with indicating arc; by Walworth, Homestead, WKM, or equal.

APPLICATION: Isolation and on-off application for gas system.

PV-2. 2-1/2 inches and larger: Rockwell No.115 and No.165 lubricated plug type, 200 lb. water operating gauge. Iron body and plug, regular pattern, flanged, with indicating arc. Walworth, Homestead, WKM, or equal.

APPLICATION: Same as PV-1.

W. Safety, Relief Valves:

SRV-1 Combination temperature and pressure relief type. CSA approved. Set to open at 125 psi pressure.

Watts 40L Cash-Acme NCLX-1
APPLICATION: Steam system, hot water system.

SRV-2 Same as SRV-1, except provide on storage type water heater with anode in dip tube.

Watts 10 x L Cash Acme NCLX-1

APPLICATION: Same as SRV-1

SRV-3 Spring pop type, ASME and/or NB stamped and certified with manual lifting device for low-pressure steam boilers not exceeding 15 psig, and for hot water boilers and heaters operated at pressure not exceeding 160 psi or temperature not exceeding 250 degrees F. Outlet shall be one pipe size larger than inlet.

Crane Bailey Cash-Acme Keckley

APPLICATION: Low pressure steam and hot water system.

SRV-4 Spring type, ASME and NB stamped and certified with manual lifting device for air or gas.

Bailey Cash-Acme Watts Keckley
APPLICATION: Gas system and compressed air system.

X. Strainers:

STR-1 Description: Wye type with monel or stainless steel strainer cylinder (manufacturer's standard mesh), and gasketed machine strainer cap. Where indicated on Drawings, provide with valved (globe valve) blowout piping, same size as blowout plug.

1. 2 inches and smaller:
   C.M. Bailey No.100-A, 250 lb., cast iron body, threaded, Keckley 'B'.

2. 2-1/2 inches and larger:
   C.M. Bailey No.100-A, 125 lb., cast iron body, flanged, or Victaulic style 732, 300 psi, ductile iron body, grooved, fusion bonded epoxy coated.
   C.M.Bailey Armstrong Muessco Keckley 'A'

   APPLICATION: Steam, oil and gas systems and chilled water and condenser water system and space heating hot water system.

STR-2 Y pattern cast iron bodies, 125 psi, monel screen. Open area at least twice the cross-sectional area of IPS pipe in which strainer is installed and may be woven wire or perforated

type. Screwed ends for sizes up to 2 inches, flanged ends fusion bonded epoxy coated for 2 1/2 inches and larger perforations, in accordance with the following:

1. Steam service - 40 sq. mesh.

2. Other services - 16 sq. mesh.

Bailey No.100 Armstrong RP&C Keckley

APPLICATION: Same as STR-1

STR-3 Flanged, bucket type, semi-steel body, 125 psi, stainless steel screen with 1/8 inch diameter perforations. All sizes.

Bailey No.1 Zurn 150 Series RP&C Keckley GFV

APPLICATION: Domestic cold and hot water system. Mount above grade for water service)

STR-4 Grooved, T-pattern, ductile iron body, 300 psi, stainless steel frame and mesh basket, grooved ends.

APPLICATION: Domestic hot and cold water system except for high pressure system.

Y. Temperature Control Valves:

TCV-1 Valves, temperature control, automatic, electric, 2-way .

Motor-operated valve, bodies designed for 125 psig working pressure; single seated, straight through, globe type body, high lift plug. Teflon packing, tight shut-off and screwed ends for valves 2 inches and smaller.
Operated by capacitor type motor, oil-immersed gear train and suitable bearings.
Honeywell Barber-Colman

APPLICATION: Domestic hot water, chilled water system and space heating hot water system.

TCV-2 Valves, temperature control, automatic, pneumatic, 2-way.

Diaphragm type, brass body construction, globe type with brass trim. Valve bodies 2 inches and smaller shall have screwed ends. Pneumatic actuator diaphragm suitable for 250 F maximum temperature.
Honeywell Johnson Robert Shaw Powers Leonard

APPLCATION: Same as TCV-1. Hot or chilled water.

TCV-3 Same as TCV-1 - except with American Standard B16.1 flanged ends and cast iron bodies, for valves 2-1/2 inches and larger.

Honeywell Barber-Colman Powers

APPLICATION: Same as TCV-1.

TCV-4 Same as TCV-2, except with American Standard B16.1 flanged ends and cast iron bodies for valves 2-1/2-inches and larger.

Honeywell Johnson Powers Robert Shaw Leonard

APPLICATION: Same as TCV-2.

TCV-5 Valves, automatic, electric, 3-way control .

Packed type bronze body and trim. Metal-to-metal seats designed for tight shut-off. Constant total flow throughout full plug travel. Valve designed for 150 psig steam working pressure. Valve operated by spring return motor with gear train. Valves screwed for sizes 2 inches and smaller.
Honeywell Powers Barber-Colman Leonard

APPLICATION: Domestic hot water, chilled water and space heating hot water system and steam system.

TCV-6 Valves, automatic, pneumatic, 3-way control .

Diaphragm-type of metal construction, brass trim. Valves of single seat type with bronze discs especially designed for the control of water. Pneumatic actuator diaphragm suitable for 250 degrees F.
Honeywell Johnson Powers Robert Shaw Leonard

APPLICATION: Same as TCV-4.

TCV-7 Same as TCV-4, except with American Standard B16.1 flanged ends and cast iron bodies for valves 2-1/2 inches and larger.

APPLICATION: Same as TCV-4.

TCV-8 Same as TCV-5, except with American Standard B16.1 flanged ends and cast iron bodies for valves 2-1/2 inches and larger.

APPLICATION: Same as TCV-5.

Z. Thermometers Industrial:

T-1 Straight type with fixed or ratable stem, extruded or cast brass or cast aluminum case and brass separable well 6 inches minimum scale, angle or straight type range 30 degrees - 240 degrees F.

Weksler Trerice Weiss

T-2 Round type 3-1/2 inches minimum dial range of 100 between 30 degrees and 155 degrees F., color coded red above 150 degrees F. Brass chrome plated case.

(Provide at mixing valves.)
Ashcroft U.S. Gauge Marsh Weiss

AA. Thermometers (Remote):

T-3 Liquid-filled capillary type with bulbs as required for remote and insertion mounting dials of 3-1/2 inches minimum diameter, non-ferrous internal parts, external means for re-calibration, glass or plastic lens and steel or non-ferrous case suitable for wall, duct or panel mounting range 30 degrees - 240 degrees F.

(Provide for measuring duct, plenum, and other air temperatures.)
Marsh Trerice U.S. Gauge Weiss

BB. Traps:

TP-1 Steam, low-pressure (15 psig) float and thermostatic without strainers and with renewable stainless steel valves and seats, for drips into gravity return, coils, etc. Cast semi-steel or high-grade cast iron body selected for one pound pressure differential.

Illinois	Hoffman	Sarco	Armstrong
50 Series	860 Series		

APPLICATION: Low pressure steam system.

TP-2 Steam, low-pressure (15 psig), thermostatic for radiators and convectors, stainless steel valves and seats, cast iron body selected for 1/2 pound pressure differential.

Webber Series 5 Sarco 17C, 8C, 9C Hoffman Armstrong

APPLICATION: Same as TP-1.

CC. Vent Assemblies:

VA-1 4 inches oval type for clothes dryer.

American Metal Products

APPLICATION: Low pressure steam system.

DD. Valves (Air Vent):

VAV-1 Hot or chilled water air release valves shall be cast brass rated for 150 psig design pressure and 270 F operating temperature.

Spirotherm Bell & Gossett Taco
APPLICATION: Domestic hot water system, chilled water and condenser water system and space heating hot water system.

VAV-2 Hot or chilled water space heating system air valve, brass with nickel trim 1/4 inch connection, disc type for manual or automatic venting.

Hoffman 500 Spirotherm
APPLICATION: Same as VAV-1.

VAV-3 Brass petcock, 1/4 inch connection by 1/4 inch copper tube to high point of coil or line by means of a tapped cap on top of 6 inches vertical nipple. Petcock to be installed approximately 5 feet-6 inches above finish floor.

APPLICATION: Same as VAV-1.

EE. Vent Caps:

VC-1 Vandal-proof hood type, for plumbing vent lines.

Stoneman Engineering and Mfg. Semco 1550

APPLICATION: Sanitary drainage system.

FF. Vacuum Valves:

VV-1 Vacuum valves; for vacuum serve, 125 psig working pressure, cast iron body, spring loaded lubricated plug type.

General Controls Honeywell

APPLICATION: Domestic hot and cold water system, chilled water, condenser water and space heating hot water systems.

GG. Protective Coating for Underground Steel Piping Applied to Underground Automotive:

VV-1 Vacuum valves; for vacuum service, 125 psig

(working hoist piping only)

1. Black steel or galvanized steel piping indicated for below grade installation, shall be protected as specified prior to delivery to the Project site:

   a. Sandblast black steel pipe to a gray finish. Sandblast galvanized steel pipe lightly only.

   b. Install one coat of cut back asphalt to galvanized pipe immediately after sandblasting. Pre-heat black pipe to 180 degrees F. immediately before coating.

   c. Install one coat of high-temperature (melting point of 240 degrees F. minimum) Grade B asphalt enamel.

   d. Install one wrapping of 20 mils thick glass, fiber mat, Owens-Corning Coromat or L.O.F. Blueflag with 1/4 inch overwrap. Glass fiber shall be dry at time of installation.

   e. Install a second coat of asphalt enamel as specified above. Glass fiber mat shall be centered in the asphalt enamel.

   f. Install an overwrap of Kraft ripple paper.

2. Total thickness of pipe wrapping shall be not less than 1/8 inch. Entire coating operation shall be accomplished by mechanical means in a continuous operation. Hand installation of protective coating is not permitted.

3. Each piece of wrapped pipe shall be legibly identified at no greater than 5 feet intervals by fabrication company. Each material submittal shall include the name of the fabrication company. Maintain one reviewed Sample on the Project Site.

4. Acceptable manufacturers of wrapping are: Hunt, Mobile, Conway

5. Fittings (including couplings), unprotected pipe adjacent to fittings, and damaged pipe protection shall be wrapped at Project site as follows:

   a. Fittings and pipe to be wrapped shall be thoroughly cleaned of material foreign to pipe manufacturer.

   b. Install one coat of Plicoflex No. 105 or Protecto Wrap No. 1170 adhesive primer to metal.

   c. Wrap pipe and fittings with a minimum thickness of 3/32 inch of Plicoflex No. 310 pipe line butyl molding tape, or Protecto Wrap No. 200 molding tape. Install 3 layers, each layer overlapping next approximately 2/3 width of tape, without stretching. Tape and primer shall be of the same manufacturer.

d. Wrap vinyl tape, 10 mil thickness, over molding tape with 1 inch minimum overlap.

J.M. Trantex 3M Scotchwrap

5. Pipe and fittings specified to be wrapped shall be tested with a holiday detector, after pipe has been installed in trench and before backfilling, in presence of the IOR. Furnish a Tinkler and Raser model E-P holiday detector, or similar equipment for this test. Work, which is deemed defective, shall be repaired and/or replaced. IOR may test for damaged pipe wrapping after backfilling.

6. Instead of wrapping underground steel pipe as specified above, pipe may be machine-wrapped before delivery to the Project site as follows:

a. Pipe shall be cleaned of moisture, oil, grease, scale, and other foreign material by cleaning with non-oily solvent and wire brushing. Remove metal burrs and projections.

b. Install one coat of Plicoflex No.105 adhesive primer to cleaned pipe. If thinning is required, furnish only non-oily thinners as recommended by tape manufacturer.

c. Wrap coated pipe with Plicoflex No.340-25 tape (15 mil butyl and 10 mil vinyl laminate) Tape shall be installed by machine wrapping at approved plant only. Maintain tension (minimum of 5 pounds per inch of width) on tape over entire diameter of pipe. Tape shall be permanently identified and visible on vinyl side.

d. Fittings, unprotected pipe, and damaged pipe protection shall be wrapped as indicated above.

HH. Pipe and Fitting Requirements Schedule: Unless otherwise specified or indicated on Drawings, pipe and fittings shall be installed in accordance with the following table:

TABLE I
PIPE AND FITTING SCHEDULE

Use	Limits	Pipe	Fittings
Domestic hot and Cold water, underground	Up To8 inches	P-6	PF-5
Copper, underground only		P-7	PF-5
Cold water, underground (Site piping)	4 inches and over	P-14	PF-11
Domestic hot and cold water, in building and above ground	All	P-6	PF-5
In building above ground	2" to 8"	P-6	PF-5
Compressed air	Underground or in concrete	P-9	PF-8
	Above ground	P-10	PF-3
Drains From HVAC Equip.		P-6	PF-5
Downspouts, interior above and below grade, up to 5 feet from building.		P-1	PF-1 Or PF-2
Acid Vent	All	P-12	PF-10

Fire Mains (Fire Hydrant)	Underground	P-15	PF-11
Gas Natural	Underground	P-8	PF-6
Gas Natural	Above ground	P-10	PF-9
Copper Drainage Tube (Underground)	Waste and Vent	P-3	PF-4
Copper Drainage Tube (Above Gzround)	Waste and Vent	P-4	PF-4
Vents	New Building	P-1	PF-1 or PF-2 (IRE) if required by engineer
Vents	Existing Buildings and Exposed Downspouts	P-2	PF-3
Vents, Waste	For acid waste lines	P-13, 14, 16, 17	PF-14a, 14b or 15
Waste lines, Sanitary		P-1	PF-1 or PF-2 (IRE) if required by engineer
Waste lines, Acid	To nearest water dilution jet	P-13, 14, 16, 17	PF-14a, 14b or 15

1. For chilled water, condenser water, steam, hot water heating piping and fittings, refer to Section 15180: Heating and Air Conditioning Piping Systems.

II. Flanges: Flanges shall be furnished and installed at each flanged connection of equipment, tanks, and valves. Faces of flanges being connected shall be furnished alike. Connection of a raised face flange to a flat-faced flange is not permitted. Flanges shall conform to following schedules:

TYPE OF PIPE	FLANGE
Screwed black or galvanized grooved steel pipelines.	125 pound black cast iron screwed flange, flat faced or grooved flange adapters, Victaulic Style 741..
Welded or grooved steel pipe, except high pressure steam lines.	150 pound black forged steel welding flanges, 1/16 inch raised face ASTM A 105, Grade II or grooved flange adapters, Victaulic Style 741.
Copper and brass pipe or tubing.	150 pound cast bronze, flat-faced flange with solder end or grooved flange adapters, Victaulic Style 641
Stainless steel pipe	Class 150, Vic-press 304 flange adapter with carbon steel back-up flange and Vic-Press 304 end. Victaulic style 565.

2. Gasket material for flanged connections shall be full faced or ring type to suit facing on flanges and shall be furnished in accordance with following schedule

SERVICE	TYPE
Cold water	1/16 inch thick neoprene
Steam, hot water	1/l6 inch Teflon

Grooved end flange adapters supplied with pressure responsive elastomeric Gaskets supplied with grooved flange adapters shall be pre-lubricated by the manufacturer. Grade of gasket to suit intended service.

JJ. Unions:

1. Unions shall be furnished and installed in accordance with the following requirements (unless flanges are furnished):

a. At each threaded or soldered connection to equipment and tanks, except in Freon or fuel gas, piping systems, whether indicated or not.
b. At downstream, threaded connection to each manually operated threaded valve and cock, and each threaded check valve, except those in Freon piping systems, and except those in yard boxes or access boxes, whether indicated or not.
c. At each threaded connection to threaded automatic valves (except those in freon piping systems) such as reducing valves and temperature control valves, whether indicated or not.
d. If grooved piping is used, couplings shall serve as unions. Additional unions are not required

2. Unions shall be located so that piping can be easily disconnected for removal of equipment, tank, or valve.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions under which Work of this section shall be performed. Correct conditions detrimental to proper and timely completion of Work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Provide all materials and equipment for the Work. Furnish and install necessary apparatus, parts, materials, and accessories.

B. Pipe Installation:

1. Install piping parallel to wall and provide an orderly grouping of proper workmanship.

2. Piping shall clear obstructions, preserve headroom, provide openings and passageways clear, whether indicated or not. Verify the Work of other Divisions to avoid interference.

3. If obstructions or the Work of other Divisions prevent installation of piping or equipment as indicated by the Drawings, perform minor deviations as required by the Architect.

4. Install piping after excavation or cutting has been performed. Piping shall not be permanently enclosed, furred in, or covered before required inspection and testing is performed.

5. Exposed polished or enameled connections from fixtures or equipment shall be installed with no resulting tool marks or threads at fittings. Residue or exposed pipe compound shall be removed from exterior of pipe.

6. Piping shall be concealed in chases, partitions, walls, and between floors, unless otherwise directed or specifically noted on Drawings. When penetrating wood studs, joists, and other wood members, provide such members with reinforcement steel straps of Kees Protecta-Plate, or equal.

7. Reduce fitting where any change in pipe size occurs. Bushings shall not be furnished unless specifically reviewed by the Architect, or indicated on Drawings.

8. Piping subject to expansion or contraction shall be anchored in a manner, which permits strains to be evenly distributed. Swing joints or expansion loops shall be installed. Seismic restraints shall be installed so as not to interfere with expansion and contraction of piping.

9. Immediately after lines have been installed, openings shall be capped or plugged to prevent entrance of foreign materials. Caps shall be left in place until removal is necessary for completion of installation.

10. Couplings shall not be installed except where required pipe runs between other fittings are longer than standard length of type of pipe being installed and except where their installation is specifically reviewed by the Architect.

11. Water piping shall be installed generally level, free of traps, unnecessary offset, arranged to conform to building requirements, clear of ducts, flues, conduits, and other Work. Piping shall be arranged with valves installed to provide for complete drainage and control of system. Piping shall not be installed which causes an objectionable noise from flow of water therein under normal conditions. Refer to Section 15010: Basic Mechanical Requirements.

12. Water lines may be installed in same trench with sewer lines, provided bottom of water line is 12 inches minimum above top of sewer line.

13. Hot and chilled water circulating piping installed for space heating or cooling shall pitch up to a high point at a slope of 1/4 inch in 10 feet in the direction of flow. Where supply and return lines are exposed, both lines shall pitch in same direction. Otherwise, where possible, lines shall pitch up toward compression tank.

14. Changes in pipe sizes shall be furnished with eccentric reducers, flat on top. Offsets to clear obstruction shall not be installed so as to produce air pockets.

C. Pipe Sleeves and Plates:

1. Provide and install pipe sleeves of Schedule 40 black steel pipe or Schedule 40 PVC plastic pipe in concrete or masonry walls, footings, and concrete floors below grade. Provide and install adjustable submerged deck type sleeves at locations where pipes pass through concrete floors, except concrete slab floors on grade, and at locations where soil pipe for floor type water closets passes through concrete floors

   (For fire rated wall penetrations follow the Uniform Building Code)

2. Sleeves shall provide 1/2 inch clearance around pipes, except plastic pipe shall have 1-inch clearance. Caps of deck type sleeves shall be removed just prior to installation of pipe. Area around sleeves shall be smooth and without high or low spots. Sleeves in walls shall not extend beyond exposed surface of wall. Sleeves in concrete floors and walls shall be securely fastened to forms to prevent movement while concrete is being placed.

3. Piping installed on a roof shall clear the roof surface by 10 inches minimum, with or without insulation. Bottom of individual fittings may infringe on 10 inches clear space but not groups of fittings or fittings located within 27 inches of each other.

4. Stiles shall be provided to facilitate crossing of piping when parallel piping runs are laterally greater than 12 inches out-to-out, or any pipe is higher than 18 inches, and more than 40 feet long or runs between 2 or more major pieces of equipment or housings greater than 20 feet apart. Stiles shall be not less than 20 inches wide with

a minimum tread depth of 10 inches. Where stiles are required, they shall be located so greatest obstructed distance is 30 feet.

5. Where pipes pass through waterproofed walls, floors, or floors on grade, caulk with Link-Seal Modular Seals or equal between pipe and sleeve to provide a waterproof joint. Where earth is in contact with pipe on both sides of a wall or foundation, the waterproof joint is not required. Commercial rubber compression units may be furnished instead of caulked sleeves if reviewed by the Architect.

6. A swing joint, or other required device, shall be furnished and installed in hot water lines with 10 feet of caulked or compression joint to allow for expansion.

7. Provide and install polished, chrome-plated flanges when plumbing pipes pass through walls at plumbing fixtures, etc., as specified in Section 15400: Plumbing. Provide and install polished steel, chromium-plated split floor and ceiling plates at locations where pipes pass through walls, floors, ceilings, and partitions in finished portion, which neatly conceals pipe insert.

8. Pipe sleeves shall be provided where pipes intersect footings or foundation walls and sleeve clearances shall provide for footing settlement, but not less than one inch all around pipe.

D. Welding of Pipe and Qualifications of Welder:

1. Joints above grade or accessible conduit or tunnels in steel piping may be either welded or screwed unless specifically indicated otherwise on Drawings or specified. Joints in below grade steel piping, whether in insulation or not, shall not be welded, unless otherwise indicated.

2. Welded joints in pipe shall be continuous around pipe and shall comply with ASME B 31.1, unless otherwise specified.

3. Each pipe weld shall be stamped with welder's identification mark. Welding shall be performed by welders possessing a valid certificate of qualification for welding carbon steel welding pipe in horizontal position (2G) and horizontal fixed position (5G) in accordance with the requirements of Section IX of the ASME code, by an Owner recognized, DSA approved testing laboratory.

4. Before any welder performs welding on the Work, furnish the IOR with a copy of welder's valid qualification papers and obtain verification. Welder qualification is not valid unless it has been issued while welder was performing work for current employer, and has performed type of work described by qualification in the preceding 3 months.

5. Welding performed under these Specifications shall be subject to special tests and inspections including rigid Ultra Sonic Testing (UT) and radiographic inspection at random, in accordance with Technique for Radiographic Examination of Welded Joints by an Owner recognized, DSA approved testing laboratory.

E. Unacceptable Welds and Repairs to Welding:

1. Welds containing any of the following types of imperfections shall be deemed defective Work:

a. Cracks of any type.

b. Zones of incomplete (in excess of 1/32 inch) fusion or penetration.

c. Elongated slab inclusions longer than 1/4 inch.

d. Groups of slag inclusions in welds having an aggregate length greater than thickness of parent metal in a length 12 times the thickness of the parent metal.

e. Undercuts greater than 1/32 inch.

f. Overlaps, abrupt ridges or valleys.

2. When a defective weld is detected by examination as outlined above, 2 additional welds shall be radiographed at locations selected by the IOR. If the 2 selected welds demonstrate compliant welding, then the 2 tested welds shall be deemed to be in compliance. Welding revealed by radiographs to be defective Work shall be removed, repaired, and tested by radiograph.

3. If either of the 2 selected welds demonstrates welding deemed to be defective Work, all welding in that portion of the Work shall be deemed defective Work and either: all welds shall be cutout, prepare new ends for welding and weld to comply with this Specification, or radiograph all welds, removing and repairing only such welding deemed to be defective Work.

4. Repair welding shall be performed in a manner in full compliance with ASA B 31.0-1955. The welded joints or repairs shall be spot examined with UT or radiographic tests in accordance with foregoing requirements.

5. Owner shall cause to be performed additional random UT and radiographic examinations of welds. Owner shall be responsible for the costs of any UT and radiographic examinations found to be in compliance with specified requirements.

6. Installer shall be responsible for the costs of UT and radiographic re-examinations of welds deemed defective Work and not in compliance with this Specification, and shall repair or replace said welds in accordance with specified requirements.

F. Welding Rods: Submit a written list of materials and proposed type of welding rods for review by the Architect.

G. Backing Rings: Backing rings may be submitted for installation provided the Product Data is submitted with the material list.

H. Qualification Tests for Low-pressure Welding:

1. Tests shall be performed on 3 inches standard weight pipe ASTM A53, Grade A, and shall be welded by acetylene and electric arc. Each sample shall consist of 2 pieces, each 10 inches long, with 30-degree bevel at point weld.

2. Two 20-inch samples shall be performed in the 2G and two 20-inch samples in the 5G positions, with positions defined in Section IX, ASME code. Welds shall have the reinforcement ground or machined flush to the surface of the pipe before testing. Samples shall be tested as full section tensile.

3. Weld shall develop a load of 90 percent of 50,000 psi, i.e., 45,000 psi or shall develop a fracture in parent metal.

4. Each qualified welder shall carry an identification card listing welder's name, date of test, and type of welding tests passed; signed by the welder and the laboratory.

5. A valid certificate of qualification issued in compliance with requirements of of the ASME Boiler Pressure Vessel Code Section IX shall qualify a welder for issuance of a certificate for low-pressure pipe welding.

I. Certificates of Qualification for Welding of Unfired Pressure Vessels:

1. Certificates of qualification shall be issued by a laboratory recognized by the Owner in compliance with the requirements of the ASME Boiler Pressure Vessel Code Section IX. Qualifications shall be for both acetylene and arc welding of ASTM Schedule 40 ASTM A53, Type B or ASTM Type B or ASTM A120 Type B carbon steel welded pipe in the Horizontal Position (2G) and the Horizontal Fixed Position (5G) as defined by said code.

J. Pipe Joints and Connections:

1. Pipe and tubing shall be cut per IAPMO 1.S. Pipe shall have rough edges or burrs removed so that a smooth and unobstructed flow shall be provided.

2. Hot tapping of gas lines is strictly prohibited.

3. Threaded Pipe: Joints in piping shall be installed according to the following service schedule:

a. Refrigerant and Soap Piping: Litharage and glycerine, or Expando, or equal.

b. Plastic Piping: Teflon pipe joint compound tape.

c. Oxygen Piping: Wash treads with S.P., rinse, blow-dry and apply litharge and glycerine.

d. Cleanout Plugs: No compound shall be used. After inspection and test, plugs shall be removed, cleaned, greased, and replaced.

e. All other services Furnish sealant, suitable and as reviewed by the Architect.

4. Threads on pipe shall be cut with sharp, clean, unblemished dies and shall conform to ASA B 2.1 for tapered pipe threads.

5. Joint compounds shall be smoothly placed on male thread and not in fittings. Threaded joints shall be installed tight with tongs or wrenches and caulking of any kind is not permitted. Failed joints shall be replaced with new materials. Installation of thread cement or caulking to repair a leaking joint is not permitted.

6. Sharp-toothed Stilson, or similar wrenches, is not permitted for the installation of brass pipe or other piping with similar finished surfaces.

K. Copper Tubing and Brass Pipe with Threadless Fittings:

1. Silver brazed joints shall be used for attaching fittings to non-ferrous metallic refrigerant piping.

2. Non-pressure gravity fed condensate lines may be soldered with 95/5 solder

3 Silver brazing alloy, Class BCUP-5. Surfaces to be joined shall be free of oil, grease, and oxides. Socket of fitting and end of pipe shall be thoroughly cleaned with emery cloth and wiped to remove oxides. After cleaning and before assembly or heating, flux shall be installed to each joint surface and spread evenly. Heat shall be applied in accordance with instructions in the Copper Tube Handbook issued by Copper Development Associates. Joints constructed of rough bronze fittings shall be provided as recommended by manufacturer.

4. Do not overheat piping and fittings when installing silver brazing.

5. Joints in non-ferrous piping for services not covered above, shall be installed with solder composed of 95-5 tin-antimony, ASTM B32, Grade 5A. Surfaces to be jointed shall be free of oil, grease, and oxides. Sockets of fitting and end of pipe shall be thoroughly cleaned with emery cloth to remove oxides. Solder flux shall be sparingly installed and solder added until joint is completely filled. Do not overheat. Excess solder, while plastic, shall be removed with a small brush in order to provide an uninterrupted fillet completely around joint. Random inspection of joints shall be conducted by IOR to ensure joints are lead-free.

6. Grooved end joints for copper piping shall be assembled in accordance with the latest Victaulic recommendations. Pipe ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove for proper gasket sealing. Grooving tools shall be as manufactured by Victaulic.

L. Ring-Type Pipe: Joints shall be installed in accordance with manufacturer's instructions with grooved couplings, fittings and rubber rings. Couplings and pipe shall be compatible and of the same manufacturer. Rings shall be accurately located and installed by grooves in coupling. Pipe shall be installed with zero deflection unless otherwise specified. Pressure pipe shall be furnished with thrust blocks at each offset point.

M. Welded Pipe Joints:

1. Joints in welded steel pipelines shall be installed by oxyacetylene or electric arc process. Welding shall be continuous around pipe and provided as specified.

2. Butt welds shall be of the single V-type, with ends of pipe and fittings beveled approximately 37-1/2 degrees. Piping shall be aligned before welding is started with the alignment maintained during welding.

3. Welds for flanges and socket fittings shall be of the fillet type with a throat dimension not less than pipe wall thickness.

N. Grooved End Pipe Joints: Grooved end joints for carbon steel piping shall be assembled in accordance with the latest Victaulic recommendations. Pipe ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to grove for proper gasket sealing. Grooving tools shall be as manufactured by Victaulic.

O. Vic-Press 304TM Joints: Vic-Press 304TM joints shall be made with Victaulic Series 'PFT' tools and the appropriate sized jaw. Pipe shall be certified for use with Vic-Press 304TM system, and shall be square cut, properly deburred and cleaned, and marked at the required location to insure full insertion into the fittings and/or couplings.

P. Polyethylene (Plastic) Pipe:

1. Joints shall be installed by the heat fusion method, in accordance with manufacturer's recommendations and IAPMO installation standard IS 12, for natural gas.

2. Pipe Riser at Meter, Regulator and Building Wall: Prefabricated, anodeless type, utilizing a grade level transition between underground polyethylene pipe and gas supply steel pipe of riser outlet, R. W. Lyall Co., or equal. Below grade to above grade transition shall be installed in a welded, epoxy coated, steel casing.

3. Connections to Existing Pipe Line or Branch:

   a. Steel-to-plastic (PE): Provide manufacturer's prefabricated standard transition fitting, transition from epoxy-coated steel pipe to plastic, R. W. Lyall Co., or equal.

   b. Plastic-to-plastic, PVC to PE: Provide manufacturer's prefabricated standard transition fitting, transition from PVC to epoxy-coated steel pipe to PE; R.W. Lyall Co., or equal.

   c. Plastic-to-plastic, PE to PE: Provide manufacturer's standard fused tapping tee assembly with shut-off feature.

4. Provide PE reinforcing sleeves where PE pipe is fused to multi-saddles, service punch tee, reducing tees, transition fittings and anodeless risers.

O. Valves: Valves shall conform to the following:

1. Piping systems shall be furnished with valves at points indicated on Drawings and specified, arranged to provide complete regulating control of piping system throughout building and the Project site.

2. Valves shall be installed in a neat grouping, so that parts are easily accessible and maintained.

3. Globe valves of disc type shall be furnished with composition disc suitable for service on which installed.

4. Valves shall be full size of line in which they are installed, unless otherwise indicated on Drawings or otherwise specified, and shall be one of types specified.

5. Provide chain operators on valves 2 inches and larger located 7 feet or more above the servicing floor level.

6. Valves for similar service shall be of one manufacturer.

7. Except where otherwise specified, valves shall be Victaulic, Stockham, Crane, Jenkins, Milwaukee, Hammond or American, Nibco, Hoffman

8. Ball valves below grade in yard boxes shall have stainless steel handles.

9. Furnished hose bibs in dense garden areas shall be 3/4 inch in size with 1hose bib in the lunch pavilion 1 inch in size. Other furnished hose bibs, unless otherwise noted or specified, shall be 3/4 inch lock shield type. Bibs shall be furnished with vacuum breaker protection.

10. Safety valves and pressure relief valves shall have stamp of approval as required by ASME and shall be provided with annual test lever. Where a hot water storage tank is heated by means of a coil, pressure relief valve shall have a steam BTU discharge rating of the coil. Discharge pipe from safety or pressure relief valves shall be not

less than one pipe size larger than inlet pipe size of valve. Discharge pipe shall terminate as indicated and shall be free of traps. In addition to locations specified, pressure relief valves shall be installed in the following locations:

a. On discharge side of each pressure-reducing valve.

b. On each water heater connected to a hot water storage tank and other pressure vessels.

c. On cold water line to each water heater or hot water storage tank when there is a check valve, backflow prevention valve or similar device between water heater or hot water storage tank and meter or relief valve at the pressure reducing valve assembly.

d. On discharge side of each air compressor.

e. On each air receiver connected to an air compressor.

11. Temperature relief valves and combination temperature and pressure relief valves shall be as specified and furnished as set forth in this section. Discharge pipe from relief valves shall be not less than discharge area of valve or valves it connects, based on discharge area of valves, and shall terminate as indicated and free of any traps. Valves shall be installed at following locations:

a. A combination temperature and pressure relief valve or combination of valves on each hot water storage tank. Temperature sending element shall extend into water inside tank.

b. A combination pressure and temperature relief valve on each water heater not connected to a storage tank. Temperature sensing element shall extend into water inside heater tank. This valve shall be required in addition to any relief valve installed on cold water line.

12. Manual air vent valve assemblies shall be installed at each high point of hot water space heating and chilled water piping systems. Valves shall discharge through 1/4 inch diameter copper tubing and drain to nearest floor sink. Automatic type air vent valve shall only be installed where specifically indicated. Radiator, convectors, and finned pipe convectors shall be fitted with packless radiator valves, angle or straight pattern. Each convector or radiator installed as part of a space hot water heating system shall be furnished with a manual-type air vent valve.

P. Strainers: Strainers shall be installed on each water main downstream of the meter, above grade, when a pressure regulator assembly is not installed. Main strainer shall be of Y-flange or groove type. On closed loop chilled and heating hot water systems pump systems, a strainer shall be installed at each pump inlet and upstream of each flow control valve assembly. The control valve assembly may include a modulating temperature control valve and a flow-limiting valve, manufactured by Griswold, AutoFlow, or equal.

Q. Hangers and Supports:

1. Piping shall be securely fastened to building structure by approved iron hangers, supports, guides, anchors, and sway braces to maintain pipe alignment to prevent sagging and to prevent noise or excessive strain on piping due to uncontrolled or seismic movement under operating conditions. Hangers and supports shall conform to Manufacturer's Standardization Society Specification SP-69. Hangers shall be relocated as required to correct unsatisfactory conditions that may become evident

when system is placed into operation. Appliances, heat exchangers, storage tanks, and similar equipment shall be securely fastened to structure in accordance with seismic requirements. Outdoor metal hangers and supports shall be hot-dipped galvanized steel, unless otherwise specified.

2. Hose faucets, compressed air outlets, and similar items at ends of pipe branches shall be rigidly fastened to building construction near point of connection.

3. Piping shall not be supported by wire, rope, wood, plumbers' tape, or other non-recognized devices.

4. Hangers and supports shall be designed to support weight of pipe, fittings, weight of fluid and weight of pipe insulation, and shall have a minimum factor of safety of 5, based on ultimate tensile strength of material installed.

5. Burning or welding of any structural member under load is not permitted. Field welding not specified on Drawings or reviewed Shop Drawings is not permitted without review by Architect and DSA.

6. Burning holes in beam flanges or other structural members is not permitted without review by the Architect and DSA.

7. Pipe hangers on piping covered with low temperature insulation shall be installed on outside of insulation and not in contact with pipe unless otherwise detailed on Drawings. Insulation shall be protected by 18 gage galvanized steel shield, with a minimum length of 10 inches, installed completely around pipe covering between covering and hanger. Installing hangers directly on pipe and butting adjoining sections of insulation against hanger is permitted provided void and hanger rod are properly insulated and sealed so that no sweating occurs at hangers.

8. Hanger rods shall be fastened to structural steel members with suitable beam clamps. Clamps shall be Tolco, Carpenter and Patterson, or Fee and Mason, as follows:

   a. Tolco I beam, Fig.62 for maximum 1000 lbs.

   b. Tolco I or WF beam, Fig. 329, for maximum of 1290 lbs.

9. Hanger rods shall be fastened to concrete inserts in concrete slabs or beams. Inserts shall be Tolco, Carpenter and Patterson, or Fee and Mason, as follows:

   a. Tolco Fig.310 for maximum of 600 lbs.

   b. Tolco Fig. 309 for maximum of 1140 lbs.

10. For fastening to wood ceilings, beams, or joists, furnish Grinnell figure 128 or 202 pipe hanger flange fastened with drive screws. Under wood floors, 3/8 inch hanger rods shall be hung from 2 inch x 2 inch x 1/4 inch angle clips 3 inches long, with 2 staggered 10d nails, clinched over joist.

11. Hanger rod sizes for copper, iron, or steel pipe: 3/8 inch for pipe sizes 1/2 inch through 2 inches, 1/2 inch for pipe sizes 3 inches, 4 inches and 5 inches, 5/8 inch for pipe size 6 inches, and 3/4 inch for 8 inches and 10 inches pipe.

12. Turnbuckles, if furnished, shall provide a load carrying capacity equal to that of the pipe hanger with which they are being installed.

13. Pipe hangers shall be of same size, or nearest larger manufactured size available, as pipe or tubing on which they are being installed.

14. Hangers, clamps, and guides furnished for support of non-metallic pipe shall be padded with 1/8 inch thick rubber, neoprene, or soft resilient cloth.

15. Where special pipe-supporting requirements in the Specifications conflict with any standard requirements specified herein, the Specification requirements shall govern.

16. Vertical Piping:

    a. Vertical pipe risers shall be securely supported with riser clamps of recognized type. Risers in reinforced concrete buildings shall be furnished with extension clamps fastened to pipe above each concrete floor slab with extended arms of clamp to rest on slab. Clamps shall be provided with lead or Teflon liners when installed on copper tubing. Clamps shall be plastic-coated when installed on non-ferrous pipe or tubing.

    b. Copper tubing in sizes 1-1/2 inches and larger and steel pipelines passing up through building shall be supported at each floor of building or every 15 feet whichever is less.

    c. Copper tubing sizes 1-1/4 inches and smaller shall be supported at not intervals not more than 6 feet on center. Special provisions shall be installed for vertical lines subject to expansion and contraction caused by operating temperature differences.

    d. Vertical cast iron pipelines shall be supported from each floor and at its base. Malleable iron or steel pipe clamps with minimum thickness of 1/4 inch shall be furnished and fastened around pipe for support.

17. Horizontal Piping:

    a. Pressure piping on roofs shall be supported from stands, trapezes, or structures so that the bottoms of pipes clear the roof surface by 10 inches.

    b. Insulated steam, space heating hot water, insulated condensate lines, insulated domestic hot water supply and return piping shall be supported with Tolco figure 4 steel hangers with welded eye rods to permit hinge movement at point of attachment of hangers. Hinge movement at point of support shall be provided by welded eye linked rods Tolco figure 101L.

    c. Domestic cold water piping, chilled water supply and return piping, condenser water piping, insulated refrigerant piping, gas piping, compressed air piping, cast iron soil piping, galvanized steel vents, waste and downspout piping and glass may be supported with Tolco figure 1or equal hangers with rods, turnbuckles and inserts suitable for above hangers.

    d. Maximum hanger and support spacing shall conform to CPC schedule for horizontal piping installed above grade.

18. A hanger or support shall be installed close to the point of change in direction of a pipe run, in either a horizontal or vertical plane.

19. When practicable, supports and hangers for cast iron soil pipe shall be installed as close as possible to joints and when hangers or supports are not located within one foot of a branch line fitting, an additional hanger or support shall be installed at fitting.

20. In systems where grooved piping is used, couplings shall be provided with angle pattern bolt pads to comply with support and hanging requirements of ANSI B31.1, B31.9 and NFPA-13.

R. Flashings:

1. Each pipe, duct, or gas-fired equipment vent passing through roof shall be installed with waterproof flashing.

2. Flashing or flanges on pipes, vents, and ducts passing through a tile or slate roof shall be constructed of sheet lead. Flashing for pipes and heater vents passing through a roof shall be 4 pound soft sheet lead. Flashing and flanges for ducts and heater vents passing through exterior walls shall be 22 gage sheet metal. Flanges and flashing shall be installed waterproof at point of connection with pipe or duct. No soldered joints on roof flashings will be allowed.

3. Lead flashing and flanges shall be constructed of 4 pound sheet lead with burned joints. Flange of lead flashing or lead flange on a duct shall extend out onto roof a minimum of 12 inches from pipe or duct. Lead flashing shall extend up the pipe or duct not less than 7 inches.

4. Sheet metal flashing shall be constructed of 24 gage galvanized sheet steel. Flanges on these flashings shall extend out onto roof a minimum of 10 inches from pipe or duct. Flanges on ducts through exterior walls shall extend out from duct a minimum of 2-1/2 inches. Flanges on gas-fired equipment single-wall vents shall be of ventilated type. Type B gas vents through a roof shall be furnished with non-ventilated flashing as per National Fire Code, Pamphlet 211-1105.

5. Cast iron, steel, brass, and copper pipe, which terminates less than 18 inches above roof, shall be furnished with a combination counter-flashing and vandal-proof hood for protection against water, birds and foreign matter. Cast iron, steel, brass and copper pipe, which does not terminate within 18 inches of roof, shall be furnished with a counter-flashing sleeve. Pipe, which terminates more than 18 inches above roof, shall be furnished with protection against entrance of water, birds, and foreign matter.

6. Counter-flashing and combination counter-flashing sleeves and vandal-proof hoods shall be cast iron, vandal-proof, threaded, caulked or approved gas-heated sleeve type. Counter-flashing sleeves on each of these items shall extend down over flashing a minimum of 3/4 inch.

7. Flashing and flanges on ducts shall be installed waterproof at point of connection to the duct by riveting and soldering. Storm collars shall be securely screwed and installed waterproof around appliance vent pipe immediately above flashing.

8. Vent piping above roof shall be furnished with a combination counter-flashing sleeve and vandal-proof hood.

S. Equipment Installation: Install roof or floor mounted equipment on level platforms, housekeeping pads or curbs and provide sound, vibration and seismic control measures per Section 15070, unless indicated otherwise whether indicated on drawings or not

END OF SECTION

SECTION 15070

MECHANICAL SOUND, VIBRATION, AND SEISMIC CONTROLS

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section

B. Section Includes: Reduction or elimination of excessive noise or vibration within building due to operation of equipment, machinery, piping, and ductwork as specified.

1. Vibration isolators.

2. Seismic restraint devices.

3. Lining and enclosing ductwork.

4. Sound attenuation boots at supply, return, exhaust and transfer air inlets, outlets and openings.

5. Flexible ducts, conduits and piping.

C. Related Sections:

1. Section 01000: General Requirements.

2. Section 15010: Basic Mechanical Requirements.

3. Section 15050: Basic Mechanical Materials and Methods.

4. Section 15300: Fire Protection Sprinkler and Standpipe Systems.

5. Section 15400: Plumbing.

6. Section 15700: Heating, Ventilating and Air Conditioning Equipment.

7. Section 15800: Air Distribution.

8. Section 15950: Testing, Adjusting And Balancing

1.02 GENERAL REQUIREMENTS

A. Provide vibration isolators to eliminate or reduce the transmission of vibration noise to any part of building and mitigate vibration frequency and load imposed by equipment. Vibration isolators, base frames, inertia bases and seismic restraints shall be of sufficient size, flexibility and load distribution configuration to assure that deflection, stability and seismic restraint requirements are met without permitting excessive movement when starting. For typical units, no fewer than

four isolators shall be provided. Isolators shall be provided to deflect uniformly under operating gravity and equipment thrust loadings to within ±10% of specified deflection values.

B. Static deflections specified are based on the anticipated equipment characteristics. In the event the equipment proposed by the Contractor has characteristics other than those indicated, particularly the rated rpm, the static deflection shall be re-evaluated and the proper mountings and other devices shall be provided.

C. Where fabricated vibration isolator units are indicated, furnish manufacturer's standard catalog products with printed loading ratings or certified submittals

D. Seismic Requirements:

1. Refer to Guidelines for Seismic Restraints of Mechanical Systems published by SMACNA, approved by DSA, for minimum seismic restraints required on mechanical components design and construction details.

2. Provide seismic restraints for mechanical equipment or components specified. Where equipment is specified with proprietary names, design for seismic restraints is for first proprietary name listed.

3. Provide restraints, bracing and anchorage as required for the mechanical equipment, electrical equipment and components specified in the Contract Documents. Restraints, bracing and anchorage shall be installed to resist the total design earthquake or wind loads in any direction in accordance with CBC Code and SMACNA guidelines.

4. Provide restraints, bracing, and anchorage for the mechanical equipment and components.

5. For rigidly mounted liquid filled steel pipe, comply with the following:

   a. Provisions of NFPA Pamphlet 13, Section 3 for sway bracing.

   b. Provisions of NFPA Pamphlet 13, Section 3 for earthquake protection.

   c. Hanger spacing as specified in Section 15050 under Hanger Spacing Schedule.

   d. SMACNA Guidelines for Seismic Restraints, of Mechanical Systems and Plumbing Piping and approved by DSA.

6. For flexibly mounted liquid filled steel pipe, comply with the following:

   a. Provisions of the California Building Code for flexibly mounted equipment.

   b. Provisions of VISCMA (Vibration Isolation and Seismic Control Manufacturer's Association) Seismic Control Device Installation, Best Practices Manuals.

   c. Installer may provide a DSA or OSHPD approved system such as the SMACNA Guidelines with Addendum No. 1, the Mason Industries Seismic Restraint Guidelines or other proprietary pre-approved system.

7. For ductwork and other mechanical equipment restraints, comply with SMACNA Guidelines for Seismic Restraints of Mechanical Systems and Plumbing Piping Systems and approved by DSA.

1.04 SUBMITTALS

A. Provide in accordance with Division 01.

1. Catalog cuts and data sheets on specific vibration isolators, seismic restraints, and anchors demonstrating compliance with the Specifications.

2. Shop Drawings for each piece of equipment including dimensions, structural member size, support point, vibration, and seismic restraints.

3. Written approval of frame design to be furnished by the equipment manufacturer.

4. Drawings indicating methods for suspension, support, seismic restraints, guides, etc., for piping, ductwork, etc.

5. Drawings indicating methods for isolation of pipes, ducts etc., piercing slabs, beams, etc.

B. Vibration Test Reports: At completion of installation, submit the following documents. Submission of these documents must be complete before final acceptance of vibration isolation systems is given. Assistance from the vibration isolation equipment Manufacturer may be required.

1. Complete tabulation showing for each vibration isolator:

a. Actual static deflection measured at the project.

b. Specified minimum static deflection.

2. Report certifying:

a. Each piece of operative rotating mechanical equipment does not exceed the specified vibration displacement level.

b. Each piece of isolated equipment or equipment component (ducts, pipes, conduit, etc.) is not short-circuited by any means.

c. Requirements of section 2.00 are satisfied for all equipment.

1.05 QUALITY ASSURANCE

A. Standards and Codes: Comply with applicable codes and standards having jurisdiction including, but not limited to:

1. NFPA, Pamphlet 13.

2. ASHRAE Systems Handbook.

3. SMACNA Guidelines for Seismic Restraints of Mechanical Systems and Plumbing Piping Systems.

4. CBC.

5. VISCMA Seismic Control Device Installation, Best Practices Manuals.

B. Qualifications of Manufacturer and Installers: Comply with provisions as set forth in Section 15010: Basic Mechanical Requirements.

PART 2 - PRODUCTS

2.01 GENERAL

A. Furnish and install vibration dampers, sound isolation pads, flexible connections and similar equipment required to prevent sound of water flowing in pipes, vibration of motors, and motor operated equipment from being transmitted to building structure; and, in case of fans, from being transmitted along ducts. Hot, tempered, and cold water lines shall be isolated from hangers, clamps and structural members by furnishing a commercially manufactured assembly of a hair felt or neoprene pad, cemented in a galvanized iron sleeve. Piping shall be isolated from vibrating equipment by furnishing required flexible connectors.

B. Excepting sump pumps and in-line circulating pumps, pumps and similar motor operated equipment shall be installed on anti-vibration units.

C. Fans, except curb-mounted roof-type exhaust fans and wall mounted propeller fans, shall be installed with anti-vibration units, whether indicated on Drawings or not. Fans built into air handling units may be furnished with independent anti-vibration mountings or whole unit may be installed on an external vibration isolation system.

D. Other equipment shall be installed on anti-vibration bases, pads, or hangers, unless specifically noted otherwise on Drawings. Package units, furnished with built in anti- vibration bases, do not require unit bases unless otherwise specified.

1. Unless specified otherwise, anti-vibration bases shall be Mason, M.W.Sausse/ Vibrex, of the Model Number specified or indicated on the drawings or equal by Mason or Korfund. Furnished base including sub-base, shall be manufactured by same company with fan and integral motor base. Seismic restraints may be incorporated into bases or furnished separately.

2. Inertia anti-vibration bases shall conform to requirements indicated.

3. Unless noted otherwise, furnished anti-vibration bases, including supporting units for inertia bases, shall be of the spring type.

4. Selection of bases or supporting units shall be in accordance with manufacturer's recommendations based on following installed minimum effective isolation efficiencies (where not provided with each piece of equipment):

a.	Centrifugal fans, packaged fan and coil units and cooling towers, less than 800 RPM	80 percent
b.	Centrifugal fans over 800 RPM	90 percent
c.	Centrifugal pumps	95 percent
d.	Reciprocating compressors	95 percent

E. Flexible duct connections shall be provided at inlet and outlets of each fan or HVAC unit, except curb-mounted roof exhaust fans whether indicated on the drawings or not.

F. Flexible pipe or conduit connections shall be provided at piping and conduit connections to HVAC units, pumps, compressors and other moving (reciprocating or rotating) mechanical or electrical equipment provided under this section whether indicated on the drawings or not.

G. Flexible connections for freon piping shall be seamless flexible metal hoses of type and length recommended by manufacturer and suitable for system operating pressure.

H. Flexible connections for all other piping shall be flexible metal hose or spool type with flanged ends, unless otherwise specified. Metal hose shall be covered with protective braiding in areas where physical abrasion may occur, or for personnel safety.

I. Spool types shall be similar to American Rubber Co., Mercer Rubber Co PROCO, and hose types shall be similar to D.M.E., Inc., U.S. Flex, Pennflex, Anaconda Flexpipe or Keflex with any required modifications to meet specified requirements. Flanges shall be furnished with steel retaining rings. Units installed on discharge side of pumps shall be furnished for a suitable working pressure of not less than 100 psig, and those on suction side for working pressures of 50 psig or 30 inches Hg vacuum.

J. Units installed in cold water lines (less than 125 degrees F.) shall furnish a minimum temperature rating of 180 degrees F. and those installed in hot water lines (above 125 degrees F.) shall be constructed of special heat resistant materials and be furnished for a minimum temperature rating of 220 degrees F., continuous operation. Units shall be able to withstand a maximum lateral deflection of 3/8 inch. Temperature and pressure ratings shall be molded into body of each spool unit so they are easily identified. Spool types shall be for straight in flow only.

K. Spool type units shall be furnished with control units comprised of a minimum of 2 tie-rods and anchor plates or internal guide sleeves to prevent excessive elongation or misalignment. Rubber washers shall be provided under bolt heads and rubber grommets in bolt holes to prevent any metal to metal contact between bolts and flanges.

L. Where hose type units are furnished, restraining anchors or braces shall be provided if excessive or undesirable pipe movement occurs when system is operated.

2.02 GENERAL PROPERTIES OF VIBRATION ISOLATORS.

A. Shall be provided with markings so that, after adjustment, when carrying their load, deflection under load can be verified; thus determining that load is within proper range of device and that correct degree of vibration isolation is being provided according to the design.

B. Isolators to operate in direct proportion to their load versus deflection curve. Load versus deflection curves shall be furnished by manufacturer and must be linear over a deflection range of 50 percent above design deflection.

C. Wave motion through isolator shall be reduced to following extent: Isolation above resonant frequency shall follow theoretical prediction based upon an un-dampened single degree of freedom system with a minimum isolation of 50 decibels above 150 cycles per second.

D. Vibration isolator spring diameters shall be no less than their deflected height. Furnish spring with a 50 percent overload safety factor.

E. Unless otherwise indicated, equipment installed on vibration bases shall provide a minimum operating clearance of one inch between structural steel base and floor or support base. Provide flexible connectors in piping and flexible conduit in power wiring to minimize transmission of vibration.

F. Isolators and springs exposed to weather shall be hot-dipped galvanized or powder coated after fabrication and before installation. Hot-dipped zinc coating shall be not less than 2 ounces per square foot by weight complying with ASTM A123. In addition, provide limit stops to resist wind velocity.

G. Where indicated, provide structural steel bases with height saving brackets, and minimum of 3 points of support. Isolators shall be furnished with a method for leveling.

H. Design isolators and seismic restraints for positive anchorage against uplift and overturning.

I. Provide and install, under this section of the Specifications, structural steel required to properly support equipment and steel required to support horizontal thrust arrestors.

2.03 ISOLATOR TYPES

A. Type A: Steel Spring Isolators: Un-housed steel spring isolators, laterally stable and unrestrained. Design springs so that ratio of horizontal to vertical spring (stiffness) constant is between 0.9 and 1.3. Natural frequency of isolator must be 1/3 to 1/4 of driving frequency that is to be controlled. Isolators to provide a minimum additional travel to solid equal to 50% of rated deflection. Isolators shall be furnished with built-in leveling bolts complete with sound isolation pads type B. Static deflection as specified.

B. Type B: Sound Isolation Pad: Provide under each spring isolator a sound isolation pad, utilizing high quality durable neoprene pad material, loaded to 40 psi. Build sound pad up to 2 layers of 1/4 inch thick neoprene material; separate layers with a 16 gage galvanized sheet metal plate. Top layer shall provide a hardness of 40 durometers and the bottom layer shall be 40 durometers. Cold bond sound pads together and to isolator baseplate.

C. Type C: Neoprene-in-Shear Isolators: Isolator shall be neoprene-in-shear type as recommended by manufacturer. Isolator shall provide a static deflection under rated load at 1/4 inch.

2.04 EQUIPMENT FRAMES

A. Provide mounting frames and brackets to carry load of equipment without causing mechanical distortion or stress to the equipment.

B. Type A Frame: Wide flange members, rigidized structural steel frame with brackets. Maximum allowable deflection at any point on load frame relative to unloaded frame shall be 0.005 inch. Members to be constructed of wide flange beams, with a depth of not less than 1/10 of length of span between isolators. Frame shall be M.W. Sausse type RMSB-W or equal by Mason Industries.

C. Type B Frame: Channel members, rigidized structural steel frame with brackets. Frame to be constructed of channel steel with section depth equal to 1/10th length of longest structural member. Frame shall be M.W. Sausse type RMSB-C or equal by Mason Industries.

D. Type C Frame: Steel gusset or bracket welded or bolted directly to machine frame in order to accommodate isolator. Frame shall be M.W. Sausse type RMSG or equal by Mason Industries.

E. Type D Frame: Fabricated of rectangular channel steel forms for floating foundations to be filled with concrete on the Project site. Channel depth to be a minimum of 1/12th of longest dimension, but in no case less than 6 inches. Form shall include 1/2 inch reinforcing bars installed each way in a layer 1-1/2 inches above bottom and drilled steel members with sleeves mounted below holes to receive equipment anchor bolts. Weight of concrete and frame shall be two times or more than the weight of the unit it supports. Frame shall be M.W. Sausse type RMSBI, or equal by Mason Industries.

2.05 MATERIALS AND CONSTRUCTION

A. Duct Silencers: (NOT USED).

B. Duct Liner: As indicated in Section 15080: Mechanical Insulation.

C. Flexible Ducts: As indicated in Section 15800: Air Distribution

PART 3 - EXECUTION

3.01 INSTALLATION

A. Provide isolators, flexible pipe connectors, flexible electrical conduit and flexible duct connectors at all moving mechanical system components to prevent transmission of vibration noise to any part of building whether indicated on the drawings or not.

B. Install isolators to suit imposed load and the vibration frequency to be absorbed. Isolator units shall furnish adequate strength and flexibility to exhibit proper resiliency under machine load and impact without permitting excessive movement when starting.

C. Where commercial vibration isolator and seismic restraint units are specified, furnish manufacturer's standard catalog products with printed loading ratings, or provide substantiating calculations.

D. Install vibration isolators and seismic restraints in accordance with manufacturer's printed installation instructions.

E. Where equipment is belt driven and motor is not installed on equipment, install motor, and driven equipment on unitized support, and install entire support isolators. Unitized support to be provided with adjustable slide rails sized for motor weight and frequency. Support shall be Mason Industries type WF, M.W. Sausse type RMSF, or equal.

F. Do not install any equipment, piping, conduit, ductwork, etc., that makes rigid contact with building or its structural members, unless reviewed by the Architect.

1. Coordinate Work with other trades to avoid rigid contact with building.

2. Correct, before installation, any conflict with other Work that would result in solid contact to equipment or piping due to inadequate space.

3. Obtain inspection from the IOR for concealed Work before enclosure.

4. Notify manufacturer before installation of vibration isolation devices so that manufacturer may instruct and demonstrate technique for proper installation.

G. The furnishing or installation of vibration isolators must not cause any change of position or alignment of equipment, ductwork, or piping, resulting in stresses in piping or ductwork, connections, or misalignment of shafts or bearings. Equipment, piping, and ductwork shall be maintained in a rigid position during installation. Load shall not be transferred to isolator until installation is complete and under full operational load.

H. Air Conditioning Units, Floor Mounted Fans, and Cabinet-Installed Fans: Install entire casing including filters, mixing box, fan section, coil sections, etc., on a continuous, integral, structural steel base, as indicated. Furnish type A, B, or C frames, reinforced as necessary to prevent distortion of frame. Furnish isolator type A; static deflection shall be a minimum of l-l/2 inches

I. Suspended Fans and Air Conditioning Unit Fan Coils: Suspend each integral unit from overhead structure on steel spring and elastomer hanger isolators. Support deflection under rated load of 3/8 inch. Provide spring static deflection as follows:

Fan RPM	Min. Deflection
200 – 400	3 inches
400 – 700	2 inches
Above 700	1 inches

J. Pipe Isolation: Where indicated and as required, furnish and support each pipe from an isolator. Isolator for the first 5 support locations away from vibrating equipment shall have the same deflection as the equipment isolators. After that, isolators shall be a neoprene-in-shear type of size as recommended by manufacturer; except where indicated on Drawings, pipe hanger rod shall be furnished with a steel spring isolator and elastomeric element, with lower rod capable of 30 degrees total misalignment without contact on spring housing.

K. Seismic Restraints: Floor or pad mounted equipment that do not require vibration isolators, shall be bolted to floor or other support. Floor mounted equipment with vibration isolators shall be

provided with lateral and vertical restraining devices on all sides of base to restrict displacement of equipment. On all sides of suspended equipment, provide bracing for rigid supports and provide aircraft cable restraints for resiliently supported equipment.

L. Ductwork, duct acoustical lining, manual volume dampers and flexible ducts: Do not reduce length of duct runs, duct acoustical lining, manual volume dampers and flexible ducts for economy.

M. Installation of flexible ducts at air inlets and outlets: Do not attach flexible ducts directly to air inlets and outlets unless a straight, smooth and uniform air flow can be achieved with sufficient space to make an elbow with a radius of at least three times the diameter of the duct. If sufficient space is not available to make such an elbow, provide a rigid elbow or a lined plenum.

N. Placement of Air Devices: Do not relocate air devices without the Architect's approval.

3.02 EXAMINATION

A. Arrange for the services of a certified representative of isolation manufacturer to visit the Project site for inspecting installation of devices. In the event the isolators do not meet specified requirements perform necessary revisions. Submit a written report to the Architect signed by above representative indicating all devices are properly installed and are operating as specified or required by isolation manufacturer.

END OF SECTION

SECTION 15075

MECHANICAL IDENTIFICATION

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section

B. Section Includes: Provide marking and identification required on mechanical piping systems, ducts, controls, valves, apparatus, etc., as specified in this section or any related sections.

C. Related Sections:

1. Section 15050: Basic Mechanical Materials and Methods.

2. Section 15300: Fire Protection Sprinkler and Standpipe Systems.

3. Section 15400: Plumbing.

4. Section 15700: Heating, Ventilating and Air Conditioning Equipment.

5. Section 15800: Air Distribution.

6. Section 15900: HVAC Instrumentation and Controls.

1.02 SUBMITTALS

A. Submit in accordance with Division 01 and Sections 15010: Basic Mechanical Requirements.

B. Submit product data and installation instructions for each item specified.

C. Submit Samples of materials.

1.03 QUALITY ASSURANCE

A. Comply with provisions of

1. Section 15010: Basic Mechanical Requirements.

2. ANSI/ASME A13.1: Scheme for the Identification of Piping Systems.

3. APWA: Uniform Color Code.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General: Piping systems, controls, valves, apparatus, etc., except those that are installed in inaccessible locations in partitions, walls, and floors, shall be permanently identified.

2.02 VALVES

A. Furnish prepared chart or diagram for each piping system, indicating by identifying letter or model number of each valve in the system, its location, and function.

B. Install charts in aluminum frame with clear glass front and secure on wall where designated by the IOR.

C. Bind copies of each chart in operating instructions manual.

D. Provide each valve with a brass, aluminum, or plastic disc, not less than 1-1/4 inches diameter bearing engraved numbers corresponding to those indicated on chart. Fasten discs to valve with No. 14 brass wire.

E. Provide an additional tag for safety valves and other valves that could be hazardous to safety and health of occupants. Distinguish these tags from regular valve tags by color (such as yellow with black letters, and marked "Danger"); submit Sample tag to the Architect for review.

2.03 INSTRUMENTS AND CONTROLS

A. Identify panel-mounted instruments and controls with engraved bakelite nameplates permanently affixed to panel boards.

B. Identify alarm indicating devices and alarm reset devices by nameplates.

C. Identify damper motors and automatic valves, flow switches, pressure switches, etc., with embossed aluminum or plastic tape affixed to controller, indicating service and setting.

2.04 EQUIPMENT

A. Identify each major piece of equipment with engraved bakelite nameplates permanently affixed to the equipment, indicating the room numbers it services. Equipment identification designation shall be the same to its designation indicated on the "As-Built Drawings". Room numbers in the nameplates shall correspond to the final room numbers.

2.05 ABOVE GRADE PIPE IDENTIFICATION

A. Identify pipes by means of colored labels with directional flow arrows and identification of the pipe content, in conformance to ANSI/ASME A13.1.

B. Materials: Precoiled acrylic plastic with clear polyester coating, all-temperature, self-adhering, as manufactured by Brady, Brimar, Seton, Stranco, or equal.

C. Size:

Outside Diameter of Pipe or Insulation	Length of Color Field	Size of Letter
3/4" to 1-1/4"	8"	1/2"
1-1/2" to 2"	8"	3/4"
2-1/2" to 6"	12"	1-1/4"

8" to 10"	24"	2 1/2"
over 10"	32"	3-1/2"

D. Colors: As indicated in schedule.

E. Locations:

1. On accessible piping, whether insulated or not (including mechanical rooms, attic and ceiling spaces); except that labels shall be omitted from piping where contained material is obvious due to its connection to fixtures (such as faucets, water closets, etc.).

2. Near each valve and branch connection in such accessible piping.

3. At each pipe passage through wall or floor.

4. At not more than 20 feet spacing on straight pipe run between bands required in 2 and 3 above.

5. At each change in direction.

F. Application: Install on clean surfaces free of dust, grease, oil, or any material that will prevent proper adhesion. Replace non-adhering or curling labels with new labels, as required by the IOR.

G. Schedule:

Content of Pipe	Legend	Color Note
Domestic cold water	Dom. c.w	G
Non-potable cold water	NP c.w.	G (1)
Domestic hot-water 140°F	Dom h.w. 140°F	Y
Sanitary waste	San waste	G
Sanitary vent	San vent	G
Storm drain or downspout	Storm drain	G
Indirect drain	Ind drain	G (1)
Fire sprinkler supply	Sprinkler supply	R
Fire sprinkler drain	Sprinkler drain	R
Gas	Gas	B

H. Notes on Schedule:

1. Note (1) indicates 2-1/4 inches x one inch yellow label with 1/2 inch letters reading UNSAFE WATER at one end of primary label.

2. Colors:

a. Symbol Y indicates yellow background color.

b. Symbol G indicates green background color.

c. Symbol R indicates red background color.

d. Symbol B indicates blue background color.

e. All letters shall be in white print, except yellow labels, which shall be in black print.

2.06 UNDERGROUND PIPE

A. Detectable Marking Tape:

1. Provide and install detectable marking tape along buried piping. Tape shall be specifically manufactured for marking and locating underground utilities with electronic equipment. Tape shall be acid and alkali resistant, and manufactured with integral wires or foil backing, encased with protective cladding. Tape shall be a minimum of two inches (2") in width.

2. Manufacturer: Reef Industries Inc., Advantage Brands, Inc., Northtown Company, Mutual Industries, Inc., or equal.

3. Detectable marking tape shall be color-coded per APWA Color Code:

a. Yellow: Oil, gas and steam.

b. Blue: Water, irrigation and slurry lines.

c. Red: Electric power lines, cables, conduit and lighting cables. By Division 16.

d. Green: Sewer and drain lines.

e. Orange: Communication, alarm or signal cables. By Divisions 16 and 25.

B. Tracer Wire:

1. Solid copper wire type THHN, 12 AWG gauge, with heat and moisture resistant insulation.

2.07 IDENTIFICATION OF AIR CONDITIONING EQUIPMENT

A. Provide identification markers to locate air conditioning equipment above T-bar ceilings. Install 3/4 inch to one inch diameter colored self-adhesive dots to T-bar ceiling grid indicating point of access. The following identification markers shall be recorded on the project record documents:

1. Fire Damper and Combination Fire/Smoke Fire Damper: Red.

2. Manual Volume Dampers, Relief Dampers, Motorized Volume Dampers: Blue.

a. Supply air: Full dot.

b. Return air: Half dot.

3. Fan coil unit: Green.

4. Filter Location if separate from fan coil: Yellow.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Correct detrimental conditions prior to commencing the Work of this section. Install markers and identification tags as specified with materials and installation procedures recommended by manufacturer.

B. Place tracer wire on top of non-metal utility lines allowing some slack. Do not wrap tracer wire around pipe. Fasten tracer wire in place at approximately at 10 feet on centers with non-metal ties.

C. Install underground detectable pipe marking tape continuously buried 10 inches above the buried utility pipe. Wrap tape on pipe risers up to a height of 12 inches above grade.

3.02 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 15080

MECHANICAL INSULATION

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes:

1. Condensate drain piping from air conditioning equipment.

2. High temperature equipment.

3. Refrigerant piping.

4. Supply and return air ducts for heating and cooling systems air ducts.

5. Plumbing piping and equipment including hot and tempered domestic water supply and return piping.

C. Related Sections:

1. Section 15010: Basic Mechanical Requirements.

2. Section 15050: Basic Mechanical Materials and Methods.

3. Section 15075: Mechanical Identification.

4. Section 15400: Plumbing.

5. Section 15700: Heating, Ventilating and Air Conditioning Equipment.

6. Section 15800: Air Distribution.

1.02 REFERENCES

A. American Society for Testing and Materials International:

1. ASTM C167 - Standard Test Methods for Thickness and Density of Blanket or Batt Thermal Insulations.

2. ASTM C302 - Standard Test Method for Density and Dimensions of Preformed Pipe-Covering-Type Thermal Insulation.

3. ASTM C411 - Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.

4. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

5. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation.

6. ASTM C534 - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.

7. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation.

8. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

9. ASTM C739 - Standard Specification for Cellulosic Fiber Loose-Fill Thermal Insulation.

10. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material).

11. ASTM C1104 - Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation.

12. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

13. ASTM E795 - Standard Practices for Mounting Test Specimens During Sound Absorption Tests.

14. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

B. Underwriters Laboratories, Inc.:

1. UL 181 - Factory-Made Air Ducts and Air Connectors.

2. UL 723 - Test for Surface Burning Characteristics of Building Materials.

C. National Fire Protection Association:

1. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems .

2. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems.

3. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.

1.03 SUBMITTALS

A. Submit in accordance with Division 01 and Section 15010: Basic Mechanical Requirements.

1. Complete material list of items to be furnished and installed under this section.

2. Manufacturer's specifications and other data required demonstrating compliance with the specified requirements.

3. Shop Drawings, catalog cuts and manufacturer's data indicating insulation, jacketing, adhesives, and coating. Insulating materials shall be certified by manufacturer to comply with the California quality standards for insulating materials.

4. Display sample cutaway sections.

5. Manufacturer's recommended method of installation procedures, which will become part of this Specification section.

1.04 QUALITY ASSURANCE

A. Qualifications of Manufacturer and Installer, Workmanship and Standard of Quality: Comply with provisions stated under Section 15010: Basic Mechanical Requirements and Section 15050: Basic Mechanical Materials and Methods.

B. Insulation Work shall be in accordance with the State of California Building Energy Efficiency Standards, CBC, and Uniform Mechanical Code.

C. Test Ratings:

1. Comply with provisions stated under Section 15010 and 15050 with emphasis on ASTM E84, NFPA 255, or UL 723. ASTM C167, ASTM C302, UL label or listing of satisfactory test results from the National Bureau of Standards, or a satisfactory certified test report from an acceptable testing laboratory. Approval by the State Fire Marshal is required.

2. Furnish labels, legibly printed with the name of the manufacturer or listings indicate that fire hazard ratings do not exceed those specified for materials proposed for installation. Flame spread index of not more than 25 and smoke developed rating not exceeding 50.

3. Tests shall be performed on each item individually when insulation, vapor barrier covering, wrapping materials, or adhesives are installed separately at the Project site.

4. Test insulation, vapor barrier covering, wrapping materials and adhesives as an assembly when they are factory composite systems.

D. Regulatory Requirements: Insulation furnished and installed under this section shall meet minimum legal requirements of the Building Energy Efficiency Standards adopted and incorporated in the California Energy Commission, Title 24, Part 2, Chapters 2 through 53, unless otherwise noted, for the piping, ductwork, and equipment.

E. All chemically based products such as sealers, primers, fillers, adhesives, etc. must meet the California air quality regulations.

1.05 PRODUCT HANDLING

A. Protection, Replacement, Delivery and Storage: Comply with provisions stated under Sections 15010: Basic Mechanical Requirements and 15050: Basic Mechanical Materials and Methods.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General:

1. Insulating material shall be fire resistant, non-corrosive, shall not break, settle, sag, pack or disintegrate under vibration, nor absorb more than 1 percent moisture by weight.

2. Insulating material shall be furnished with thickness indicated in Table 1, and shall furnish thermal resistance in the range of R 4.0 to 4.6 in accordance with inch at 75 degrees F. For any other value of R, insulation thickness shall be calculated accordingly and submitted for review.

3. Asbestos in any quantity in insulating material is not permitted.

4. Provide insulation materials, adhesives, coatings, sealants, fitting covers, and other accessories with a fire hazard rating not to exceed 25 for flame spread, 25 for fuel contributed and 50 for smoke developed, except for materials listed as follows:

   a. Nylon anchors for installing insulation to ducts or equipment.

   b. Treated wood blocks.

5. Flameproofing treatments subject to moisture damage are not permitted.

TABLE 1 - MINIMUM PIPING INSULATION THICKNESS (1)

Insulation Thickness Required (in inches)

Piping System Type	Temp. Range (degrees F)	Runouts up to 2 (2)	1 and less	1.25-2	2.5-4	5-6	8 and larger
Service Water Heating Systems (recirculating, piping supply and return)							
Hot Water	Up to 180	0.5	1.0	1.0	1.5	1.5	1.5
Space Cooling Systems (Refrigerant)							
Refrigerant	Below 40	1.0	1.0	1.5	1.5	1.5	1.5
Condensate Drain	1/2 inches Minimum insulation thickness.	0.5	0.5	0.5	0.5	0.5	0.5
From A/C Equipment:	Insulate condensate drain lines within building, in room, inside walls and above ceilings.	0.5	0.5	0.5	0.5	0.5	0.5

NOTES: (1) For piping exposed to ambient temperatures, increase thickness by 0.5 inch.

(2) Runouts to individual terminal units, not exceeding 12 feet in length.

B. Lagging Adhesives: Shall be nonflammable and fire-resistant and shall have a maximum flame spread index of 25 and a maximum smoke developed index of 50 when tested in accordance with ASTM E 84. Insulation finished with canvas shall be provided with laps adhered in accordance to manufacturer's recommendation. A finish coat of same material shall be applied to entire outer surface of lagging cloth at coverage specified by manufacturer.

C. Canvas Jackets: Furnish 6 oz. in accordance with square foot minimum, 48 x 48 thread count canvas jacketing.

D. Insulation Jackets:

1. Exterior insulation exposed to weather shall be weatherproofed with Childers aluminum jacketing, or equal. Jacketing shall be manufactured from 1100, 3105 or 5010 aluminum alloy with 3/16 inch corrugations. Smooth or embossed jackets may be permitted in special situations to match an existing installation. Jacketing shall be furnished with an integrally bonded moisture barrier over entire surface in contact with insulation. A minimum thickness of 0.016 aluminum jacketing is to be provided on ducts and piping. A minimum thickness of 0.020 shall be provided on tanks, equipment, and heat exchangers.

2. Insulated elbows, of 90 degrees and 45 degrees, with a nominal iron pipe size of 1/2 inch to 8 inches shall be provided with Childers aluminum Ell-Jacs insulation covers, or equal, manufactured from 1100 aluminum alloy of 0.024 inch thickness. Insulated elbows with a nominal pipe size of 10 inches to 18 inches shall be provided with Childers 4-piece aluminum Ell-Jacs.

3. Tees, Flanges, and Valve Insulation in Conjunction with Aluminum Jacketing: Furnish Childers Aluminum Special Fabrications Insulation Covers as manufactured by Childers Products Company, or equal.

E. Adhesives: Adhesives shall be water based, UL Classified, meet the requirements of NFPA Standard 90-A & 90-B and has been tested according to relevant ASTM requirements and be acceptable to the State Fire Marshal. Name, type and method of installation shall be submitted for review.

F. Valve and Fitting Cover: When installed in conjunction with PVC jacketing, furnish Zeston 25/50 rated polyvinyl chloride fitting covers as manufactured by Johns Manville, or equal.

2.02 DOMESTIC HOT WATER PIPING SYSTEM INSULATION

A. General: Insulate domestic hot water supply and return piping, including valves, strainers and fittings with insulation thickness as indicated on Table 1.

B. Materials:

1. Classes of Insulation:

a. Class A: Calcium silicate molded pipe insulation, suitable for service temperature up to 1200 degrees F., ASTM C533; Johns Manville Thermo 12, Owens-Corning Kaylo-10, or equal. Fittings: diatomaceous silica thermal insulating cement, ASTM C 197.

b. Class B: Glass fiber molded pipe insulation suitable for service temperatures up to 850 degrees F. Pipe insulation shall be one piece,

preformed, and provide a minimum R factor of 4.0 at 75 degrees F. mean temperature. Insulation shall be faced with all-purpose fire retardant vapor barrier jacket. Pipe insulation shall be Johns Manville Micro-Lok, Certain-Teed Snap-On, or Owens-Corning ASJ/SSL II.

c. Class C: Flexible open-cell melamine (foam insulation) suitable for service temperature -320 degrees F. to 400 degrees F. Thermal conductivity at 75 degrees F. K=. 26. Pipe insulation, one-piece pre-formed, laminated to heavy non-reinforced PVC jacket, with locking track, factory installed to jacket, to snap insulation and jacket onto pipe. Similar to Thermazip insulating or Techlite Melamine Form Insulation System as manufactured by Accessible Products Co., or equal. Installation shall comply with manufacturers recommendations.

d. Class D: Mineral fiber pipe insulation suitable for service temperatures up to 1200 degrees F. Pipe insulation shall be one-piece, preformed up to 3 inches thickness, and provide a minimum R factor of 4.0 at 75 degrees F. mean temperature. Insulation shall be faced with all-purpose fire-retardant vapor barrier jacket. Pipe insulation shall be 8 pounds in accordance with cubic foot density by Industrial Insulation of Texas Inc. Delta Snap Wrap, Bradford Enercon Enerok, Lapinus 1200, or equal.

2. Locations and Class of Insulation Required:

TABLE 2 – LOCATIONS AND CLASS OF INSULATION REQUIRED

LOCATION	CLASS OF INSULATION
Boiler and Mechanical Equipment Room	A, B, C, or D
All Other Locations	A, B, C, or D

3. Fittings on indoor piping shall be covered with flush, hand-wrapped Class A, B, C, or D insulation, to match the adjoining pipe insulation and covered with polyvinyl chloride fitting covers: Zeston 2000 25/50 by Johns Manville, or equal.

4. Adhesive: Fibrous Adhesive to bond calcium silicate to itself and non-porous surfaces.

2.03 COOLING PIPING SYSTEM INSULATION

A. General: Insulate refrigerant piping.

B. Materials:

1. Classes of Insulation:

a. Class A: Expanded polystyrene pipe insulation, self-extinguishing type, either molded or extruded; Dow Chemical Styrofoam FR, California Zonolite Co. Dyfoam, or Koppers Insulfoam.

b. Class B: Glass fiber molded pipe insulation ASTM C547. Pipe insulation shall be one piece, preformed, and provide a minimum R factor of 4 at 75 degrees F. mean temperature. Insulation shall be faced with all-purpose fire retardant vapor barrier jacket. Pipe insulation shall be Johns Manville Micro-Lok, Certain-Teed Snap-On, or Owens-Corning ASJ/SSL II.

c. Class C: Expanded (foamed) urethane (polyurethane) pipe insulation of self-extinguishing type molded or fabricated, UpJohn Co. CFR Division, Armstrong Armalok or Expando-foam, or Owens-Corning Urethane.

d. Class D: Foamed plastic pipe insulation, self-extinguishing type, ASTM C534 Type 1 - tubular. Pipe insulation shall be one-piece preformed, flexible tubing type and provide a minimum K factor of 0.28 at 75 degrees F. mean temperature. Pipe insulation shall be Johns Manville Rubatex, Armstrong Armaflex II, or equal.

2. Locations and Class of Insulation Required: For thickness required, refer to Table 1 of this section.

TABLE 3 – SERVICE, LOCATION AND CLASS OF INSULATION REQUIRED

SERVICE	LOCATION	CLASS OF INSULATION
Condensate drains from air conditioning equipment	Indoors at all locations including above ceilings and between stud walls	D
Refrigerant suction Liquid line as required	All locations except underground	D
All other piping, except underground	All locations except underground	A, B, C,

3. Adhesives:

a. Polystyrene adhesives: Synthetic rubber and resin adhesives specifically designed to adhere extruded and expanded rigid polystyrene and urethane insulation to themselves and to other porous and non-porous substrates.

b. Vapor barrier laps and penetrations: Furnish protective coating and lagging adhesive on butt joints of foil-faced vapor barriers, and where pins and staples puncture facings.

2.04 HIGH TEMPERATURE EQUIPMENT INSULATION (NOT USED.)

2.05 LOW TEMPERATURE EQUIPMENT INSULATION (NOT USED.)

2.06 DUCTWORK AND PLENUM INSULATION

A. General: Insulate ductwork and plenums with not less than the amount of insulation tabulated in Table 4. Insulation may be omitted under the following conditions:

1. Exposed return air ductwork in conditioned space.

2. Return air ductwork between wall studs inside an interior wall.

TABLE 4 - INSULATION OF DUCTS AND PLENUM

INSULATION TYPES

Duct Location	Heating and Cooling
On roof or exterior of building	L2
Attics, Garages, and Crawl Spaces	F-3 or L-2 See Note 3
In walls, within floor-ceiling spaces	F-1 or L-1 See Note 3
Hot and cold plenums	F-2 or L-2 See Note 3
Within unconditioned space or in basement	F-3 or L-2 See Note 3

B. Insulation Types:

1. F-1: 1 ½" blanket fiberglass, factory-laminated with all-service jacket vapor barrier.

2. F-2: 2 inch blanket fiberglass, factory-laminated with all service jacket vapor barrier.

3. F-3: 3 inch blanket fiberglass, factory-laminated with all service jacket vapor barrier.

4. L1: 1 inch internal duct lining. Flexible type for ducts and rigid board for plenums.

5. L2: 2 inch internal duct lining. Flexible type for ducts and rigid board for plenums. Duct joints shall be waterproofed.

C. Notes:

1. Minimum insulation provided shall be as required by the current CAC Title 24 for the most restrictive condition.

2. Refer to the materials indicated in this section for external insulation and internal lining, this section, below.

3. External insulation shall be replaced with internal duct lining (of equivalent thermal resistance value unless noted otherwise) where indicated on the drawings or specified elsewhere for sound attenuation.

4. Provide internal duct lining (1 inch unless noted otherwise) where indicated on the drawings or specified elsewhere for sound attenuation.

D. Materials:

1. Fire-Resistive Insulation Materials and Coatings: Submit State Fire Marshal pre-approved materials only.

2. Adhesives: See Article 2.01, E for applicable products.

3. External Insulation: Provide glass fiber blankets that are factory-laminated with reinforced foil Kraft (FRK) vapor barrier facing; Johns Manville Microlite, Owens

Corning all-service faced duct wrap, Ultralite No. 100, Pittsburgh Plate Glass Superfine, or Silvercote Silvercel. Provide a minimum installed R value as required by the latest edition of the California Energy Efficiency Standards; but not less than scheduled below:

TABLE 5

INSULATION OF DUCTS AND PLENUM INSTALLED

THERMAL RESISTANCE "R" VALUES

Type	Labeled Thickness	Installed R Value ($hr.ft^2.°F/Btu$)
F1	1 ½"	4.2
F2	2"	5.6
F3	3"	8.3
L1	1"	4.2
L2	2"	8.3

4. Internal Lining: Johns Manville Permacote® Linacoustic ® and/or Permacote® Spiracoustic®, Owens Corning QuietR® acoustic duct liner and liner board, or equal. Internal lining shall conform to:

   a. Fire Safety Standards: NFPA 90A and 90B.

   b. Operating Temperature: ASTM C411.

   c. Air velocity: ASTM C1071, UL 181.

   d. Fire Hazard Classification: ASTM E84, UL 723-Class 1, NFPA 255.

   e. Corrosion Resistance: ASTM C739 and ASTM C665.

   f. Fungi Resistance: ASTM G21.

   g. Water Vapor Sorption: ASTM C1104, less than 1% by weight.

   h. Formaldehyde, Phenolic Resins or other Volatile Organic compounds: 0%.

   i. Minimum R value as required by the latest edition of the California Energy Efficiency Standards, but not less than 4.0 at 75 degrees F.

   j. Acoustical Performance: ASTM C423 & ASTM E795 Minimum NRC of 0.75 for interior spaces Minimum NRC of 0.90 for exposed to weather.

   k. Hot and cold plenums separated by single partition: Minimum NRC of 0.75, both sides.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Except as specified herein, install material in accordance with recommendations of manufacturer. Do not install insulation materials until tests specified in other sections are completed. Remove foreign material such as rust, scale, or dirt. Surfaces shall be clean and dry. Maintain insulation clean and dry at all times.

B. On cold surfaces where a vapor barrier must be provided and maintained, insulation shall be installed with a continuous, unbroken moisture and vapor seal. Hangers, supports, anchors, or other projections that are fastened to cold surfaces shall be insulated and vapor sealed to prevent condensation.

C. Surface finishes shall be extended in such a manner as to protect raw edges, ends, and surfaces of insulation.

D. Pipe or duct insulation shall be continuous through walls, ceiling or floor openings, or sleeves; except where firestop or firesafing materials are required.

E. Metal shields shall be installed between hangers or supports and the piping insulation. Rigid insulation inserts shall be installed between the pipe and the insulation shields. Inserts shall be of equal thickness to adjacent insulation and shall be vapor sealed accordingly.

F. Insulation shall not be installed in the following locations unless otherwise noted:

1. On unions, flanged connections or valve handles.

2. Over edges of any manhole, clean-out hole, clean-out plug, access door or opening to a fire damper, so as to restrict opening or identification of access.

3. Over any label or stamp indicating make, approval, rating, inspection, or similar data, unless provision is made for identification and access to label or stamp.

3.02 INSTALLATION OF HEATING PIPING SYSTEM INSULATION

A. General: Domestic hot water, tempered water supply and return piping, after having been tested, shall be cleaned and insulated.

B. Application: Insulate domestic hot water supply and return, including tempered supply and return piping in accordance with manufacturer's instructions and as specified herein.

1. Install insulation on valve bodies up to valve bonnet. Fill void in saddles, in accordance with Section 15050: Basic Mechanical Materials and Methods, with insulation and seal joints.

2. Install insulating material to fittings, valves, and strainers and smooth to thickness of adjacent covering. Leave strainer clean-out plugs accessible. Covers fabricated from polyvinyl chloride shall be furnished.

C. Insulation Jackets in Exposed Indoor Locations:

1. Cover completed insulation with canvas jacket tightly pasted to covering with lagging adhesive. Lap jacket seams 1-1/2 inches minimum. Finish entire jacket with coating of undiluted adhesive.

2. Equivalent factory applied pre-sized, glass fiber reinforced, or glass fiber jackets may be furnished. Seal jacket seams with adhesive in accordance with manufacturer's instructions.

3. Zeston 2000, or equal, fitting covers may be furnished, with molded or segmented insulation equal to specified insulation applied to fittings. Secure covers in accordance with manufacturer's instructions.

4. In addition to above requirements, cover exposed insulated piping within a distance of 8 feet above floors with 26 gage galvanized steel jacket. Omit jacket in areas accessible only to maintenance personnel, such as mechanical equipment rooms, utility corridors, accessible pipe tunnels and manholes.

D. Concealed Indoor Locations: Cover insulation over fittings, valves, and strainers with canvas. Provide pipe insulation with factory or field applied standard jacket of 4 oz. minimum canvas, fiberglass cloth, or glass fiber reinforced jacket. Seal jacket laps with adhesive in accordance with manufacturer's instructions.

E. Exposed Outdoors: In addition to canvas or fiberglass cloth cover, pipe insulation exposed to weather shall be provided with an additional 0.016 inches thick aluminum jacket with 2 inches lap connected with one inch hem overlap joint located on side of pipe and turned down to shed water. Jacket shall be strapped 12 inches on center with 1/2 inches wide stainless steel strapping and wing seals. Aluminum jacket shall be mitered to fit fittings.

3.03 INSTALLATION OF COOLING PIPING SYSTEM INSULATION

A. General: Refrigerant piping and condensate drain lines, after having been tested, shall be cleaned and insulated.

B. Application: Insulation on refrigerant suction lines and liquid lines, if indicated, and air conditioner interior drain lines shall be jacketed with fire-resistant vapor barrier of laminated aluminum foil consisting of 2 plies with glass-yarn reinforcing. Jacket joints shall be lapped and sealed with an approved adhesive. Insulation shall be secured with aluminum bands not less than 0.005 inch thick by 3/4 inches wide, spaced not over 12 inches on centers, or as recommended by manufacturer.

1. Longitudinal Seams: Butt hinged sections of covering tightly together and seal down jacket flap with adhesive, or with factory-applied, self-sealing lap with pressure-sensitive sealer protected with release paper.

2. End Joints: Wrap joint with a 3-inch wide (minimum) self-sealing tape.

3. Fittings and Valves: Fittings and valves shall be covered with same material of same thickness as pipe insulation, sealed with an approved, vapor-sealing tape or compound and covered with Zeston polyvinyl-chloride cover.

4. Pipe hangers shall be insulated or attached to pipe by an insulating insert, butted between adjoining insulation sections.

C. Additional Jackets:

1. Exposed Indoor Insulation: Cover with 26 gage galvanized sheet metal jacket to 8 feet above floors, except in mechanical equipment rooms and accessible pipe tunnels.

2. Exposed Outdoor Insulation: In addition to canvas or fiberglass cloth cover, provide 0.016 inch thick aluminum jacket with one inch wide aluminum bands and seals. Install appropriate jackets on valves and fittings.

3.04 INSTALLATION OF HIGH TEMPERATURE EQUIPMENT INSULATION

(NOT USED.)

3.05 INSTALLATION OF LOW-TEMPERATURE EQUIPMENT INSULATION

(NOT USED.)

3.06 INSTALLATION OF DUCTWORK AND PLENUM INSULATION

A. External Covering:

1. Before installing duct insulation, sheet metal ducts shall be clean, dry, and tightly sealed at joints and seams.

2. Duct exterior insulation shall be firmly wrapped around ductwork with joints lapped a minimum of 2 inches. Insulation shall be securely fastened with 18 gage copper-lined steel wire, or 16 gage soft-annealed galvanized wire spaced approximately 12 inches on centers and at loose ends, presenting a neat and workmanlike appearance. Where duct width is such that wiring will not fasten insulation firmly against duct an adhesive shall be furnished to fasten insulation to duct with wiring being installed at ends of insulation segment.

3. Duct insulation in finished rooms shall be covered with wrapped fiberglass cloth cover. Install on each corner of duct 26 gage galvanized steel small nose, wide flange corner bead of appropriate height. In unfinished rooms, the insulation shall have a vinyl or similar coating. In all rooms, insulation shall be fastened to the ducts with an approved adhesive instead of wire. Corners shall be cut and formed instead of bending the insulating material. Raw edges shall be taped.

4. Insulation on ductwork transporting conditioned air, both supply and return, and outside air intake ducts shall be furnished with a factory-applied, fire-resistant vapor barrier.

5. Exposed Ducts or Plenum:

a. Install insulation to ducts or plenum furnished with butt joints, without voids and with adhesive over entire surface of duct. Cover insulation with canvas jacket, fastened tightly to insulation with lagging adhesive. Install 2 finish coats of undiluted adhesive.

b. When installing jacket, finished covering shall be even and level, without humps, with constant diameters on round ducts maintained.

c. For non-lined insulated ducts or plenums exposed to weather: Insulation finish shall be 0.016 inch thick aluminum sheet with joints lapped not less than 3 inches, sealed, and secured with 6 gage by 3/8 inches aluminum sheet metal screws, or aluminum handgun-type rivets.

B. Lining General:

1. Floors of cold plenums and fan enclosure plenums shall not be insulated.

2. Cover short damper sections on lined ducts on outside to permit free operation of dampers and linkage.

3. Dimensions of ducts indicated are net inside dimensions and must include thickness of duct liners to obtain the required duct size.

4. Install insulation in square turns, where required, to cover interior surfaces before duct turns are installed.

C. Interior insulation (lining) of ducts shall be as specified in above.

1. Liner material installed during fabrication of duct with sealed face only exposed to air stream. Insulation shall be fastened to sheet metal with an approved fire-retardant adhesive, with minimum 90 percent coverage and edges firmly adhered. Mechanical fasteners shall supplement the adhesive on top sections of ducts more than 12 inches wide and on sides of ducts more than 24 inches high, and shall be spaced on 16-inch centers maximum. Fastener posts shall be cut off approximately 1/4 inch from metal disc.

D. Interior insulation in ducts or plenums shall not have exposed edges. Edges open to entering or leaving air streams shall be covered, secured in place and sealed with approved duct liner edge sealers.

3.07 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.08 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 15800

AIR DISTRIBUTION

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section

B. Section Includes: Provide ductwork and appurtenances required for a complete air transmission and distribution system for the heating, ventilating, and air conditioning systems indicated on Drawings and as specified.

C. Related Sections:

1. Section 09912: Interior Painting.

2. Section 15010: Basic Mechanical Requirements.

3. Section 15050: Basic Mechanical Materials and Methods.

4. Section 15070: Mechanical Sound, Vibration and Seismic Control.

5. Section 15080: Mechanical Insulation.

6. Section 15700: Heating, Ventilating and Air Conditioning Equipment.

7. Section 15900: HVAC Instrumentation and Controls.

8. Section 15950: Testing, Adjusting And Balancing

1.02 SUBMITTALS

A. Provide in accordance with Division 01 and Section 15010: Basic Mechanical Requirements.

B. Manufacturer's Data:

1. Complete list of items to be furnished and installed under this section. Material lists that do not require performance data shall include manufacturer names, types and model numbers.

2. Manufacturer's specifications and other data required to demonstrate compliance with specified requirements.

3. Literature shall include descriptions of equipment, types, models, sizes, capacity tables or curves marked to indicate performance characteristics, electrical requirements, options selected, space requirements (including allowances for servicing) and other data necessary to ensure compliance with requirements of these Specifications and performances indicated on Drawings. Data shall also include name and address of nearest service and maintenance organization that regularly stocks repair parts.

Listings of items that function as parts of an integrated system shall be furnished at one time.

4. Submit complete acoustical test reports showing that proposed products have been tested in accordance with latest editions of relevant ASHRAE and ARI Standards (ASHRAE Standard 70 for air inlets and outlets; ASHRAE Standard 130 and ANSI Standard 880 for terminal units) and will be suitable for operation in Project spaces with specified maximum noise criteria (NC) requirements. The results of all testing shall be certified by an independent testing agency and submitted to the Architect for approval. The submittal shall include a complete description of the test conditions, methods and procedures.

5. Submittals shall include a tabulation of proposed products, identification of Project spaces where proposed products are to be installed, maximum allowable NC for all Project spaces, and product NC (at specific design air volume) for all Project spaces.

6. Shop Drawings: Shop Drawings indicating methods of installation of equipment and materials, sizes and gages of ducts, and details of supports. Coordinate location of smoke detectors with other shop drawings. Items to be covered shall include but not be limited to following:

   a. Layout of ductwork and equipment drawn to scale to establish that equipment will fit into allotted spaces with clearance for installation and maintenance. Indicate proposed details for attachment, anchoring to, and hanging from structural framing of building. Indicate vibration isolation units, foundations, supports, and openings for passage of pipes and ducts

   b. Drawings indicating locations and sizes of sleeves and prepared openings for pipes and ducts.

   c. Typical details of supports for equipment and ductwork.

1.03 QUALITY ASSURANCE

A. Installer's and Manufacturer's Qualifications: Comply with provisions stated under Section 15010: Basic Mechanical Requirements.

B. All sound power level measurements and Manufacturers' NC value calculations shall be conducted in complete accordance with the latest version of ASHRAE Standards 70, 130 and ARI Standard 880. Equivalent test and calculation procedures may be substituted for the above procedures if approved in advance by the Architect.

1.04 PRODUCT HANDLING

A. Protection, Replacements, Delivery and Storage: Comply with provisions stated in Section 15010: Basic Mechanical Requirements.

1.05 COORDINATION

A. Coordinate activities in accordance with provisions of Section 15010: Basic Mechanical Requirements.

PART 2 - PRODUCTS

2.01 GENERAL

A. Unless otherwise noted, provisions, including amendments thereto, of the HVAC Duct Construction Standards of Sheet Metal and Air Conditioning Contractor's National Association (SMACNA) and the California Mechanical Code (CMC), are hereby made part of this section.

B. Rectangular, round and flat oval ducts shall be manufactured and installed in accordance with requirements of the HVAC Duct Construction Standards of SMACNA.

C. Sheet metal ducts shall be fabricated from galvanized steel, aluminum or stainless steel.

D. Galvanized steel ducts shall be fabricated of galvanized steel sheet, lock forming grade, conforming to ASTM A 525 and A 527.

E. Galvanized steel ducts gage thickness and permissible joints and seams of concealed ductwork shall conform to requirements in HVAC Duct Construction Standards of Sheet Metal and Air Conditioning Contractor's National Association (SMACNA) and the California Mechanical Code (CMC) unless noted otherwise on the drawings. The more stringent requirements shall prevail. Galvanized steel ducts gage thickness and permissible joints and seams of exposed ductwork shall conform to requirements in Table 2, Minimum Metal Gages, of this section. When more stringent requirements are noted on the drawings the most stringent requirement shall prevail.

F. Button punch snap-lock seams, Lockformer, or equal, shall be permitted only in concealed areas using 20 & 22 gage galvanized steel ducts with screws added at the ends. Button punch snap-lock is not permitted for aluminum or duct lighter than 22 gage.

G. Ducts shall be reinforced in accordance with SMACNA standards:
   1. Cross-broken Duct: Duct sizes 19 inches wide and larger which have more than 10 square feet of unbraced panel shall be beaded or cross-broken. This requirement is applicable to 20 gage or less thickness and 3 inches w.g. or less pressure. For details, refer to SMACNA manual.

H. Round, Oval and Flexible Duct for Galvanized Steel and Aluminum Ducts:

   1. Round Spiral Ducts and Fittings: Fabricated from galvanized sheet steel shall be machine-formed spiral pipe with sealed spiral locking joints. Fittings shall be furnished with continuous corrosion-resistant welds. Ducts and fittings shall be as manufactured by United Sheet Metal, or equal. Provide gages of ducts and fittings recommended by manufacturer.

   2. Details of seams and transverse joints for round duct and fittings shall conform to SMACNA standards.

   3. Flat oval ducts shall be provided as indicated on the Drawings. Reference standard details in SMACNA manual.

4. Minimum duct wall thickness for concealed flat oval duct construction shall conform to requirements in HVAC Duct Construction Standards of Sheet Metal and Air Conditioning Contractor's National Association (SMACNA) and the California Mechanical Code (CMC). The more stringent requirements shall prevail. Gage thickness and permissible joints and seams of exposed ductwork shall conform to requirements in Table 1, of this section.

5. Non-metallic flexible duct for T-bar suspended ceiling may be provided upon review of the Architect, after submittal of installation, bench details and certified test data in accordance with the Air Diffusion Council Test Code FD-72. Flexible duct shall be rated for not less than 6 inches w.g. static pressure.

6. Flexible duct shall be non-metallic, insulated for conditioned air supply and return. The flexible ducts shall be factory fabricated with exterior reinforced laminated vapor barrier, 1-1/2 inch thick fiber glass insulation (K=0.25 @ 75 degrees F.), encapsulated zinc-coated spring steel wire helix and impervious, smooth, non-perforated interior vinyl liner and factory fabricated steel connection collars. For the composite assembly, including insulation and vapor barrier, comply with NFPA Standard 90 A or 90 B and tested in accordance with UL Standard, UL-181. Non-insulated metallic ducts shall be provided for exhaust only.

7. Methods of installations, standards for joining and attaching, and supporting flexible duct shall conform to applicable provisions of SMACNA manual.

8. These provisions apply for ducts furnished for indoor comfort heating, ventilating and air conditioning service only.

9. Specifications herein shall not supersede installation requirements by flexible duct manufacturer if those are more stringent.

I. Stainless Steel Duct:

1. Materials for stainless steel duct shall be stainless steel conforming to ASTM A 167 and A 480.

2. Stainless steel ducts shall be provided as required and indicated on the Drawings.

3. Fume hood exhaust shall be stainless steel.

4. Kitchen hood make-up air supply and exhaust duct system shall be stainless steel Type 304.

5. Stainless steel ducts shall be constructed with welded joints except for connections to equipment which shall be flanged joints with gaskets.

6. Entire stainless steel duct systems shall comply with current CMC requirements for product conveying ducts except where the requirements of this specifications are more stringent.

J. Fittings and Other Construction Details: Details of fittings such as elbows, turning vanes, branch take-off and connections, duct access doors, connections for grilles, registers and ceiling diffusers, flexible connector at fan, etc., shall conform to applicable provisions of this section or SMACNA manual.

K. Duct Seam and Joint Sealant: Provide sealant or tape for metal ducts at duct joints which are defined as transverse joints between duct sections including girth joints, branch and sub-branch intersections, duct collar tap-ins, fitting subsections, louver and air terminal connections, access doors and frames, and abutments to building structure. Also provide the same at duct seams which are defined as longitudinal joint between duct sections. Spiral lock seams in factory fabricated round or oval ducts are excluded.

1. Sealant for low-pressure ducts shall be 3M Company Miracle D17, or equal, for installation with a caulking gun. Provide tape joints with canvas fastened with Borden Chemical Division Arabol adhesive, or equal.

2. Provide sealing material for medium-pressure ducts as described in the SMACNA manual for those pressures.

3. Sealant materials shall comply with the flame spread/smoke developed rating of current CMC when tested in accordance with ASTM E 84.

4. Sealant for exposed to weather ducts shall pass the Weather Resistance Test per ASTM G-53 @ 2000 hours QUV.

L. Restrictions:

1. Zinc-coated steel duct shall not be installed for ductwork transporting moisture-laden air. Aluminum shall not be installed for kitchen cooking equipment ductwork. Fume hood exhaust shall be stainless steel, non-metallic, or coated metal as required. Flexible duct may only be furnished where specifically indicated on Drawings. Aluminum ducts shall not be installed for internal pressures above 2 inches of water.

2. Fiberglass duct is not permitted as a substitute for sheet metal duct.

2.03 ACOUSTICAL DUCT AND PLENUM LINERS

A. Duct liners shall conform to requirements of Section 15080: Mechanical Insulation.

2.04 DAMPERS

A. Manually Operated Volume Control Dampers:

1. VD-1, Rectangular: Multi-blade type, opposed blade operation, 16 gage galvanized steel blades; center pivoted on 3/8 inch diameter steel trunnions; interlocking edges; dampers shall be in own angle frame, full duct size as indicated on Drawings; frame of minimum 16 gage steel channel construction. Provide with damper operator and axles positively locked to blade. Ruskin MD 35, or equal.

2. VD-2, Round: Frame shall be constructed of not less than 16 gage galvanized steel, blades of not less than 16 gage galvanized steel channel construction with factory neoprene seals, 1/2 inch diameter axle shafts and locking hand quadrant. Ruskin CDR S25, or equal.

3. VD-3, Oval: Frame shall be constructed of not less than 14 gage galvanized steel channels with factory blade seals of not less than 12 gage galvanized steel with not less than 1/2 inch diameter axle shafts. Provide Ruskin standard construction for frame,

blade and axle size, thickness and material variation. Provide adjustable locking hand quadrant. Ruskin CDO 25, or equal.

B. Motorized Volume Control Dampers:

1. MVD-1, Rectangular: Multi-blade type opposed blade operation, 16-gage minimum steel channel frame construction; 16-gage galvanized steel blades center pivoted on 1/2 inch diameter steel trunnions. Interlocking edges. Dampers shall be in own angle frame. Full duct size as indicated on the Drawings. Provide with matching 2-position motorized actuator with linkages, 120 VAC by Barber-Colman, Honeywell, or equal. Ruskin, Damer CD35, or Pottorff.

2. MVD-2, Round: Butterfly type constructed with minimum 18 gage galvanized steel frame with steel angle reinforcement on above 20 inches diameter. Blade 2-layer, minimum 14-gage equivalent thickness. Neoprene seal to ensure air tightness in closed position. Furnish with matching 2-position motorized actuator with linkage 120 VAC by Barber-Colman, Honeywell, or equal.

C. Automatic Fire Dampers:

1. FD, Fire Dampers: Shall conform to requirements of and be listed by State of California Fire Marshal and NBFU Pamphlet 90A. Dampers shall provide airflow resistance not to exceed 0.05 inch water gage static pressure at 900 fpm or 0.25 inch water gauge at 2000 fpm. Dampers shall be installed in required steel sleeve at each penetration of a rated partition. Dampers shall be dynamic type.

a. Vertical-mounted fire dampers: Fire damper shall be curtain type with blades removed from the air stream to allow for maximum free area. Dampers will be provided in factory sleeves as tested and listed by manufacturer. Dampers shall be rated for 1-1/2 hours for installation in one or 2-hour partitions. Provide UL listed fusible links of adequate size and temperature rating. Dampers will be installed according to the manufacturer's recommended installation instructions provided with units. Provide suitable access for inspection and servicing of each damper. Pottorff Model VFD-10 ISB (CSFM No. 3225-368:101), Ruskin, or equal.

b. Ceiling fire dampers: Ceiling fire dampers shall be butterfly type with ceramic material to minimize heat radiation. Dampers shall be rated for one hour and shall be furnished as a part of an integral sleeve ceiling box that will accept air distribution, have a UL listed and pre-mounted hanger tabs. Dampers shall be installed according to the manufacturers recommended installation instructions. Pottorff Model CFD-15 ES (CFSM No. 3225-368:104), Ruskin, or equal.

c. Combination fire and smoke dampers (CSFD): Combination fire and smoke dampers shall be louver bladed type. Units shall be tested and listed under UL 555 and UL 555S. Rating 1-1/2 hours for installation in one or 2-hour partitions. The seals shall be non-degradable steel to steel. Leakage shall not exceed 15 cfm/sq. ft. at one inch w.g. and shall be tested at 850 degrees F. Dampers shall be capable of being remotely controlled and reset for pressurization and smoke evacuation. Fire-releasing device shall be UL 33 listed melting fusible links.

Dampers shall be provided in sleeves with pre-mounted non-stall motor actuators and dual-position indicators for remote annunciation, if required. The complete assembly shall be factory cycled and tested prior to shipment. Provide suitable access for inspection and servicing of each damper. Pottorff Model FSD142 (CSFM No. 3225-368:110) with non-stall motor, or Ruskin Model FSD 35, FSD60 (CSFM No. 3225-245:005, 102) with electric fuse link Model EFL 200, with electric non-stall motor, or equal.

D. Relief Dampers: Parallel multi-blade, counter balanced type with adjustable counter weights. Constructed of 20 gage galvanized sheet steel or extruded aluminum with solid stops all around. Bearings shall be dust proof, ball bearings. Damper shall open on a positive pressure of 0.01" within space and close to a backdraft. Interlocking edges shall prevent dust infiltration when closed. Air Balance, Pottorff, Ruskin or Metal Form.

E. Duct Access Panels: Provide factory fabricated access panels in ducts where required for servicing fire or smoke dampers, and at other locations as specified in this section. Units shall consist of removable panel, gasketed and pressure sealed by controlled spring tension locks. Construct unit, including interior parts, of same material as duct. Units shall be constructed to be suitable for installation in systems of up to 5 inches water gauge static pressure.

2.05 AIR DISTRIBUTION DEVICES

A. General:

1. Grilles, registers, diffusers and appurtenances shall conform to requirements specified herein and shall be of type and sizes as specified and indicated on Drawings. Performance shall be in accordance with ASHRAE Standard 70 including airflow velocity, pressure, temperature, and sound measurements.

2. Sponge neoprene, rubber, vinyl or felt border gaskets shall be provided for surface-mounted registers, grilles or diffusers.

3. The noise generating characteristics of all specified grilles, registers, and diffusers shall be tested to, and comply with, all requirements of this specification. Representative samples shall be subjected to tests in accordance with applicable standards and procedures in order to demonstrate such compliance. A special test for this project is not required if the manufacturer has previous certified test results that can be made applicable to this project. Maximum Sound Levels of diffusers, grilles and registers shall be as follows:

Administrative office area:	NC 30
Libraries and other noise sensitive areas:	NC 25
Cafeterias, lockers areas:	NC 30.

4. Provide suitable frame types to match the ceiling types as specified or indicated on the Architectural Drawings

5. Ceiling diffusers shall be provided with equalizing grids deflectors. Barber-Colman Deflectrol, Anemostat Model ED, Tuttle, or Bailey M-6.

6. Ceiling mounted grilles, registers and diffusers shall be provided with a factory applied, baked enamel, dull finish, bone white to match acoustical ceiling tile.

7. Grilles or registers mounted on painted walls or other surfaces shall be furnished with a baked prime coat and finish painted in accordance with Section 09900: Paints and Coatings.

8. Do not provide opposed blade dampers at diffusers and registers for to balance the airflow, as they tend to create noise. Provide a manual volume damper at each branch take-off and also at branch duct to each diffuser and register upstream of the flexible duct connections. Air throw patterns shall be as indicated on the drawings.

9. Diffusers, registers and grilles indicated or scheduled on the drawings to comply with special requirements shall take precedence over the standard items specified.

10. Ceiling diffusers return grilles with duct connections, and exhaust grilles shall be provided with loose key-operated opposed blade volume control. Volume controls for return grilles without duct connections are not required.

B. Ceiling Diffusers - Round, Square, Rectangular:

1. CD-1 For areas of less than 10'-0" ceiling height only. Units shall be square or rectangular modular core type as indicated on the drawings. Anemostat Type RMD, Krueger Model 1240 or Price Model SMCD.

2. CD-2 For typical rooms. Units shall be square plaque type. Anemostat Type PG, Krueger Model PLQ or Price Model SPD.. The horizontal air discharge pattern shall be 360-degree radial type with factory installed blank-offs for 3 way, 2 way corner, 2 way opposite, or 1 way discharge pattern.

C. Grilles - Return, Exhaust, Ceiling, Square, Rectangular:

1. GR-1 Acoustical Tile on Plaster Ceiling: Return and exhaust grilles shall be single deflection type with horizontal fixed face bars set at straight or 45 degree angle, ½" spacing and flush and flanged for surface mounting. Anemostat Type S3HD, Kruger Model S80/S85 or Price 500/600 Series.

2. GR-2 Prefabricated Acoustical Tile Ceiling with Inverted Exposed T-Bars: Return and exhaust grilles shall be with single deflection horizontal fixed face bars, set at straight or 45 degree angle, ½" spacing and flush, lay-in panel type with nominal overall dimension of 24 inches x 24 inches. Anemostat Type SAC3LD, Krueger Model S80/S85 or Price 500/600 Series.

D. Registers, Supply, Return, Wall:

1. WR-1: Sidewall supply register shall be double deflecting type with loose key-operated opposed blade volume control. Anemostat Type S2HO, Krueger 80/880 Series or Price 500/600 Series.

2. WR-2: Sidewall return register shall be single deflecting type with horizontal fixed face bars set at 45 degree angle flush and flanged for surface mounting and complete with loose key-operated opposed blade volume control. Anemostat Type S3HOD, Krueger Model S80/S85 or Price 500/600 Series.

2.06 SOUND ATTENUATING EQUIPMENT - DUCT SILENCERS

As specified in Section 15080 Mechanical Sound, Vibration and Seismic Control

2.07 SMOKE DETECTORS

A. Refer to Division 16: Fire Alarm Systems

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions under which Work of this section will be performed. Correct conditions detrimental to proper and timely completion of Work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 DUCTWORK

A. Construct ductwork according to details of fabrication and methods of support, as indicated in the SMACNA manuals and CMC, unless specified or indicated otherwise in this section or on Drawings. In event of conflict, the most stringent requirement shall be provided.

B. Unless otherwise required, construct ducts to conform accurately to dimensions indicated and to be straight and smooth on inside, with joints neatly finished.

C. Duct dimensions indicated are net inside dimensions. If the indicated duct is to be furnished with an acoustic lining, add twice the thickness of the acoustic liner in both the duct width and height dimensions to provide the gross sheet metal duct dimensions.

D. Where aluminum is welded, provide a minimum thickness of 16 gage, and use gas inert tungsten process of welding.

E. Anchor ducts to building structural slab, framing and roof decking and detail method of anchoring and fastening if not indicated on Drawings. Supports shall be seismically constructed.

F. Construct and install ducts to be completely free from vibration under operating conditions.

G. Indicate on layout drawing, required for suspended ductwork, location of supports, loads imposed on each fastening or anchor, typical details for anchorage, and details for special anchorage for supports attached to metal roof decking.

H. Attach supports only to building structural framing members and concrete slabs.

I. Where supports are required between structural framing members, detail and install suitable intermediate metal framing.

J. Ducts transporting air-conditioned or heated supply air shall be insulated in accordance with requirements of Section 15080: Mechanical Insulation.

1. Ducts exposed to weather shall be furnished with exterior insulation with weather jacket or interior lining as indicated on Table 2, Section 15080: Mechanical Insulation.

K. Ferrous angles and structural members and joining collars specified for construction and support of ductwork and plenums shall be primed with one heavy coat of required asphaltic aluminum paint before installation or fabrication. Metal surfaces shall be thoroughly cleaned before installation of paint. Galvanizing may be provided instead of painting. Installed duct hanger rods concealed in furred ceilings and walls are not required to be primed or painted.

L. Broken places in galvanized coating shall be acid washed and then completely soldered over or painted with galvanizing paint, Devcon Z or ZRC cold galvanizing compound.

3.03 DUCT CONSTRUCTION

A. Minimum ductwork gages, joints, reinforcing, and bracing of concealed ductwork shall conform to SMACNA and CMC. Exposed ductwork shall conform to the following tables in addition to SMACNA and CMC. The most stringent standards shall prevail. Hoods, plenums, and castings shall not be lighter than the duct gage listed in Table 2 for corresponding dimensions. Additional bracing shall be provided to prevent objectionable panel vibration.

B. Provide longitudinal seams of the grooved snap lock and standing, sealed and taped, or sealed spiral or continuously welded. For exhaust duct, taping may be omitted.

TABLE 1 - SHEET METAL THICKNESS FOR CIRCULAR DUCTS AND FLAT-OVAL(FOR STATIC PRESSURES LISTED)

Gage Thickness 2" Water Column	Diameter of Duct	Horizontal Girth	
Maximum S.P.	Maximum	Maximum	Joints
Round / Oval	Diameter Support	Distance	
26 / 24	Up to 9"	10'	2" slip
26 / 24	9" - 14"	8'	4"
24 / 22	14" - 23"	8'	4"
22 / 20	23" - 37"	8'	4"
20 / 18	37" - 51"	6'	1-1/4"x1-1/8" flange

C. Construction Details for Rectangular Sheet Metal Ducts for Low-Pressure Systems - Velocities not Exceeding 2,000 Feet Per Minute:

1. For pressures in excess of 2 inches water column, duct wall thickness shall be 2 gages heavier than set forth in this table.

2. Duct specifications shown below are applicable when ducts larger than 18 inches are cross-broken. Where cross breaking is not provided, duct wall thickness shall be 2 gages heavier on ducts 19 inches to 60 inches wide unless longitudinal standing seams are furnished.

TABLE 2 - MINIMUM METAL GAGES

Minimum Gage Thickness Steel / Aluminum	Max. Side, Gross Dimensions	Duct Permissible Girth Joints & Longitudinal Seams	Horizontal Support Maximum Distance
26 / 24	Up to 12"	Drive-slip, plain S-slip, or 1" pocket lock	10'
24 / 22	13" - 18"	Drive-slip, plain S-slip,	10'

1" pocket lock

Minimum Gage Thickness Steel / Aluminum	Max. Side, Gross Dimensions	Duct Permissible Girth Horizontal Support Joints & Longitudinal Seams	Maximum Distance
24 / 22	19" - 30"	Hemmed S-slip, 1" bar slip, or 1" pocket lock on 5' centers.	10'
		Hemmed S-slip, 1" slip, or 1" pocket lock on 5' centers with 1" x 1" x 1/8" angles on center line between.	
		Hemmed S-slip, 1" bar slip, or 1" pocket lock on 10' centers with cross break 1" standing seam on 5' centers.	
22 / 20	31" - 42"	1" bar slip, reinforced bar slip, or pocket lock 5' centers.	8'
		1" bar slip, reinforced bar slip, or pocket lock on 10' centers with 1" x 1" x 1/8" angles on center line between.	
		1" standing seam on 5' centers inside longitudinal standing seams with 1"x 1" x 1/8" angles on 5' centers on exterior.	
22 / 20	43" - 54"	1-1/2" bar slip, reinforced bar slip, or pocket lock on 4' centers.	8'
		1-1/2" bar slip, reinforced bar slip, or pocket lock on 8' centers with 1-1/2" x 1-1/2" x 1/8" angles on center line between.	8'
		1-1/2" bar slip, reinforced bar slip, or pocket lock on 4' centers with cross break.	

Minimum Gage Thickness Steel / Aluminum	Max. Side, Gross Dimensions	Duct Permissible Girth Horizontal Support Joints & Longitudinal Seams	Maximum Distance
20*/ 18	55" - 60"	1-1/2" standing seam on 3' centers inside longitudinal standing seam with 1-1/2" x 1-1/2" x 1/8" angles on 4" centers on exterior.	8'

20*/ 18	61" - 84"	Reinforced bar slip, angle slip, alternate bar slip, or angle reinforced pocket lock on 4' centers using 1-1/2" x 1-1/2" 1/8" 1-1/2" x 1/8" angles on centerline between reinforced bar slip, angle slip, alternate bar slip or angle reinforced pocket lock on 8' centers using 1-1/2" x 1-1/2" x 1/8" reinforcing angles 2' on centers in-between 1-1/2" angle reinforced standing seam on 2' center using 1-1/2" x 1-1/2" x 1/8" reinforcing angles. Inside longitudinal standing seams with 1-1/2" x 1-1/2" 1/8" angles on 2' centers on exterior.	6'

* Button punch snap-lock seams, Lockformer, or equal, shall only be permitted on 20 and 22 gage galvanized steel ducts. For aluminum duct, button punch snap-lock is not permitted.

D. Ferrous angles and structural members and joining collars specified for the construction and support of ductwork and plenums shall be primed with one heavy coat of asphalt aluminum paint before installation or fabrication. The metal surface shall be thoroughly cleaned before application of the paint. Galvanizing may be provided instead of painting. Installed duct hanger rods concealed in furred ceilings and walls is not required to be primed or painted.

E. Broken places in galvanized coating shall be acid washed and then completely soldered over or painted with galvanizing paint, Devcon Z or ZRC cold galvanizing compound.

F. S-type or drive-slip type girths or longitudinal seams shall not be furnished for ductwork installed outdoors or mounted on roofs. Provide angle-reinforced government lock only.

G. Broken places in galvanized coating shall be acid washed and then completely soldered over or painted with galvanizing paint, Devcon Z or ZRC cold galvanizing compound.

3.04 DUCTS AND PLENUMS WITH LINERS

A. Ducts and plenums lined with acoustical insulation shall be as indicated on Drawings.

B. Duct dimensions indicated on Drawings are net. Add thickness of acoustic liners to obtain gross sheet metal duct dimensions.

C. For duct liner Specifications and installation, refer to Section 15080: Mechanical Insulation.

3.05 DUCT ELBOWS AND TURNING VANES

A. Duct elbows, including supply, exhaust, and return, shall be provided with a centerline radius of 1.5 times duct width parallel to radius whenever possible; centerline radius shall not be less than width of duct parallel to radius.

B. Where space does not permit above radius, or where square elbows are indicated on Drawings, turning vanes shall be installed whether indicated on Drawings or not.

C. Turning vanes shall be thick double-wall vane type, Titus Y or Z, Tuttle and Bailey Ducturn, or equal. Duro-Dyne vane rail system duct turns may be furnished, provided they are of thick double wall type and Shop Drawings are submitted and reviewed by the Architect. Duct turning vanes shall be of same material as ductwork and shall be rigidly fastened in ductwork.

3.06 DUCT JOINTS AND SEAMS

A. Conditioned air supply ducts shall be furnished with joints and seams taped for air tightness or welded, except spiral seam factory machine formed duct components. Spiral seam is exempted. Joints between slip-fit components may be assembled with all seams and joint connections fastened with screws and taped.

B. Other ducts shall be furnished with joints and seams sealed by caulking, taping, soldering, or welding. Ducts for grease hood exhaust shall be furnished with grease-tight welding or brazing on external surface for joints and seams. Fiberglass ducts shall be provided with a thermally activated closure system, Johns Manville Fortifiber Therm-Lock with Automatic Bond Indicator dots, or equal.

C. S-slip or drive-slip type girths or longitudinal seams are not permitted on exterior or exposed rooftop mounted ductwork. Provide angle-reinforced government lock only.

D. Caulking, taping, or other joint or seam treatment shall be provided in accordance with recognized standards.

E. Unless otherwise detailed, duct shall be sealed with approved duct sealer or Arabol and canvas tape. Ducts shall not be covered or insulated on outside until joints are inspected by the IOR. A second coat of sealant or Arabol shall be installed 24 hours after initial application if separation occurs. Provide only approved and UL or Factory Mutual listed material for sealing and caulking.

F. Seams around fan, coil housing and plenums shall be sealed with gaskets or caulking compound to provide an airtight assembly.

G. Stainless steel ductwork connected to range hoods and fume hoods shall be provided with grease-tight, gas tight welded seams, and shall be constructed and installed so that grease or other material cannot become pocketed in any portion thereof, and system shall slope downward toward hood not less than 1/4 inch per lineal foot. Gasketed flanged joints with caulking or sealing compound shall be used only at fan and fume hood connections.

H. Alternative duct connectors such as Ductmate® or Mez® may be used if the following conditions are met:

1. One of the specifically listed connectors is submitted and approved by the Architect and/or OAR.

2. The correct size connector, application, and gage of material conform to SMACNA Standards.

3. The connector is installed per manufacturer's specifications.

3.07 DUCT TRANSITION

A. Slopes in sides of transition pieces shall be no greater than 1 to 5. Abrupt changes or offsets in duct system are not permitted, except when reviewed by the Architect.

3.08 DUCT TEST HOLES

A. Holes in ducts and plenums shall be provided for pilot or static tubes for obtaining air measurements to balance or check air systems. Holes shall be covered with neoprene gasketed sheet metal cover or plugged with a fitted neoprene plug chained to duct.

3.09 SOUND ATTENUATING EQUIPMENT

A. Install sound attenuators where required and indicated on Drawings. Refer to manufacturer's instructions for required installation.

3.10 FLEXIBLE CONNECTIONS

A. At points where sheet metal connections are installed to fans or air handling units, or where ducts of dissimilar metals are connected, a flexible connection of commercial grade, Duralon by Duro-Dyne Corporation, or equal, non-combustible material shall be installed and securely fastened by zinc-coated steel clinch-type bands or a flange type connection. Inlet and outlet openings shall be axially in-line, maximum deviation of centerline shall be less than 5 percent of diameter or shortest dimension of a rectangular inlet of fan or air handling unit, with system at rest. Duct end of connection shall be seismically restrained if more than 4 feet from last support.

3.11 AIR TERMINAL DEVICES

A. General:

1. Install supply devices after ducts, plenums, and casings have been cleaned and blown free of small particles, as specified. Devices shall be aligned to be parallel to ceiling construction or walls and ceiling surfaces, and shall be pulled tightly to compress gaskets and to fit neatly against surfaces.

B. Diffusers: Support surface mounted ceiling diffusers from angles or channels resting on and fastened to ceiling construction. Do not support from ducts. Install lay-in diffusers on T-bar ceilings with hanger wires from each corner and not supported by ceiling structure. Provide sheet metal adaptor box above each diffuser to allow space for volume controller with round collars for connection to round ducts where indicated on Drawings. Fasten duct-mounted diffusers to duct collars.

C. Registers and Grilles:

1. Install wall supply registers at least 6 inches below ceiling, unless otherwise indicated. Locate return and exhaust registers 6 inches below ceiling unless otherwise indicated.

2. Support ceiling diffuser type inlets, registers, and grilles as required above for ceiling diffusers.

3. Fasten wall mounted and duct mounted registers and grilles to flanges of duct collars.

3.12 DAMPERS

A. Manually operated dampers, gravity dampers, fire dampers, and motor operated dampers shall be furnished and installed as specified and indicated. Upon completion of installation, dampers shall be checked, lubricated, and adjusted so that they operate freely, without binding. Dampers shall be of standard commercial manufacture, complete with damper frame. Where painting is required, they shall be shop finished unless otherwise noted.

1. Provide and install manual volume dampers per current SMACNA standards to allow balancing per current AABC, NEBB or TABB Procedures and Standards whether indicated on the drawings or not.

2. Balancing dampers shall be installed in main supply ducts from fan discharge plenums, where 2 or more ducts are connected to each plenum, although such balancing dampers may not be indicated. Each zone shall be provided with a manual volume damper. Sheet metal screws shall be installed through handles and into ducts to lock damper in place after test and balance.

3. Each Supply, return, and exhaust branch shall be provided with manual volume dampers.

4. Do not provide opposed blade dampers at air inlets and outlets.

5. Each supply, return, and exhaust inlet or outlet shall be provided with a manual volume damper. This damper shall be a minimum of 5 feet upstream of the air outlet/inlets. An acoustic flexible duct should be provided between the outlet/inlet and the damper for concealed ducts.

6. Dampers installed in accessible locations shall be provided with locking and indicating quadrants. Ventlock, Duro-Dyne, or equal.

7. Dampers installed in ductwork in furred ceiling spaces or in roof spaces with less than 30 inches of clearance below beams, joists, or other construction, and where access panels are not provided shall be furnished with damper rods extended below ceiling and terminated with a concealed damper regulation. Ventlock, Young, or equal.

8. Dampers not identified as splitter, extractor, or butterfly dampers shall be of multi-louver type arranged for opposed blade operation. Damper shall be same dimension as adjoining duct and be tight closing. Blades shall not be greater than 9 inches. Dampers shall be not less than 18 gage steel. Teflon, or equal.

9. Motor operated dampers shall be furnished by temperature control manufacturer as part of temperature control equipment and shall conform to requirements of Section 15900: HVAC Instrumentation and Controls.

10. Dampers shall be provided with accessible operating mechanisms. Where operators are exposed in finished portions of building, operators shall be chromium-plated with exposed edges rounded. Splitter dampers are not permitted unless specified and reviewed by the Architect.

11. Dampers shall not be installed in combustion air ducts.

12. Access panels shall be installed for access at each damper's operating mechanism.

3.13 FIRE AND SMOKE DAMPERS

A. Fire dampers or combination fire and smoke dampers shall be installed and accessible at duct penetrations of rated walls and partitions and as required by State Fire Marshal and NFPA 90A, 92A, 92B, and 101.

B. Fire dampers shall be sized, and adjoining duct enlarged, to assure full size air passage of connecting ductwork.

C. Install smoke dampers as indicated on Drawings and as required in ducts penetrating smoke isolation separations.

D. Fire dampers or combination fire and smoke dampers shall be electrically actuated, power open-fail close type, UL 555 and U.L. 555S classified for 1-1/2 hours.

E. Provide a service disconnect switch for each and every combination smoke and fire damper.

3.14 SMOKE DETECTORS

A. Smoke detectors shall be installed in accordance with Division 16.

B. Smoke detectors shall be installed in systems of 2000 CFM & above capacity to detect presence of smoke and automatically shut down air handling units or fans unless it has been verified with the electrical installer that Exception 1 to CMC 609 regarding automatic shut down of systems with total coverage smoke detection systems is applied.

C. Smoke detectors shall be installed in supply system downstream of filters.

3.15 BACKDRAFT DAMPERS

A. Backdraft dampers shall be installed at locations indicated in accordance with the State of California Energy Conservation Standards, Title 24, CCR.

3.16 DUCT SLEEVES AND PREPARED OPENINGS

A. Furnish duct sleeves for 15-inch diameter ducts or less passing through floors, walls, ceilings, or roof and install during construction of the floor, wall, ceiling, or roof. Install round ducts larger than 15 inches diameter and square and rectangular ducts passing through floors, walls, ceilings or roof through prepared openings. Provide duct sleeves and prepared openings for duct mains and duct branches.

B. Provide one inch clearance between duct and sleeve or between insulation and sleeves for insulated ducts, except at grilles, registers and diffusers.

C. Provide prepared openings for round ducts larger than 15 inches in diameter and for square and rectangular ducts with one inch clearance between duct and openings or between insulation and opening for insulated ducts, except at grilles, registers and diffusers.

D. Provide closure collar of galvanized sheet metal not less than 4 inches wide unless otherwise indicated on Drawings on each side of walls or floors where sleeves or prepared openings are

provided except where grilles or diffusers are installed. Install collar tight against surface. Fit sharp edges of collar installed around insulated duct to preclude tearing or puncturing insulation covering vapor barrier. Fabricate collars from round ducts in steel. Provide not less than 4 nails to attach collar where openings are 12 inches in diameter or less and not less than 8 nails where openings are 20 inches in diameter or less.

E. Pack space between sleeve or opening and duct or duct insulation with commercial grade packing yarn.

3.17 FLEXIBLE DUCT RUNOUTS

A. Runouts from branches, risers or mains to air terminal units and outlets may be pre-insulated, factory fabricated flexible ducts complying with NFPA No. 90A. Flexible ductwork shall not exceed 7 feet in length. When required to suspend flexible ducts, furnish hangers of type recommended by manufacturers of pre-insulated flexible duct and install at intervals recommended. Method of attachment to other components of air distribution system for a vapor-tight joint shall be in accordance with printed instructions of flexible duct manufacturer. Bend radius shall be 1-1/2 times diameter of duct, measured from centerline. Bends greater than 90-degree angle are not permitted. Non-metallic flexible duct shall be permitted only in T-bar suspended ceilings.

3.18 DUCT HANGERS AND SUPPORTS

A. Exposed or easily accessible ductwork: Single horizontal ducts shall be suspended from heavy steel hanger straps securely fastened to overhead structural members. Ducts shall be supported by a hanger strap passing around and fastened to duct with not less than 2 Parker No. 10 screws set approximately 2 inches in from each edge, to form a supporting stirrup attached to overhead supports. Rectangular ducts shall be provided with 2 hanger straps, one located on each side of duct. Round ducts may be installed from a single hanger strap unless conditions require that duct be held tight against ceiling, in which case 2 hanger straps may be brought down each side of duct, oriented at right angles to axis of duct and securely fastened to duct standing leg seam or angle iron stiffener with a minimum of 2 bolts, measuring 1/4 inch, for each side of duct. Hanger straps shall be galvanized with a minimum size of 1-1/8 inches x 14 gage. Angles of galvanized steel of 1-1/8 inches x 1-1/8 inches x 16 gage (14 gage for ducts 60 inches or greater) may be furnished instead of straps.

B. Non-accessible ductwork:

1. Rigid round, rectangular, and flat oval metal ducts shall be installed with support systems conforming to SMACNA Standards.

2. Note: Non-accessible ductwork is defined as non exposed and hidden from sight during regular school operations. All other ductwork is considered easily accessible.

C. Where ducts are installed one above the other, they shall be individually supported on a trapeze of steel angles with 3/8 inch supporting steel rods securely fastened to overhead construction. A minimum distance of 3 inches shall be maintained between ducts wherever possible, but in no event shall distance be less than 2 inches. Minimum sizes of steel angles shall be 1-1/2 inches x 1-1/2 inches x 1/8 inch for duct sizes through 60 inches in greatest dimension, 2 inches x 2 inches x 1/8 inch for duct sizes 61 inches through 84 inches, 2 inches x 2 inches x 3/16 inch for duct sizes 85 inches through 96 inches, and 2 inches x 2 inches x 1/4 inch for duct sizes over 97 inches

D. Ducts 30 inches square area and greater and ducts 20 feet long and longer shall be seismically restrained. Refer to Section 15070: Mechanical Sound, Vibration and Seismic Control.

E. Hangers shall not be supported by, or fastened to, non-structural members including blocking. Toggle or Molly type bolts are not permitted.

F. Vertical ducts shall be supported with suitable angles on each side of each duct located at each floor and at intervals not to exceed 8 feet. Angles shall be sized and installed according to SMACNA Standards for required span so that they will be rigid, without bending or sagging.

G. Roof-mounted ductwork shall be installed a minimum 12 inches above roof and shall be supported by galvanized welded pipe- one on each side- fastened to roof structure, flashed and sealed to roof membrane. Install supports at each turn, unit connections, and each penetration, and space at maximum 6 feet off-center in general. Pitch pockets are not allowed.

3.19 ACCESS PLATES AND DOORS

A. Access plates and doors shall be furnished and installed where stops, valves, fire dampers or combination fire and smoke dampers, fusible links, coils, damper operating mechanism, control equipment, lubrication fittings, air filters, air handling equipment and similar items normally requiring adjustment or servicing are installed in concealed spaces.

B. Access plates and doors shall be located to permit convenient access to equipment sized to permit removal of equipment for servicing. Access plates shall be no less than 12 inches x 12 inches in clear opening. Proper servicing of equipment requires adequate access for maintenance personnel. Access doors shall not be less than 24 inches x 24 inches, unless otherwise detailed. Two or more valves shall not be located in same access area unless sufficient clearance is provided for operation, servicing and removal of each valve.

C. Openings in ducts or plenums whose longer dimension does not exceed 12 inches may be covered by a plate of same material as duct, gasketed and fastened to duct or plenum with sheet metal screws.

D. Access plates in floors shall not be less than 8 inches x 8 inches and shall be carborundum surface brass with cast brass frames anchored into concrete. Access plates in tile walls shall be chromium plated brass and polished. Approved serrated plates furnished as part of a clean-out assembly are permitted in floors instead of a separate plate.

E. Access plates and doors in walls and ceilings of finished rooms and in locations normally accessible to students shall be furnished with continuous piano hinges, unless otherwise specified, and a special flush type spring-loaded latch requiring an Allen wrench to operate. Access devices shall be installed after plastering in plaster ground openings.

F. Access panels or doors penetrating one-hour fire resistive ceilings shall meet code requirements for such openings.

G. Access panels shall be fire-rated Milcor manufactured by Inland Steel Products Co., or equal. Access doors shall be as required for installation in openings penetrating one-hour fire resistive ceilings. Access doors shall be furnished with a flush, key-operated cylinder lock, furnished with 2 keys each, instead of Allen headlock for non-rated ceilings.

H. Access panels that are part of an integrated ceiling are specified in Section 09510: Acoustical Ceilings. Identification markers shall be affixed to adjacent supports, under this portion of Work, to indicate location and type of mechanical device to be serviced.

I. Access panels installed in ducts or plenums located in heater or equipment rooms containing gas-fired equipment shall be furnished with heavy-duty spring closing hinges and refrigerator door type catches unless otherwise required. When these panels are intended for maintenance personnel access, catches shall be operable from both interior and exterior.

J. Other access panels, except those specified above, shall be furnished with suitable hinges and one or more sash fasteners.

K. Panels located in ducts and plenums shall be installed with gaskets made of synthetic rubber, felt, or similar material to provide an airtight installation. Panels shall be constructed and reinforced to prevent vibration.

L. Letter words "FIRE DAMPERS" on panels over fire dampers and words "DO NOT OPEN - HEATER IS OPERATING" on panels located in heater or equipment rooms. Letters shall be approximately 3 inches high, if space is available.

M. Furnish a key to operate latch access plates, one for each access plate, but not to exceed 5 keys for any one Project.

N. Access plates and panels shall be furnished with manufacturer's name or trade mark and model number cast or stamped thereon, or upon a label permanently affixed thereon.

O. Provide duct through roof flashing as detailed in the SMACNA standards or as indicated on Drawings.

P. Refer to SMACNA Figures 2-10 and 2-11 for access plate and door construction.

3.20 PRESSURE TESTING

A. Test and provide substantially airtight supply, return and exhaust ducts, plenums and casings at static pressure indicated for system before covering with insulation or concealing in masonry. Substantially airtight shall be construed to mean that no air leakage is noticeable through senses of feeling or hearing at duct joints. Test ductwork for leaks at 1-1/2 times operating pressure but at a minimum of 2 inches of water.

3.21 CLEANUP

A. Remove rubbish, debris and waste materials and legally dispose off the Project site.

3.22 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 15400

PLUMBING

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section

B. Section Includes: Labor, materials, tools, and equipment to install plumbing systems as indicated.

C. Related Sections:

1. Section 07920: Joint Sealants

2. Section 10523: Fire Extinguishers

3. Section 15010: Basic Mechanical Requirements.

4. Section 15050: Basic Mechanical Materials and Methods.

5. Section 15070: Mechanical Sound, Vibration and Seismic Control.

6. Section 15075: Mechanical Identification.

7. Section 15080: Mechanical Insulation.

8. Section 15700: Heating, Ventilating and Air Conditioning Equipment.

9. Section 15950: Testing, Adjusting And Balancing

1.02 SUBMITTALS

A. Provide in accordance with Division 01 and Section 15010: Basic Mechanical Requirements.

B. Provide necessary documentation to Owner for processing rebates for water efficient fixtures.

1.03 QUALITY ASSURANCE

A. Unless otherwise noted, provisions including amendments thereto, of the State Plumbing Code Part 5, Title 24, CCR; of the Uniform Plumbing Code, latest edition; and of the latest Plumbing Ordinances of the City and Torrance are hereby made part of this section.

B. Conform to provisions of Section 15010: Basic Mechanical Requirements.

C. Manufacturer of plumbing products must have ANSI/NSF Standard 61, Section 9 certification to demonstrate compliance with the federal requirements for lead contribution to drinking water, Safe Drinking Water Act SDWA and AB 1953.

1.04 PRODUCT HANDLING

A. Conform to provisions of Section 15050: Basic Mechanical Materials and Methods.

PART 2 - PRODUCTS

2.01 PIPING SYSTEMS

A. Materials: Refer to Section 15050: Basic Mechanical Materials and Methods.

B. Insulation for Piping: Refer to Section 15080: Mechanical Insulation

2.02 FIXTURES AND DRAINS

A. General: Fixtures specified shall be furnished complete with trim and fittings. Cast iron plumbing fixtures shall be acid resistant enamel, and identified by casting letters "AR" or words "acid-resistant" into metal. Fixtures shall be white unless otherwise specified. Cast iron fixtures shall be white enamel inside and on back, rim and apron, with exposed unfinished surfaces painted white. Fixtures of same general classifications shall be of same make.

B. Finished Brass:

1. Unless otherwise specified, finished brass of a similar type shall be of same manufacturer and model throughout buildings.

2. Finished and exposed brass equipment, except floor, shower and urinal drains shall be chromium-plated and polished. Floor, shower and urinal drains, unless otherwise specified, shall be nickel-bronze metal.

C. Traps, Trap Arms and Tailpieces:

1. Fixture traps shall be all cast brass, chromium-plated and polished. (No tubular traps). Exceptions as follows:

a. Traps that are an integral part of a fixture.

b. Traps concealed in floors, walls and furring.

c. Traps standard for service sinks and Industrial Shop equipment.

d. laboratory traps and tailpieces shall be as specified in section 15050:

"Basic Mechanical Materials and Methods"

2. Concealed traps and 17 gauge tailpieces may be rough brass finish, except as otherwise specified. Laboratory traps and tailpieces shall be as specified in Section 15050: Basic Mechanical Materials and Methods. Furnish chromium-plated and polished cast brass wall flanges with setscrews and chromium-plated and polished brass casing on discharge side of each trap.

3. Tailpieces shall be not lighter than 17 gauge, brass, chromium-plated, and polished. Furnish and install chromium brass plated wall flanges with set screws and chromium-plated 20 gauge brass casing on discharge side of each chrome-plated all cast trap.

D. Faucet Handles: Faucet handles shall be solid brass, chromium-plated and polished, and fastened to their stems by Allen type hollow head stainless steel set screws through the side of the handle extending into the stem. Handles with sharp edges or projections shall not be furnished.

E. Fixture Supplies:

1. Supplies for garbage disposal units and water heaters shall be unplated rigid copper water tube with threaded adaptors for connections to valves and other threaded connections. All other supplies shall be chromium-plated brass with hospital threads or shall be furnished with fittings and valves, which completely cover threads.

2. Supplies to sinks shall be furnished with chromium-plated and polished screwed type angle compression stops with square shank stems and lock shields extending beyond stem. Instead of solid supply piping, polished chrome-plated risers of 3/8 inch outside diameter with ferrule stop end and metal nosepiece may be furnished. The installation of braided stainless or easy hooker's supplies is not permitted. Exception: Supplies that rise vertically from floor shall be furnished with straight type instead of angle type stops.

4. Each supply or pipe that penetrates a finished surface and plumbing pipes passing through a countertop or part of a cabinet shall be furnished with a chromium-plated brass flange except flanges furnished by manufacturer of flush valves as an assembly.

5. Water supplies of plumbing fixtures shall be protected against back-siphonage in event of a vacuum in piping system.

6. Discharge outlets of supply faucets for lavatories and sinks shall clear top of overflow rim by at least one inch.

2.03 ACCESS PLATES (To cleanouts, valves, water hammer arrestors and hose faucets)

A. Schedule Numbers:

AP-1: Square, unless otherwise noted, steel, prime coated; frame, 18 gauge minimum. Door shall be 16 gauge minimum with concealed hinge or be removable, with vandal-proof lock operated by Allen wrench. Provide for painted and stucco walls.

SMITH	ZURN	ELMDOR	MILKOR	WATTS	MIFAB
Fig 4760 AK	Z-1462-VP	DW-AKL	MOR DW AK1	CO-300-S-6	UA-A

AP-2: Round type, stainless steel, vandal-proof, 5/16 inch No. 18 or 1/4 inch No. 20 flat-head machine screw into cleanout plug. Plate shall be prime coated minimum 18 gauge steel or polished chrome-plated brass, 18-8 No. 302 stainless steel, or polished nickel bronze. Provide for painted walls, screwed into cleanout plug.

SMITH	ZURN	JOSAM	WADE	WATTS	MIFAB
4710U	Z-1469-VP	58600	8480R	CO-480-RD-6	C1400-RD-6

AP-3: Square, polished face chrome-plated bronze, aluminum alloy or brass chrome-plated brass frame with 14 gauge polished 18-8 No. 302 stainless steel or brass chrome-plated secured cover with vandal-proof screws. Provide for tile walls.

SMITH	ZURN	WADE	WATTS	MIFAB
4735U	Z-1460-VP	58630	CO-300-S-6	C1400-S-3-6

2.04 BACKFLOW PREVENTION ASSEMBLIES (NOT USED)

2.05 BACKWATER SEWER VALVE ASSEMBLY

A. Schedule Numbers:

BSV-1: Cast iron with access cover, Los Angeles City approved type, with line size gate valve upstream and downstream.

SMITH	ZURN	WATTS	MIFAB
7022-S	Z-1090	BV-200	BV-1000

2.06 CLEANOUT ASSEMBLIES

A. Cleanout plug shall be line size.

B. Schedule Numbers:

CO-1: Iron body cleanout tee full line size up to 4 inches and round access plate, plugs shall be brass, countersunk with tapped boss for 5/16 inch No. 18 or 1/4 inch No. 20 screws. Provide for finished walls at base of waste stack, above urinal and service sink. AB&I and

TYLER may be used as iron body cleanouts. Trim and accessories shall be Smith or Zurn or equal.

SMITH	ZURN	AB&I	TYLER	WATTS	MIFAB
4532-U	Z-1446-BP			CO-460-RD-34B	C1460-RD-6

CO-2: Iron body with approved UPC plug, top and adjustable sleeve, cut-off ferrule, polished scoriated brass nickel bronze secured cover. AB&I and TYLER may be used as iron body cleanouts. Trim and accessories shall be Smith or Zurn or equal Provide for finished floors inside buildings, in covered areas, and in concrete paving.

Square:

AB&I	SMITH	ZURN	WATTS	MIFAB
	4053L-U-NB	ZN-1400-T	CO-200-S	C1220-S-1-6

Round:

SMITH	ZURN	WATTS	MIFAB
4033-L-U-NB	ZN-1400	CO-200-R	C1220-1-6

CO-3: Raised threaded head brass plug. Provide for yard box YB-3.

ZURN	OR EQUAL
Z-1470-A	

2.07 CIRCULATING PUMPS, HOT WATER HEATING SYSTEM (NOT USED)

2.08 DRINKING FOUNTAINS (NOT USED)

2.09 DRUM TRAPS (NOT USED)

2.10 DIELECTRIC UNIONS

A. Schedule Numbers:

1. Dielectric style Unions using ferrous and no-ferrous metals are prohibited. Dielectric flanges are admitted for use – see DU-2.

DU-1: Brass union with 6-inch brass nipple.

DU-2: Brass union or Brass flanged fittings are to be used in between pipes made of dissimilar metals to prevent accelerated corrosion and deterioration in the piping systems due to galvanic and stray current.

WATTS	OR EQUAL
3100-CXC,	

2.11 EMERGENCY EYE WASH / EMERGENCY SHOWER (As Indicated On Plans)

2.12 ELECTRIC WATER COOLERS (NOT USED)

2.13 FAUCETS (As Indicated On Plans)

2.14 FLOOR DRAINS (As Indicated On Plans)

2.15 NOT USED.

2.16 NOT USED.

2.17 FIRE HOSE VALVES: Refer to Section 15300.

2.18 FLEXIBLE HOSES (NOT USED)

2.19 FLUSH VALVE ASSEMBLY (As Indicated On Plans)

2.20 FLOOR SINKS (NOT USED)

2.21 NOT USED.

2.22 GREASE TRAPS (INTERCEPTORS) (NOT USED)

2.23 HOSE BIBBS (NOT USED)

2.24 IRRIGATION SPRINKLER (NOT USED)

2.25 SINKS (As Indicated On Plans)

2.26 LABORATORY GAS VALVES (NOT USED)

2.27 LAUNDRY TRAYS and TRIM (NOT USED)

2.28 PIPE HANGERS

A. Refer to Section 15050: Basic Mechanical Materials and Methods.

B. Schedule Numbers:

1. PH-1: Complete with clamps, inserts, etc.

SUPERSTRUT	UNISTRUT	TOLCO	B-LINE

2.29 P-TRAPS

A. Schedule Numbers:

PT-1: Cast brass complete, chrome-plated.

ZURN	AB&A
Z-8712-LC	107

2.30 PRESSURE REGULATING VALVE ASSEMBLIES (NOT USED)

2.31 ROOF DRAINS (NOT USED)

2.32 SHOWER ASSEMBLIES (NOT USED)

2.33 SERVICE SINKS and TRIM (NOT USED)

2.34 COUNTERTOP SINKS AND TRIM (As Indicated On Plans)

2.35 SILL COCK (NOT USED)

2.36 SEWAGE EJECTORS (NOT USED)

2.37 SERVICE STOP GAS VALVES (NOT USED)

2.38 SUMP PUMP (NOT USED)

2.39 SINK TRIM – SEE "SINKS AND TRIMS" Section 2.33

2.40 STOP VALVES (NOT USED)

2.41 THERMOSTATIC MIXING VALVE ASSEMBLIES (TMVA) (NOT USED)

2.42 TRAP PRIMERS (As Indicated On Plans)

2.43 URINALS (NOT USED)

2.44 WATER CLOSETS (NOT USED)

2.45 WATER TEMPERATURE CONTROLLERS (NOT USED)

2.46 WATER HEATERS / Domestic / Boilers (NOT USED)

2.47 WATER HAMMER ARRESTORS (As Indicated On Plans)

2.48 WATER TANKS, HOT – UNFIRED (NOT USED)

2.49 WASH SINKS - See Section 2.33 – "Service Sinks and Trim".

2.50 YARD BOXES (NOT USED)

2.51 FIXTURE CONNECTIONS

A. Branches to individual fixtures shall be of the following sizes unless larger sizes are indicated on Drawings:

Fixture	Copper, Cold	Copper, Hot	Trap and Connections	Soil/ Waste	Vent
WC Flush Valve	1"	-----	4"	4"	2"
Lavatories	1/2"	1/2"	1-1/2"x1-1/4"	2"	1-1/2"
Sinks:					
Service	1/2"	1/2"	2"	2"	1-1/2"
Kitchen	1/2"	1/2"	1-1/2" x 1-1/2"	2"	1-1/2"
Classroom	3/8"	3/8"	1-1/2" x 1-1/2"	2"	1-1/2"
Wash	3/4"	1/2"	1-1/2" x 1-1/2"	2"	1-1/2"
Drinking Fountains:					
Multiple	3/8"	-----	1-1/2"x1-1/2"	2"	1-1/2"
Single	3/8"	-----	1-1/2"	2"	1-1/2"
Individual Showers	1/2"	1/2"	2"	2"	2"

Fixture	Water Supply	Soil/ Horizontal	Vent
Urinals, Wall-Hung Flush Valve			
Standard	3/4"	2"	1-1/2"
Access Compliant Use	1"	2"	1-1/2"
Sill cocks	3/4" min.	-----	-----

B. Hose racks shall be furnished 2-inch supply lines. Reduce to 1-1/2 inches at rack valve.

C. Water headers serving water closets shall be copper water tube, with following size throughout length:

1. 1-1/2 inches for 2 flush valves.

2. 2 inches for 3 to 9 flush valves.

D. Water headers serving urinals shall be of following size throughout length:

1. 1" for 1 or 2 flush valves.

2. 1-1/4" for 3 flush valves.

3. 1-1/2" for 4 to 8 flush valves.

E. Water headers serving showers shall be same as listed above for urinals.

F. Water headers serving lavatories shall be of following size throughout length:

1. 1/2 inch for 2 lavatories.

2. 3/4 inch for 3 and 4 lavatories.

3. One inch for 5 and 6 lavatories.

2.52 HEIGHT OF FIXTURES

A. Heights for standard fixtures.

Fixture	
Water Closets	15"
Lavatories	32"
Drinking Fountains	42"
Wash Sinks	30"
Urinals, lip height	24"
Shower Heads Male (Student and Instructor) From tip of shower head to finish floor.	72"
Shower Heads Female (Student and Instructor) From tip of shower head to finish floor.	72"
Shower valves	48"

B. Heights for access compliant fixtures.

Fixture	Adult
Toilets, center line from wall	18"
Toilets, height to top of seat	17" - 19"
Lavatories, sink top height	34" max.
Lavatories, sink knee clearance	27" min.
Urinals, lip height	17" max.
Urinals, flush handle height	N/A
Drinking fountains, bubbler height.	36" max.
Drinking fountains, knee clearance	27" min
Wash Sink	Per Drwgs.
Shower Valves	Per ADA
Shower Seat	Per ADA
Shower Head (adjustable) Bar	Per ADA

2.53 DOMESTIC WATER PRESSURE BOOSTER PUMP SYSTEM (NOT USED)

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions under which Work of this section will be performed. Correct conditions detrimental to proper and timely completion of Work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. General:

1. Unless otherwise specified, plumbing fixtures, equipment and appliances that require connections to plumbing line shall be connected. This shall include fixtures specified or indicated as furnished by others, furnished by Owner, or specified in other related sections. Install supplies, stops, valves, traps, wall flanges, or pipe casing for connection of this equipment.

2. Install equipment as indicated on reviewed and accepted Shop Drawings.

3. Avoid interference with Work of other trades. Do not deviate from Drawings without review of the Architect.

B. Examination: Check each piece of equipment in system for defects verifying that parts are properly furnished and installed.

C. For piping Work, refer to Section 15050: Basic Mechanical Materials and Methods.

D. Plumbing Fixture and Equipment Installation:

1. Unless otherwise indicated, fixtures shall be installed with 5/16 inch brass bolts or screws of sufficient length to securely fasten fixture to backing wall.

2. Fixtures installed against concrete or masonry walls shall have their hangers fastened with 5/16 inch brass bolts, Philip Shield type anchors, or 2 unit cinch anchors. Wood or plastic plugs are not permitted.

3. Fixtures installed against wood or metal stud walls shall have their hangers fastened to metal backing plates with 5/16 inch brass bolts screwed into plate. rs. Each sink hanger shall be hung with not less than four 5/16 inch brass bolt or not less than five 1/4 inch brass bolts.

4. Backing for hanging of plumbing fixtures and equipment shall be installed in supporting wall at time rough piping is installed. Backing for stud walls shall be steel plate 1/4 inch thick, not less than 4 inches wide. Steel plate shall be attached to stud at each end of plate and to each stud it crosses. Plate shall be attached to metal studs by bolting with two 1/4 inch U-bolts per stud with bolts through plate and around stud flange or by welding with a 1/8 inch fillet weld full width of stud flange, top and bottom of plate. At wood studs, plate shall be carefully recessed flush with face of stud and attached to each stud with 2 No. 14 flat-head wood screws, 2 inches in length into pre-drilled 1/8 inch holes.

5. Rough-in for fixtures, equipment and appliances shall be as indicated on Drawings and as specified, including those items indicated as furnished by others, furnished by Owner, or future capacity. When connections to equipment from capped or plugged lines are required, caps or plugs shall be removed at time equipment is set and stops or valves installed and connections provided as specified.

7. Piping materials for trap arms shall be Brass, Cast Iron or DWV copper

8. Piping shall be stubbed out to exact location of fixtures and stubs shall be installed symmetrical with fixtures. Hot and cold water supplies for center set faucets on lavatories shall be installed on 8-inch centers, unless otherwise specified or required.

E. Cleanouts in Drain, Waste, Vent and Sewer Lines:

1. Cleanouts shall be installed at locations stated in the California Plumbing Code and accessible at following locations:

   a. At locations above first floor as stated on construction documents.

   b Above faucets of each sink with brass plug.

   d At upper end of a horizontal vent line when any part of horizontal line is below overflow level of fixture it serves.

   c. Not to exceed 100-foot intervals in sewer and waste lines exterior of building.

d. At property line connection.

e. Where indicated on Drawings.

2. Cleanouts shall be extended to grade as follows:

a. Not to exceed 100-foot intervals in straight runs of pipe outside buildings.

b. At changes of direction greater than 22-1/2 degrees (underground).

c. At property lines.

d. Where cleanouts occur under concrete.

e. Where marked for future connections.

3. Cleanouts in building shall be extended to floor level or above floor level or above floor level in walls or furring when cleanouts are not accessible or where clearance is less than 18 inches.

4. Cleanouts in finished areas in building shall be concealed.

5. Cleanouts in floors of covered areas and those extended to grade in concrete areas shall be floor level type with extensions body brass plugs and detachable nickel-bronze or aluminum alloy scoriated.

6. Concealed cleanouts in vertical lines shall be service weight soil cleanout tees with brass plugs and round cover plates unless otherwise specified or indicated. A snug fitting sleeve of galvanized sheet metal shall be placed around hub of tee and shall extend to flush with finished soil, or cleanout shall be extended to finished wall.

7. Cleanouts extended from below floor to a wall or furring or on horizontal lines above floor that terminate at a wall or furring shall be iron body type with brass plugs and round cover plates.

8. Cover plates over cleanouts in painted walls shall be steel, bonderized and prime coated. Cover plates cover cleanouts in tile walls shall be chromium-plated brass or nickel bronze. Plates shall be attached to cleanout plugs with 5/16 inch No. 18 or 1/4 inch No. 20 stainless steel vandal-proof type screws. Plates shall be one inch larger in diameter than fitting opening.

9. Cleanouts extended to grade in exterior sewer lines other than floors or concrete areas shall be a cleanout assembly with secured top, extra heavy-duty, adjustable sleeve, cut-off ferrule, countersunk threaded brass plug and scoriated tractor type cover.

10. All other cleanouts shall be iron body type.

11. Cleanout extensions shall be no-hub cast iron soil pipe. Exterior cleanouts, those in concrete excepted, shall terminate in a 14 inch x 6 inch thick concrete block with cleanout assembly and top of block flush with finish grade.

12. Fittings in lines utilized as cleanouts shall be approved soil fittings including no-hub pipe. Tees and crosses in vent headers excepted.

13. Pipe joint compound shall not be installed on cleanout plug. After lines are tested and approved, each cleanout plug shall be removed, greased, and replaced.

3.03 EXCAVATION, TRENCHING AND BACKFILLING

A. Perform trenching, excavation, and backfilling required for Work of this section as specified herein and in Section 02318: Excavating, Back-filling, and Compacting for Utilities.

3.04 SERVICE CONNECTIONS

A. Determine exact location of required water, drain, and sewer connections and provide proper connections.

B. Potable water lines shall be purged completely before connecting to sources of water for the Project. Determine quality of water supply before connection.

3.05 WATER HAMMER ARRESTORS

A. Install water hammer arrestors indicated on Drawings and in following locations (only non-ferrous arrestors may be installed in copper water system):

1. Water lines to lavatory headers, water closet and urinal headers, service sinks, kitchen sinks, wash fountains, drinking fountains, laboratories with medical type faucets and on wash sinks having 3 or more stations and all other quick closing fixture such as clothes washers, as close to fixture as possible.

2. Between last 2 fixtures when 3 or more fixtures, other than those listed in 1 above, are served by a common header.

B. When possible, arrestor shall be installed in wall or furring. When arrestor is installed in wall or furring, furnish an access plate large enough to permit removal of arrestor. Access plate shall be a minimum of 2 inches larger in each direction than arrestor.

C. Fixture water lines shall be provided with mechanical water arrestor hammer dampening devices. Air chambers are not approved.

3.06 MAKE-UP WATER SYSTEMS

A. Provide and connect make-up water systems for equipment in other sections.

3.7 GAS SERVICE (NOT USED)

3.8 CLEANING - PLUMBING PIPING SYSTEMS AND FIXTURES

A. Plumbing lines and fixtures shall be flushed to remove dirt and foreign material until water runs clear and no foreign substance or odor is present. Strainers and screens on faucets shall be removed during this cleaning operation.

B. After satisfactory cleaning of strainer and screen replacements has been witnessed by IOR, post and maintain signs stating: "CAUTION - Water at this construction Project has not yet been certified for human consumption." Signs shall be furnished with letters at least 1/2 inch in height, and shall be conspicuously posted at entrances to Project site. Signs shall be paneled, black and yellow, in conformance with OSHA Section 1910.1455.

3.9 DISINFECTING DOMESTIC WATER PIPING SYSTEMS

A. Newly installed or replaced piping and/or fixtures dispensing potable water shall be disinfected and undergo an approved bacteriological analyses before water system is allowed for public use.

B. All work shall be performed by Technicians Certified by the American Water Works Association (AWWA) and/or the State of California Department Health Services, Grade II Water Treatment Operator Certification or higher issued by the Department of Health Services (DHS) for the State of California. Comply with Title 22, Code of Regulations Division 4, Chapter 13, Article 2 Operator Certification Grades.

C. Method:

1. A Reduced Pressure Backflow assembly shall be in installed to protect from cross contamination of the local water purveyor's meter service supply when at any time there is any type of water connection with the piping to be disinfected (Chlorinated) and the water meter service supply.

2. System is to be flushed to remove any materials that may have entered the system.

3. Using a chemical feed metering pump and a chlorine tank, the chlorine solution is injected into the water system.

D. Disinfection and De-chlorination procedure (24 or 3 Hour Contact Time):

1. 24 Hour Test Method:

a. Prior to disinfection, post signs on all water outlets of the system to be disinfected. Sign or tags shall read, "Water System Being Chlorinated- "Danger Do Not Drink Water" or similar warning.

b. Piping system shall then be adequately flushed with water to remove any particles and eliminate air pockets.

c. Using the continuous feed method, sodium hypochlorite conforming to ANSI/ AWWA B300 will be injected into the water system at a minimum of 50 PPM. A water flow meter provided by the water treatment technician will be used to determine the rate of injection and a chlorine test kit, Hach or equivalent, will be used to monitor the residual.

d. Chlorine residual test will be taken at all appropriate points and outlets to verify 50 PPM residual levels.

e. The chlorinated system shall be shut down for any use and the chlorinated water shall remain in the water system for retention of 24 hours.

f. After 24 hours, chlorine residual levels will again be tested at various points throughout the system to insure a minimum of 25 PPM residual. If the system has not met the minimum of a 25 PPM residual, the above disinfection process shall be repeated.

g. After satisfactory completion of the residual testing, flush out system until Hach or equivalent test reveal the water outlets have a free chlorine residual concentration less than 0.5 PPM. The procedure shall be in accordance with the AWWA standard C651-05.

h. The OAR may allow temporary use of the water system for construction purposes pending results of the bacteriological test analysis. Sign or Tags shall be left on all outlets stating water system is not safe for consumption until laboratory results are complete and meet these specifications.

2. 3 Hour Test Method:

a. If the water systems must be turned on for use as soon as possible, a 3 hours chlorine contact time to allow for disinfection is permitted with the OAR's approval.

b. Prior to disinfection, post signs on all water outlets of the system to be disinfected. Sign or tags shall read, "Water System Being Chlorinated- "Danger Do Not Drink Water" or similar warning.

c. Piping system shall be then adequately flushed with water to remove any particles and eliminate air pockets. Using the continuous feed method, sodium hypochlorite conforming to ANSI/ AWWA B300 will be injected into the water system at a minimum of 200 PPM. A water flow meter provided by the water treatment technician will be used to determine the rate of injection and a chlorine test kit, Hach or equivalent, will be used to monitor the residual.

d. Chlorine residual test will be taken at all appropriate points and outlets to verify 200 PPM levels. The chlorinated system shall be shut down for any use and the chlorinated water shall remain in the water system for retention of 3 hours.

e. After satisfactory completion of a 3 hour disinfection period, flush out system until Hach or equivalent test reveal the water outlets have a free

chlorine residual concentration less than 0.5 PPM. The procedure shall be in accordance with the AWWA standard C651-05.

f. The OAR may allow temporary use of the water system for construction purposes pending results of the bacteriological test analysis. Sign or Tags shall be left on all outlets stating water system is not safe for consumption until laboratory results are complete and meet these specifications.

E. Bacteriological Test:

1. After final flushing and satisfactory results from the residual free chlorine concentration test, Bacteriological test samples shall be collected. The intent of the following is to provide insurance for an accurate representation to a complete Bacteriological test of the water system. At least two samples shall be taken from each floor of each building.

2. Bacteriological test samples shall be delivered to a State of California Department of Health Services Certified Laboratory to perform qualitative and quantitative bacterial analyses on the water samples for the presence of any Total Coliform bacteria and Plate Count. This count must be less than 500 cfu/mL.

3. The procedure shall be repeated if it shown by bacteriological examination made by an approved agency that the level of Disinfection does not meet these specifications.

4. After satisfactory results for the bacteriological test are provided to the OAR, warning Sign or Tags shall be removed.

3.10 VALVES ON PLUMBING SYSTEM

A. Furnish and install gates, ball, globes, angles, and check valves on plumbing Work at following locations whether indicated on drawings or not.

B. All hot and cold valves shall be iron pipe size (IPS).

1. Sweat valves are prohibited.

2. Above the ground copper water system, 2" and larger may utilize Victaulic butterfly valves and fittings for their connections. A 2" or larger Victaulic valve may be in a wall if an adequately sized access panel is provided for maintenance or removal.

C. Valves shall be accessible and installed within an access panel approximately 3 feet above floor and no more than 7 feet above floor, or in a marked Yard Box to prevent tampering.

1. Immediately after each water meter, in addition to any valve furnished by utility company, there shall be an accessible valve on the inlet side for a strainer assembly, dual Backflow device assembly and/or possibly a dual pressure reducing valve assembly.

2. A gate or ball valve on each water supply before it enters building. Valve s shall be accessible from outside building and shall be installed in a marked Yard Box, unless otherwise indicated on drawings. Ball valves 2-1/2" size or larger shall omit gate valve handle and furnish 2" square operating nut.

3. At multi story buildings, provide an isolation-valve or multiple valves for both hot and cold water in access panel to isolate and control each floor level.

4. Install a gate or ball valve to control hot and cold water lines to each group of fixtures, a group of fixtures shall be considered to be 2 or more fixtures in the same room. When practical, valves shall be installed on the same wall as group of fixtures. Valves shall control ONLY fixtures in rooms in which they are installed.

5. Install a gate or ball valve on each building branch line, which serves 2 or more fixtures, when These fixtures are not provided with a group isolation valve as specified above. These valves shall be located approximately 3 feet but not more than 7 feet above finish floor.

6. Install a gate, ball valve or partition stop for hot and cold water supply to plumbing fixtures with no accessible supply stops, such as wall mounted faucets.

7. Install a gate, ball valve or partition stop for stops adjacent to, and controlling water flow to each sill cock and hose bib except as follows:

   a. A sill cock immediately below an exterior drinking fountain may be controlled by the same gate, ball valve or partition stop as drinking fountain.

   b. Valves or stops will not be required for individual hose bibs when these hose bibs are on a branch line serving only hose bibs and branch line is furnished with a shut-off valve.

10. Install gate or ball valve at each location where a water line is connected to a piece of equipment other than items mentioned above.

12. Install a check valve on each hot water return line where it connects to a hot water storage tank or a water heater.

13. Handles, hand wheels (including dishwasher fill valve handles) and operating nuts shall be furnished of steel, brass, or cast iron and shall be removable. Unless specified to be loose key type, handles shall be securely fastened to their stems. On exposed outdoor valves, omit operating handles and provide operating nuts.

14. Provide a handle or a key for each 5, or fraction thereof, loose key valves, bibs, or stops and deliver them to the project OAR.

3.11 ELECTROLYSIS PREVENTION

A. Brass nipples, 6 inches, with recognized brass unions; flanges shall be furnished and installed at locations described herein. Flanges shall be installed with complete insulating component consisting of gasket bolt sleeves and bolt washers. Dielectric insulators shall be installed at following locations:

1. Where special applications indicated on Drawings require an insulation flange or brass union, with 6-inch brass nipple to be installed in a condensate line, or steam line, flange insulation shall be of a high temperature type, suitable for continuous operation at temperatures up to 220 degrees F. for condensate and 400 degrees F. for steam.

2. Where steel or cast iron in ground connects to copper or brass piping above ground, transition from steel or cast iron pipe to copper or brass pipe shall be provided in an accessible location.

3. Underground dielectric connections shall be furnished in accessible yard boxes.

4. Above ground dielectric connections shall be exposed; or if in finished rooms shall be located in accessible access boxes.

3.12 UNDERGROUND PIPE MARKERS

A. Pipe markers shall be furnished according to:
Section 15075: "Mechanical Identification" – 2.06, A and B.

B. Under ground Caution Tape shall be placed 12" to 18" above the utility line. The Caution Tape shall be a designated color and marked with the appropriate name for the specific type of utility pipe as follows:

1. Yellow – with the words: CAUTION GAS LINE BELOW

2. Blue – with the words: CAUTION WATER LINE BELOW

3.13 WATER TEMPERATURE CONTROLLERS

A. Furnish and install a water temperature controller in hot water line adjacent to, and for control of, circulating pumps on hot water return lines when said pump is indicated on Drawings or herein specified. Bulb of temperature controller shall be installed so as to be directly in path of flowing water and so as not to obstruct flow of water.

B. Furnish and install a water temperature controller in hot water storage tanks for control of circulating pump on hot water circulating line when said pump is indicated on Drawings or specified herein.

3.14 DEPTH OF SEWER LINES

A. Minimum depth of below grade sewer lines shall be 24 inches to centerline of pipe. Sewer lines shall slope 1/4 inch per foot minimum, unless otherwise indicated. Minimum depth at Owner property line shall be 6 feet, unless otherwise required.

3.15 BACKFLOW PREVENTION DEVICES

A. Backflow Devices: Installation of backflow devices shall be tested and certified by Los Angeles County backflow device tester before Substantial Completion. Tests shall be performed in presence of IOR. Test reports shall be turned over to IOR for mailing to proper agency.

3.16 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose off Project site.

3.17 PROTECTION

A. Protect Work of this section until Substantial Completion.

END OF SECTION

SECTION 15700

HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes: Air conditioning and air handling equipment as indicated on Drawings and as specified.

C. Related Sections:

1. Section 15010: Basic Mechanical Requirements.

2. Section 15050: Basic Mechanical Materials and Methods.

3. Section 15070: Mechanical Sound, Vibration and Seismic Control.

4. Section 15180: Heating and Air Conditioning Piping Systems.

5. Section 15400: Plumbing.

6. Section 15800: Air Distribution.

7. Section 15900: HVAC Instrumentation and Controls.

8. Section 15950: Testing, Adjusting and Balancing

1.2 SUBMITTALS

A. Provide in accordance with Division 01 and Section 15010: Basic Mechanical Requirements.

1.3 QUALITY ASSURANCE

A. Provide submittals in accordance with Section 15010: Basic Mechanical Requirements.

1.4 OPERATION AND MAINTENANCE INSTRUCTIONS

A. Provide Owner instructions on equipment operation and maintenance procedures, as indicated in Section 15010: Basic Mechanical Requirements.

PART 2 PRODUCTS

2.01 EQUIPMENT

FUME HOOD EXHAUST

A. FHE-1:

1. Manufacturer: Fan shall be model CPV as manufactured by Loren Cook Company, Greenheck, or equal.

2. Fume Hood Exhaust: Provide single width, single inlet, backward inclined aluminum wheel, belt driven centrifugal vent sets of sizes, capacities and configurations indicated on drawings, complete with all accessories required for installation of fans, as configured on drawings. Also, provide all required accessories for proper operation and balancing of fans in accordance with design intent and sequence of operation. The fans shall comply with following:

3. Certification: Fan shall be manufactured at an ISO 9001 certified facility. Fan shall be listed by Underwriters Laboratories (UL 705) and UL listed for Canada (cUL 705). Fan shall bear AMCA certified ratings seal for sound and air performance and Type C spark resistance.

4. Housing: The fan shall be of bolted and welded construction utilizing corrosion resistant fasteners. The scroll wrapper shall be minimum 14 gauge steel with scroll drain and scroll side panels shall be minimum 12 gauge steel. The entire fan housing shall have continuously welded seams for leakproof operation. A performance cut-off shall be furnished to prevent recirculation of air in fan housing. The fan housing shall be field rotatable to any one of eight discharge positions and shall have a minimum 1-1/2 inch outlet discharge flange. Bearing support shall be minimum 10 gauge welded steel. Side access inspection ports shall be provided with quick release latches for access to motor compartment without removing weather cover. Lifting lugs shall be provided for ease of installation. Unit shall bear an engraved aluminum nameplate and shall be shipped in ISTA certified transit tested packaging.

5. Finish: All exterior steel fan components shall be an electrostatically applied, baked epoxy powder coating. Each component shall be subject to a five stage environmentally friendly wash system, followed by a minimum 2.5 mil thick baked powder finish. Paint must exceed 1,000 hour salt spray under ASTM B117 test method. All interior and exterior parts of the fan exposed to the air being moved shall be coated with minimum 15 mils of baked epoxy.

6. Wheel: Wheel shall be centrifugal backward inclined, constructed of 100% aluminum, including a precision machined cast aluminum hub. Wheel hub shall be keyed and securely attached to fan shaft. Wheel inlet shall overlap a one piece aerodynamic aluminum inlet cone to provide maximum performance and efficiency. Wheel shall be balanced in accordance with AMCA Standard 204-05, Balance Quality and Vibration Levels for Fans.

7. Motor: Motor shall be heavy-duty, explosion proof type with permanently lubricated sealed ball bearings and furnished at specified voltage, phase, and enclosure.

8. Shaft: Blower shaft shall be AISI C-1045 hot rolled and accurately turned, ground and polished. Shafting shall be sized for a critical speed of at least 125% of maximum RPM.

9. Bearing: Bearings shall be designed and tested specifically for use in air handling applications. Construction shall be heavy-duty regreasable ball or roller type in a cast iron pillow block housing selected for a minimum L50 life in excess of 200,000 hours at maximum cataloged operating speed.

10. Belts and Drives: Belts shall be oil and heat resistant, non-static type. Drives shall be precision machined cast iron type, keyed and securely attached to wheel and motor shafts. Drives shall be sized for 150% of installed motor horsepower. The variable pitch motor drive must be factory set to specified fan RPM.

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PART 3 EXECUTION

3.1 GENERAL

A. Examine areas under which Work of this Section will be performed. Correct conditions detrimental to proper and timely completion of Work. Do not proceed until unsatisfactory conditions have been corrected.

3.2 EQUIPMENT DESIGN AND INSTALLATION

A. Uniformity: Unless otherwise specified, equipment of same type or classification shall be product of same manufacturer.

B. Application: Only provide equipment as reviewed by the ARCHITECT.

C. Equipment Installation: Equipment installation shall be strictly in accordance with these Specifications, and installation instructions of manufacturers. Equipment installed on concrete foundations shall be grouted before piping is installed. Piping shall be installed in such a manner as not to place a strain on any of the equipment. Flanged joints shall be adequately extended before installation. Piping shall be graded, anchored, guided and supported, without low pockets.

1. Install equipment in a neat and skillful manner, properly aligned, leveled, and adjusted for satisfactory operation.

2. Install so connecting and disconnecting of piping and accessories can be readily accomplished, parts are readily accessible for inspection, service and repair. Space shall be provided to readily remove filters, coils, compressors and fan wheels. Access doors shall be hinged with cam lock door handles.

3. Provide flexible connections for duct, pipe and conduit connections at moving equipment.

3.3 NOISE AND VIBRATION

A. Operation of Equipment: Mechanical equipment and piping systems shall operate without exceeding specified noise and/or vibration levels.

B. Corrective Measures: If specified noise and/or vibration levels are exceeded, provide necessary changes to reduce noise and/or vibration levels to within specified levels.

3.4 FIELD TESTS AND INSPECTION

A. General: Perform field inspections, field tests, and trial operations as specified in Section 15010: Basic Mechanical Requirements. Provide labor, equipment and incidentals required for testing. The ARCHITECH will witness field tests and trial operations as specified in Section 15010: Basic Mechanical Requirements.

B. Equipment and Material: Equipment and material certified as being successfully tested by manufacturer, in accordance with referenced Specifications and standards, will not require re-testing before installation. Equipment and materials not tested at the place of manufacture will be tested before or after installation, as applicable or necessary, to determine compliance with reference Specifications and standards.

C. Start-Up and Operational Test: System shall be started up and initially operated with components operating. During this test, various strainers or filters shall be periodically cleaned until no further accumulation of foreign material occurs. Do not permit excessive loss of water while strainers are being cleaned. Adjust safety and automatic control instruments as required to provide proper operation and control sequence. Refer to Section 15010: Basic Mechanical Requirements.

D. Extent of Field Tests: After installation and before completion, Work of this section shall be subjected to required field tests, including those specified here and in Section 15010: Basic Mechanical Requirements.

E. Operation and Maintenance Data: Provide required operation and maintenance data as specified in Section 15010: Basic Mechanical Requirements.

3.5 CLEANUP

A. Remove rubbish, debris and waste materials and dispose legally off the Project site.

3.6 PROTECTION

A. Protect the Work of this section until Substantial Completion.

-- End of Section --

SECTION 15900

HVAC INSTRUMENTATION AND CONTROLS

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Refer to the current ASHRAE Guidelines for the terminology applied in this document.

C. Work includes, but is not be limited to, the following:

1. Furnishing and installing automatic control valves and automatically operated dampers, except those furnished as part of a unit.

2. Furnishing and installing electric relays (magnetic starters excepted), electric or mechanical linkages, duct sensors, thermostats, dampers and motorized valves, and appurtenances and accessories required to make a complete and operable electric, or electronic installation.

3. Wiring outlet boxes and conduits, unless otherwise noted, for control systems, including wiring required to connect magnetic starters, (specified in other sections) to control systems. Wiring carrying currents 50 Volts or lower is defined as control wiring and shall be provided under Division 15.

4. Testing and adjusting temperature control system.

5. Furnishing record drawings and operational data of systems as installed and finally adjusted.

6. Formal instruction of Owner personnel in operation of equipment.

D. Following items are specified in other sections:

1. Magnetic starters, contacts, power relays and variable resistors or controllers for motors, and other electrical devices.

2. Load carrying wiring for above listed devices and wiring for starting switches not interconnected with temperature control system. (Division16: Electrical).

3. Electrical power to control panels and other equipment. (Division16: Electrical).

4. Installing automatic valves in pipelines.

5. Installing automatic dampers.

6. Automatic controls and valves not connected with comfort heating, ventilating and air conditioning systems.

7. Packaged self contained equipment specified complete with temperature controls.

E. Related Sections:

1. Section 15010: Basic Mechanical Requirements.

2. Section 15050: Basic Mechanical Materials and Methods.

3. Section 15700: Heating, Ventilating and Air Conditioning Equipment.

4. Section 15800: Air Distribution.

5. Division 16: Electrical.

1.02 SUBMITTALS

A. Provide in accordance with Division 01 and Section 15010: Basic Mechanical Requirements.

1. Complete list of items proposed to be furnished and installed under this section.

2. Manufacturer's specifications and other data required to demonstrate compliance with specified requirements.

3. Manufacturer's printed installation procedures.

B. Shop Drawings: Provide Shop Drawings, in the same size as the Drawings. Shop Drawings shall indicate temperature control diagrams, complete with equipment appurtenances required for system. Include sequence of operation description for each system. Submit in accordance with of Division 01.

C. Sequence of Operation: Provide complete, detailed, step-by-step sequence of operation for each item of equipment.

D. Operating Instructions: Comply with provisions of Section 15010: Basic Mechanical Requirements. Explain and demonstrate operation of system to Owner representatives as required.

E. Guarantee: Refer to Section 15010: Basic Mechanical Requirements.

1.03 QUALITY ASSURANCE

A. Manufacturer and Installer Qualifications: Comply with provisions stated under Section 15010: Basic Mechanical Requirements.

1.04 PRODUCT HANDLING

A. Production, Replacement, Delivery and Storage: Refer to Section 15010: Basic Mechanical Requirements and Section 15050: Basic Mechanical Materials and Methods.

PART 2 - PRODUCTS

2.01 TEMPERATURE CONTROLS

A. Provide temperature controls of pneumatic type, as indicated on Drawings, to provide required sequences or operational control.

2.02 MANUFACTURERS

A. Equipment in system shall be of same manufacturer or their standard furnished items. Testing, initial start-up and adjusting of control system shall be under continuous observation of the mechanical engineer responsible for Shop Drawing preparation.

B. Electric, electronic or direct digital microprocessor based control equipment shall be one of following manufacturers, unless otherwise noted:

1. Honeywell, Inc.

2. Johnson Controls, Inc.

3. Robert Shaw Controls Co.

4. Barber-Colman Co.

2.03 ELECTRIC EQUIPMENT AND ACCESSORIES

A. Electric control equipment and accessories include, but are not limited to, the following:

1. Electric control devices as indicated on Drawings and described herein, including thermostats, temperature controllers, valve and damper operators, switches, relays and control panels for instruments as required to provide a complete and operable system.

2. Wiring and conduit, unless otherwise noted, or control systems including wiring required, to connect magnetic starters specified in other sections, to control systems.

B. Room Thermostats:

1. Thermostats for unitary air conditioning units shall be as specified in Section 15700 – Heating, Ventilating and Air Conditioning Equipment. Thermostats located on outside walls shall be installed on insulated backplates or as specified by unit manufacturer.

2. Provide the following room thermostats for each specific application as follows, where manufacturer's thermostats are not specified in Section 15700:

a. Carrier 33CS250-01 Two-Stage Programmable thermostat. Shall allow programming that includes password protection capability, 7-day programming with 3 occupied and 1 unoccupied time periods per day with separate heating and cooling setpoints for each period. Programming shall also allow scheduling of holiday periods with up to 99 days in each period, activating a pre-occupancy purge, and providing a soft start after power failure. Thermostat shall allow user to adjust heat and cool setpoints, configurations, compressor timeguard, deadband, and temperature difference. Fan operation shall be user selectable to be either continuous when occupied, or to cycle with the activation of heating or cooling.

b. Honeywell T822-D for heating only; Honeywell T822-C for cooling only.

c. Honeywell T7100 microelectronic commercial thermostat with Q7100 sub-base for electronic control of 18 to 30 VAC single zone HVAC equipment. Thermostat is either stand alone, or arranged in a temperature averaging network consisting of 2, 3, 4, 5, or 9 sensors for corresponding rooms or zones.

d. Honeywell T921 proportional thermostat, low-voltage, 3-wire controller for valve, damper motors and balancing relays. Unit manufacturer may specify or recommend optional thermostat.

e. Provide tamper-proof locking thermostat guards for items specified above. Covers shall be opaque beige plastic in student occupied areas, clear plastic cover in administrative areas. Provide Honeywell TG500 and TG501 universal thermostat guards or as recommended by thermostat manufacturer.

C. Duct-Mounted Thermostats: Duct-mounted thermostats shall be modulating or 2-position as required to accomplish sequence of operation.

D. Valve and Damper Motors: Damper motors shall be furnished with oil-immersed gear trains and ample capacity to handle required loads under normal operating conditions. Where indicated, spring return type motors are to be provided. Valve motors to be 2-position or proportional, spring return or now spring return.

E. Time Clocks:

1. TC-1: Time clock shall be solid-state digital electronic type capable of 28 on/off set points to be distributed through the week, complete with a day repeat feature, time and set points to be adjustable to nearest minute with a minimum on duration of one minute and a maximum of 7 days, LED readout to show day of week and time of day using 12 hour AM/PM indicator, wired to be powered by 120 volt 60 cycle source and switch configuration to be SPDT with a rating of 5 amps. UL listed, enclosed in standard case NEMA Type 1, Intermatic Model ET715C or Paragon EC 71/18S, with battery operated carry-over.

2. TC-2: Interval timer (bypass), except for window units, shall be manually set and spring operated type Intermatic Model FF6H or Mark-Time Model 90007, 0 to 6 hours, without hold feature, or equal.

3. By-pass timer for window type air conditioner units shall be Mark-Time Model No. 72136AB, or equal. Provide double gang box as specified in Division 16: Electrical.

F. Wiring: Wiring in connection with control systems regardless of voltage, power supply circuits excepted, is part of the Work of this section. Wiring shall comply with Division16: Electrical.

2.04 ELECTRONIC EQUIPMENT AND ACCESSORIES

A. Electronic equipment and accessories includes, but is not limited to, the following:

1. Electronic controls and devices as indicated on Drawings and described herein including thermostats, temperature controllers, valve and damper operators, switches, relays and control panels for instruments as required to provide a complete and operable system.

2. Wiring and conduit, unless otherwise noted, for control systems including wiring required to connect magnetic starters specified in other sections to control systems.

B. Room Thermostats: Room thermostats shall be electronic type, with a resistance sensing element to provide, through electronic bridge circuit, a direct acting and reverse-acting signal to operator being controlled, and shall be furnished with separate and independent band width adjustments for both direct-acting and reverse-acting output, and be complete with concealed adjustment and guard.

C. Controllers:

1. Electronic controllers will be solid-state type utilizing electronic bridge control circuitry and having capability of providing a separate, direct acting and reverse-acting signal across null with band width adjustments and settings for both direct-acting and reverse-acting signals.

2. Output signals shall be 0-16 volt DC and shall be capable of operating one or 2 electronic operators.

3. Controllers shall be capable of being furnished with main and auxiliary sensing circuits for master and submaster type applications. These circuits shall be available for local or remote set point ranges. Sensing elements utilized with these controllers shall be nickelwire resistance element type.

4. Electronic controllers shall be capable of being installed with more than one actuator for sequencing. Controllers shall be panel-mounted.

D. Auxiliary Devices:

1. Furnish and install necessary auxiliary electronic devices as required to accomplish sequence as specified. These totally electronic devices shall include, but not be limited to, such items as load limiting controllers, low signal selectors, high signal selectors, remote reset control devices, remote set point control devices, floating alarm units, staging networks, damper position indicators, unison amplifiers, reversing networks, sequencing networks and electronic power supplier.

2. Indication meters shall be furnished on panels to indicate output signals from controllers and auxiliary devices.

2.05 PNEUMATIC EQUIPMENT AND ACCESSORIES

A. Pneumatic equipment and accessories shall include, but not be limited to following:

1. Pneumatic control devices as indicated on Drawings and as described including sensors, switches, relays, thermostats, control panels for instruments, temperature controllers, automatic valves, automatic dampers, damper operators as required to provide a complete and operable system.

2. Pneumatic distribution tubing for temperature control systems.

3. Local control panels.

4. Complete instrument air system including air compressor and receiver, refrigerated air dryer, and appropriate accessories.

B. Control Panels:

1. Controllers, relays, switches, etc., for equipment located within equipment rooms shall be installed in enclosed control panel, with hinged locking doors. Pneumatic indicating devices and pressure differential devices shall be mounted on face of control panel door. Control devices, including pneumatic indicators, for equipment located in exposed areas subject to outside weather conditions, shall be mounted inside weatherproof enclosures. Location of each panel shall be convenient for adjustment service. Nameplates shall be provided beneath each panel-mounted control device describing function of device.

2. Pneumatic devices within panel shall be factory pre-piped. A pneumatic terminal numbering system shall be installed on pneumatic lines within a panel with aforementioned numbers matching pneumatic terminals indicated on control diagrams. This feature is required to assist system checkout and service.

3. Electrical devices within panel shall be pre-wired to terminal strips with inter-device wiring within panel completed before installation of the system.

C. Room Type Instruments: Room thermostats and transmitters shall be miniature type, 2 pipe with pneumatic relay, pneumatic feedback, and adjustable sensitivity. A cover with tamperproof screws shall be provided on room type instruments, unless indicated otherwise.

1. Single pipe non-relay bleed type instruments may be furnished if indicated on Drawings.

2. Deadband Thermostat: Thermostat shall be furnished with dual movement, one for cooling control and one for heating. An adjustable dead-band shall be provided centered approximately at nominal comfort temperature of 73 degrees F. For any particular dead-band selected, thermostat shall react to temperatures above and below that band while within that band shall maintain a signal that produces neither cooling nor heating.

D. Damper Operators:

1. Damper operators shall be synthetic elastomer diaphragm piston-type and shall be fully proportioning unless otherwise specified. Damper operators shall be furnished with metal bodies. Operators shall provide ample power to overcome friction of damper linkage and air pressure acting on damper blades. Damper operator mounting arrangement shall be outside airstream wherever possible. Operators shall be furnished with external adjustable stops to limit stroke. Operator linkage arrangement shall be such as to permit normally open or normally closed positions of damper as indicated.

2. Damper operators on modulating dampers that are to be sequenced with other control devices, shall, where indicated on Drawings or required to meet sequencing needs, be provided with a pilot positioner of full relay type with an interconnecting linkage to provide mechanical feedback so as to accurately position and control damper.

E. Receiver Controllers:

1. Modulating temperature, pressure, and humidity receiver controllers shall be fluid type furnished with adjustable gain with an amplification ratio up to 40 to 1. Dual input (submaster) instruments shall provide adjustable ratio or reset range. Instruments shall be furnished with dials for setpoint, gain, and where applicable ratio or reset range. Such receiver controllers shall be mounted inside local control panels. A pressure gauge shall be mounted on instrument indicating the output air pressure supplied to controlled device. Test probe points shall be furnished to permit analysis of input signals without interrupting controller functionally.

2. Applications requiring offset compensation shall include a proportional integral controller. The device shall be fluid in design to minimize internal hysteresis and be furnished with either integral or remote setpoint adjustment and integral time constant adjustment. Device shall function as an integral feedback device with an output that varies progressively depending on degree of offset and time since transient was detected.

F. Pneumatic Transmitters:

1. Pneumatic duct and immersion temperature transmitters shall be furnished and shall be liquid filled capillary type, incorporating a pneumatic feedback signal to ensure an exact and proportional relation between measured temperature and transmitted signal. Where transmitter is provided for sensing of mixed air temperature or coil discharge temperatures,

and/or duct area is more than 14 square feet, instrument shall incorporate an averaging element. This element shall be minimum of 96 inches long. Outside air sensing shall be accomplished with a transmitter and a bulb element either duct mounted or shielded from effects of solar radiation.

2. To limit total control loop error and provide closer control, transmitters shall be furnished in following ranges:

		Degrees F.
a.	Chilled water	0 - 100
b.	Condenser water	50 - 100
c.	Cold plenum	40 - 65
d.	Hot plenum	50 - 150
e.	Mixed air	50 - 100
f.	Outside air (temperate climate)	0 - 100
g.	Outside air (severe climate) minus	0 - 160
h.	Hot water	40 - 240
i.	High temperature hot water	200 - 400
j.	Room temperature	60 - 85

3. Manufacturers not furnishing the above ranges shall provide industrial transmitters bench calibrated for particular range. Calibration certificate shall be furnished with each device.

4. Where transmitters are provided for sensing liquid temperatures, they shall be furnished with brass separable wells. Pressure and pressure differential transmitters shall be provided in conjunction with calibrated sensing arrangements to provide a linear 3-15 psi signal across operating range.

G. Economizer Control System: (Not Used)

H. Pneumatic Indication:

1. Pneumatic indicator gauges shall be provided for each transmitter. Indicators shall be temperature, humidity, or pressure according to type of transmitter. Indicators shall be dial type, a minimum of 2-1/2 inches in diameter.

2. Control panels shall have a 0-30 psi pressure gauge of 1-1/2 inches minimum diameter to indicate input control air pressure and output of controllers contained within panel.

3. Accessory pneumatic and pneumatic electric devices shall be furnished with a pneumatic test point on device output, which will allow output signal to be measured without interruption of control function.

I. Direct Reading Pressure Differential Gauges: Gauges shall be panel or equipment installed with appropriate sensing tubes located on the equipment being measured. Differential pressure gauges shall be of high sensitivity bellow actuated variety. Range of differential pressure gauge shall be appropriate for pressure drop being measured. Refer to Drawings for location of gauges.

J. Solenoid Air (E.P.) Valves: Solenoid air valves shall be 2-position electric to pneumatic devices capable of feeding a pneumatic signal through a common port from either a normally closed port or a normally open port.

K. Signal Discriminators: Signal discriminators shall be a pneumatic device capable of simultaneously limiting high and low signals to predetermined levels to limit amount of reset applied to a submaster receiver controller. Setting shall be completely and infinitely variably adjustable. Mechanical stops on controllers that are subject to vibration errors are not permitted.

L. Relays and Signal Transmitters: Necessary relays and signal boosters shall be furnished to provide a full and operable system as required by sequence of operation.

M. Square Root Extractors: Square root extractors shall be furnished where indicated on Drawings. Device shall obtain a parabolic input signal, such as that obtained from a velocity pressure transmitter, and linearize it to provide a signal proportional to square root of original signal.

N. Multi-Port Summing Cumulators: Summing cumulators shall process input signals to provide an output signal proportional to actual value of input parameters. Different spans of input signals shall be accommodated by provision of ratio adjustments for inputs referenced to largest input.

O. Selector Switches, 2-Position: For applications where 2 signals need to be switched manually, selector switches shall be furnished. Switches shall be designed for panel face mounting with position graphics located behind a knob.

P. Gradual Switches: Gradual switches shall provide a proportional output signal that increases and decreases according to position of a knob. Device shall be designed for panel mounting and be provided with a graduated backplate.

Q. Pressure Electric (P.E.) Switches:

1. Pressure electric switches shall convert a pneumatic control signal into an electric contact closing. Action may be to open a contact on rise in pressure or to close a contact on rise in pressure as required by sequence of operation. Single-pole double-throw switches may be provided for either action.

2. Differential shall be adjustable where required to stage correct sequences of on/off and to prevent rapid cycling of equipment.

3. Narrow differential switches may provide fixed differential where close tolerance of on/off point is required.

4. Double pole single throw switches furnished for duplicate functions shall be constructed such that both contact sets close simultaneously.

5. Contact rating shall be suitable for application with necessary approvals from such agencies as Underwriters' Laboratories.

R. Automatic Control Valves:

1. Automatic control valves shall be fully proportioning with modulating plugs for equal percentage of linear flow characteristics. Valves shall be sized by control manufacturer and be provided with actuators of sufficient power for duty intended. Valve body and actuator selection shall be sufficient to handle system pressure and shall close against differential pressures encountered on the Work.

2. Where required by sequence of operation, valves shall be capable of being sequenced either with other valves or other pneumatically actuated devices. Where such sequencing is required, actual spring range, when adjusted for spring shift, shall be such that no overlapping occurs. In event that spring shift causes an overlap, a pilot positioning operator shall be furnished.

3. Small Valves, 1/2 to One Inch: Valves shall be constructed with a cast brass body and screwed ends. Trim shall consist of a removable cage providing valve plug guiding throughout entire travel range. A stainless steel stem shall be provided. Bonnet, cage, and stem and plug assembly shall be removable for servicing. Actuator shall be cast aluminum with spring return piston operated by synthetic rubber diaphragm. Body rating shall be 400 psi at 150 degrees F.

4. Valves, 1-1/2 to 2 Inches: Valves shall be constructed with a cast brass body and screwed ends. For special duty, valves may be selected by control manufacturer to have either bronze or cast iron bodies with screwed or flanged ends. Valves shall be provided with either piston or diaphragm actuators as required.

5. Valves, 2-1/2 Inches and Above: Valves shall be constructed with a cast iron body and be furnished with flanged connections. Actuators shall be synthetic rubber, spring return, diaphragm type sized for the duty.

S. Dampers: Modulating dampers shall be single or multiple blade type as required. Damper frames shall be constructed of 13 gage galvanized sheet metal and shall be furnished with flanges for duct mounting. Blade-to-blade linkage on each section shall be concealed within damper frame. Section linkage shall not be exposed to airstream. Damper blades shall not exceed 6 inches in width. Blades shall be corrugated type construction, fabricated from 2 sheets of 22 gage galvanized sheet steel, spot welded together. Blades shall be suitable for high velocity performance. Dampers furnished for outside, return, or exhaust air and those provided for zone mixing dampers shall be furnished with seals to provide tight shut-off along edges of blades. Seals shall be synthetic elastomer, spring stainless steel or combinations of both. Seals shall provide a tight closing, low leakage damper of less than one percent at 3 inches static pressure. Bearing shall be oil-impregnated sintered bronze or bearing grade nylon.

T. Instrument Air Supply:

1. Instrument air supply shall be furnished to provide clean, dry control quality instrument air to temperature control system.

2. A single or duplex air compressor shall be installed as indicated on Drawings. Each air compressor shall be sized by the temperature control manufacturer to provide adequate air for system without operating more than 50 percent of the time. Air compressor and after cooler sizing indicated on Drawings shall represent minimums only. Air compressor shall be instrument air quality, operating at low piston speeds and low temperature to minimize oil vaporization and carry-over.

3. A receiver tank shall be furnished complete with ASME label, pressure gauge, relief valve, automatic drain trap piped to convenient drain, and necessary openings. Compressor receiver tank shall be sized to require no more than 10 starts per hour of an individual

compressor. Receiver tank shall comply with applicable state and local codes as well as OSHA standards.

U. Driers:

1. A drier shall be furnished to remove condensible contaminants from air such as oil and water. After cooler drier shall be mechanical refrigeration type rated at not less than 1/6 HP with a refrigeration capacity to assure a dewpoint of 39 degrees F. for 10 CFM of air at 100 psi, with inlet air at 100 degrees F., operating at 100 degrees F. ambient temperature.

2. Drier shall be provided for full system capacity.

3. Assembly shall be furnished with the following:

a. Integral 40 micron particulate afterfilter.

b. Automatic condensate drain trap.

c. Power on green pilot light.

d. High air temperature red warning pilot light.

e. Provision for connection of a remote alarm.

V. Following instrument air accessories shall be provided:

1. Submicron filter assembly including replaceable cartridge type filter with transparent bowl and metal bowl guard. Filter element shall be effective in removing 98 percent of any oil leaving after cooler and solid particles as small as 0.6 microns. A trap shall be provided to automatically discharge any liquid contaminants retained in the filter bowl.

2. Pressure reducing stations shall be provided at locations to ensure adequate quantity and pressure of instrument air to controls furnished herein. Pressure gauge shall indicate output of PRV. For systems operating at 20 psig a pop safety shall be furnished to protect instruments from excess air pressures.

W. For duplex air compressors, provide an electric alternator system that will:

1. Automatically alternate lead/lag compressor on each start.

2. Energize lag compressor in event that lead compressor either fails to start or fails to deliver sufficient air capacity.

3. Alternator system shall include combination starters or fused disconnect starters as indicated on Drawings.

2.06 VVT (Variable Air Volume and Variable Temperature Zone Control Systems)

A. The zone control system shall consist of a multiple communicating zone controllers, and a bypass controller. The system shall also include a complete array of sensors and input components. The system shall be capable of operating as a stand-alone system or networked with multiple systems connected on a communications bus to communicating air source controllers.

B. The control system shall be designed to conform to UL and CSA standards. Controllers shall be manufactured within an ISO-9000 certified facility.

C. The control system shall be available as a complete package, with the required input sensors and additional control components readily available. It shall provide complete control of the HVAC system including: unit, bypass airflow system, and zone control. Individual zones in the system shall have the capability to provide supplemental heat and pressure independent operation.

D. The system components shall operate without the use of battery back-up to support time clocks and non-volatile memory storage. The timeclocks must be capable of retaining the correct time for a minimum of 10 hours and the non-volatile memory storage shall be indefinite during a power interruption.

E. The controllers shall be capable of providing all control functions of the HVAC system without the use of a computer. All configuration selections shall be capable of being performed at a System Pilot display via push button access. The controllers shall include the inherent capability to access the system control selections as well as to monitor system performance by means of a communicating network with a PC and EMS software program.

F. Zone Controller as a Linkage Coordinator

1. The zone controller shall be capable of controlling space demand in a variable volume application by monitoring space temperature and determining the heating or cooling demand. The space temperatures shall be controlled to maintain individual heating and cooling setpoints.

2. The zone controller shall have the capability of scanning up to 32 linked zones including itself and determining system heating and cooling requirements. Individual zones may be configured so that they do not participate in system mode determination for heating and cooling or just for the heating if zone supplemental heat is installed.

3. The zone controller shall include adjustable system mode lockouts for Cooling, Heating and a configuration for intermittent fan when occupied. These settings shall be accessible from a System Pilot or from a PC with EMS software.

4. The system fan shall be capable of operating in a continuous or automatic mode during occupied hours and in an automatic mode during unoccupied hours.

5. The zone controller shall be capable of operating the system in manual or automatic changeover mode.

6. The zone controller shall include a heating/ cooling mode temperature changeover cycle to eliminate zone thermal shock during periods of system mode change.

7. The zone controller shall have a system commissioning mode whereby the installer may easily command all dampers to the maximum or all dampers to the minimum positions or position individual dampers. While this mode is active, maximum and minimum damper settings may be set. The system static pressure reading may be viewed from the same screen while performing the operations above and the Bypass pressure set point adjusted as required. The screen data for this mode may be displayed from the System Pilot or from a PC with EMS software.

8. The Zone Controller shall be capable of providing a communication check of all associated controls and display device type as well as error conditions.

G. Zone Controller with modulated dampers

1. The zone controller shall be capable of independent zone control.

2. The zone controller shall operate all zone dampers as well as Variable air volume and fan powered terminal boxes.

3. The zone controller shall be capable of controlling supplemental heat or auxiliary heat sources, including fan control, when required at the zone level. Conversion to supplemental heat shall not require replacement of the control system.

4. The zone controller shall operate in a pressure dependent mode. Damper inlet area shall be adjustable in increments of one square inch. The zone controller shall be capable of reading zone airflow in cfm and controlling zone airflow based upon this information when operating in pressure independent mode.

5. The zone controller shall have the capability to support adjustable minimum and maximum damper positions.

H. Zone Control System Bypass Controller

1. The bypass controller shall be capable of reading supply static pressure and controlling the bypass damper to maintain the supply static set point. This operation shall be provided when operating within a system application or in a stand-alone mode.

2. The bypass controller shall include a pre-positioning mode for opening the damper prior to fan operation.

3. The bypass controller shall provide configurable minimum and maximum damper position settings.

4. The bypass controller shall have the capability of displaying system static pressure, duct temperature, pressure set point and damper position.

5. The bypass controller shall provide the capability of increasing the maintained supply static pressure when the system supply-air temperature exceeds adjustable high and low duct temperature set point limits.

I. Demand Controlled Ventilation (DCV):

1. The DCV zone controller shall be capable of reading an analog signal from a CO_2 sensor or other sensor measuring volatile contaminants, or relative humidity and provide DCV at the zone by calculating a DCV damper position and participate in system DCV operation with the air source. The CO_2 sensor shall be available in wall-mount as well as duct-mount with or without an LED display of parts per million of measured contaminant. The set point shall be adjustable.

2. System DCV (System Level):
The zone controller when operating as a Linkage Supervisor shall have the ability to collect the DCV value from any or all of the zone controllers it is configured to scan. These values may be averaged or the high or low sensor value may be transmitted to an air source controller's analog DCV sensor input. The air sources configured DCV routine may perform the appropriate actions to reduce CO_2 concentration at the reporting zones. If not being used for DCV this system composite value collection may be used to collect zone relative humidity readings or another type of analog sensor values to be reported to the air source.

3. Local DCV (Zone Level):

DCV Zone Controllers shall be capable of reading an analog signal from a CO_2 sensor or other sensors measuring volatile contaminants at the zone level, for independent DCV mode operation. The zone controller shall calculate a DCV damper position for the zone based on an error reduction calculation. When the DCV damper position value is greater than temperature control damper position the DCV damper position shall be used to position the damper.
System heating and cooling and zone supplemental heat shall be allowed to operate.

4. The CO_2 sensor shall be available in wall-mount as well as duct-mount with or without an LED display of parts per million of measured contaminant. The set point shall be adjustable.

J. Each Zone Damper shall include:

1. Terminal to include a motorized damper assembly with actuator.

2. Sound attenuators

3. A duct temperature sensor shall be an integral part of the damper assembly.

4. 115 Volt to 24 Volt transformers.

K. The VVT System shall control the HVAC units in the following manner:

1. The zone controller shall be capable of zone demand data coordination with a communicating rooftop. Set point and temperature information from the zones shall be shared with the rooftop controller so that the rooftop controller's error reduction calculations can determine the proper number of heating or cooling stages to operate in order to balance the system load.

PART 3 - EXECUTION

3.01 TEMPERATURE CONTROL SYSTEM INSTALLATION

A. Control system shall be installed in accordance with control manufacturer's instructions and reviewed Shop Drawings.

3.02 CONTROL PANELS OR CABINETS

A. Control system components shall be mounted in control panels with required wiring behind panel. Control panels shall be galvanized steel sheet metal, with light gray hammertone enamel finish, not lighter than 14 gage. Control panels shall comply with the Los Angeles City Electrical Work Specifications. Panels shall be attached to wall at locations indicated, or as required. Adjustable apparatus shall be provided with screwed or riveted green Micarta plate engraved in white to indicate function. A clear space of 30 inches in front shall be maintained.

B. At locations indicated on Drawings, control cabinets shall be provided with door locks. Door locks shall be the flush type, latched, Corbin No. 15751, 5/8 inch for metal door, keyed to a Corbin Cat. No. 60 key. Cabinet shall be prime coated and finish painted as specified in Section 09912: Interior Painting. Cabinet shall be flush mounted.

3.03 ROOM THERMOSTAT

A. Room thermostats shall be wall mounted at a height of approximately 4 feet. Room thermostats are not permitted on outside walls, at chalkboards, between shelving, in recesses or above heat producing equipment. When installation is necessary in tackboards, review by the Architect is required. Units shall be installed as close to edge of the tack board as possible. Room thermostats shall be furnished with approved tamperproof cover. Thermostats shall be furnished with set point windows and integral thermometers. Office thermostats shall be furnished with extended adjustment knobs; all others shall have key adjustments. Unless indicated otherwise, room thermostats shall be furnished with non-switching sub-bases.

3.04 COORDINATION

A. Coordinate this Work with other aspects of system balancing to obtain a complete operating mechanical system in accordance with design intent, including coordinating with balancing of the system.

B. Coordinate this Work with all aspects of alarm, fire alarm, and smoke detector, specified in Division 16: Electrical.

3.05 SEQUENCE OF OPERATION

A. Each system shall operate as graphically and described on Drawings and in accordance with reviewed sequence of operation.

3.06 CONTROL SYSTEM ADJUSTMENTS

A. Perform adjustments under operating conditions to provide sequence of operation for controls indicated. If required operating conditions cannot be obtained before Substantial Completion, due to outdoor seasonal temperatures, return to the Project site when requested by the Owner and readjust control system when outdoor temperatures will permit proper operating conditions. Start readjustment within 7 calendar days after notification. Final settings of controls and pressure ranges indicated by gauges shall be indicated on project record documents.

3.07 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.08 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 15905

DUCTWORK CLEANING

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of the General and Supplementary Conditions and Division 01 apply to this section.

B. Section Includes: The Air Conveyance Systems Cleaning Contractor (herein called the Contractor) shall be responsible for the removal of visible surface contaminants and deposits from within the Heating, Ventilating and Air Conditioning (HVAC) system in strict accordance with these specifications and applicable drawings.

C. Related Sections:

1. Section 09511: Acoustical Ceiling Systems.

2. Division 15: Mechanical

3. Division 16: Electrical

1.02 QUALITY ASSURANCE

A. CONTRACTOR QUALIFICATIONS:

1. Completed Projects: The Contractor shall submit five (5) Commercial or Industrial HVAC systems rehabilitation and cleaning projects of similar type, size, and degree of difficulty completed within the last two years. The Contractor shall provide name and telephone number of contact person for each listed project.

2. Contractor's License: The Contractor shall be licensed in the State of California. This license shall be a minimum of "C-61"Speciality License in the "D-64" Duct Cleaning Sub-Division.

3. NADCA: The Contractor shall be a certified member of the National Air Duct Cleaners Association (NADCA). To perform required professional services, the Contractor shall have a minimum of one (1) Air System Cleaning Specialist (ASCS) certified by the National Air Duct Cleaners Association on the job sight on a full time basis, and whose status as a certified ASCS shall be verified by a certificate issued from NADCA.

4. IAQ Assessor (Optional): The Contractor's IAQ Assessor shall be a Certified Industrial Hygienist (CIH) and a member in good standing with the American Conference of Governmental Industrial Hygienists (ACGIH).

B. TECHNICIAN TRAINING:

1. Equipment and Chemicals: Foreman and Technician training shall include complete instruction in the use of Fiber optic Boroscopes, and Cameras. Additional training shall also include the proper use of High Pressure Water Injection Cleaners, handling of Caustic and Toxic Cleaning Agents, and a thorough understanding of the Material Safety Data Sheets (MSDS's).

2. Asbestos: Foreman and Technicians shall have passed the "California Certified Asbestos Operations and Maintenance" course" (8-hour initial/4-hour yearly refresher or as amended by California Law).

3. Lead: Foreman and Technicians shall have passed the California Department of Health Services (DHS) "Certified Lead Related Construction Certification" course (32-hour with bi-yearly 7-hour refresher or as amended by California Law and defined by Title 17, California Code of Regulations, Section 35001 et seq.). Foreman/Crew Leaders and Technicians shall have yearly "Lead Blood Level Examinations" performed to ensure worker levels are within OSHA worker Guidelines.

4. Respirator Fit Test: Contractors employees working in areas or situations that require respirators will have had proper training in use and care of respirators. Certified fit testing will have been completed.

5. Annual Physicals: Foreman and Technicians shall undergo and successfully pass a yearly "Pulmonary Function Test" (PFT) examinations.

6. CPR, First Aid and Blood Borne Pathogens: Foreman shall have completed requirements in "Cardio Pulmonary Resuscitation" (CPR), First Aid and Blood Borne Pathogens, and hold current certificate(s).

7. Confined Space: Contractor's employees shall be certified in Confined Space.

C. BID PACKAGE FOR SUBMISSION:

The following shall be included and submitted by the Contractor:

a. Surety documentation certifying ability to post a "Bid Bond" for one-and-one-half times the contract price.

b. Five (5) Commercial HVAC system Duct Cleaning projects of similar type, size, and degree of difficulty completed within the last two years including the name and telephone number of contact person for each listed project.

c. A copy of Contractors Code of Safe Practices and/or their written safety procedures.

d. Technicians current California Certified Asbestos Operations and Maintenance course (16-hour or as amended by California Law) certificates.

e. Technician's current Pulmonary Function Test (PFT) examination Certificates.

f. Technicians current CPR/First Aid Certificates

g. A copy of Contractors "Confined Space Entry Program" showing compliance with "Title 8 CCR sections 5156, 5157 and 5158" CAL/OSHA

h. Certificate of the NADCA certified Air Systems Cleaning Specialist (ASCS) who will be supervising the project.

i. Certificate of the AABC Test and Balance Technician who will be performing Coil Pressure Drop Verification, HVAC Component R&R, etc.

j. An inventory of all equipment, devices and certificates of calibration in possession of the Contractor to determine the Contractor's performance capability.

k. Copy of Contractors California "C-61" License.

l. Proof of membership in good standing with a National Sheet Metal Contractors Union.

m. Contractor price for of Sheet Metal repair.

n. Cost of Performance Bond

1.03 RELATED SECTIONS

A. Section 15010: Basic Mechanical Requirements.

B. Section 15050: Mechanical Materials and Methods.

C. Section 15800: Air Distribution.

D. Section 15950: Testing, Adjusting and Balancing.

1.04 DUCTWORK CLEANING

1.05 APPLICABLE AFFILIATIONS

A. Following affiliations form a part of this specification to extent indicated by reference thereto. In text, publications are referred to by the initials of organization.

1. American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. (ASHRAE): 1980 Systems Volume.

2. National Air Duct Cleaners Association (NADCA)

3. California Society of Healthcare Engineering (CSHE)

4. Sheet Metal Air Conditioning Contractor's National Association (SMACNA)

5. The Institute of Heating and Air Conditioning Industries Inc. (IHACI)

1.06 COORDINATION

A. Coordinate all activities in accordance with provisions of Section 15010.

PART 2 - PRODUCTS

A. MATERIALS:

All materials specified by brand names used for the work described herein shall be delivered to the job site in original, unopened, clean containers, with labels in place. All such materials shall be of the brand and type specific. A substitution of any materials shall not be permitted, unless approved by the Project Supervisor. MSDS's for all the products used by the Contractor shall be made available for inspection at the job site at all times.

PART 3 - EXECUTION

3.01 GENERAL

A. MAINTAINING EXISTING SERVICES:

The existing HVAC system(s) shall be maintained to all occupied areas during normal working hours. Any exceptions to this rule must be pre-approved by the Project Supervisor. Contractor's hours shall be during the evening shift or as designated by the Project Supervisor and shall not interfere with Los Angeles Unified School District operations.

B. STORAGE OF CONTRACTORS EQUIPMENT AND MATERIALS:

The Contractor shall remove all Equipment and Materials from the job site daily or shall obtain permission to store it in an area specified by the Project Supervisor.

C. SITE EVALUATION AND PREPARATIONS:

Contractor and Project Supervisor shall conduct a site evaluation, to establish a specific, coordinated plan which details how each area of the building will be protected during the various phases of the project. The site evaluation shall address, at a minimum, the following concerns:

a. Occupant Safety and Protection from Contaminants.

b. Building Safety and Security Policies. Prior to any Fire Safety or Security Systems shutdown at any time during the project, the Contractor shall first advise and coordinate with the Project Supervisor and ensure all concerned parties are notified.

c. Protecting Occupant Areas, Office Equipment, Furniture, Computers, Photocopiers, etc.

d. Concerns specific and unique to building related issues.

e. Downtime required for each Air Handling Unit - including projected Return Time to Normal Temperature and Humidity Levels.

f. Relocation of Occupants for the contractor to work.

g. Erection of Temporary Scaffolding within Occupant areas for the contractor to work.

h. Containment Strategies for Debris Removal from the HVAC system and associate Cross-Contamination Prevention Protocols within the HVAC system and the building.

D. PRE-CLEANING PREPARATIONS:

Prior to start of work, the HVAC system is to be carefully inspected and checked for all conditions affecting the cleaning. Defects are to be reported in writing to the Project Supervisor and work will not proceed until all known defects have been documented.

No cleaning is to be performed to ducts where the process has the capability of damaging the duct lining. The decision to clean and/or encapsulate these areas will be made by the Project Supervisor after review of the Contractors findings.

Fire protection devices (such as smoke detectors, etc.) shall be protected prior to cleaning procedures. Fire protection devices internal to the ductwork shall be cleaned and tested at the conclusion of work. The Contractor shall coordinate with the Project Supervisor any shutdown and reactivating of the fire alarm system to avoid accidental alarms during cleaning process and related work.

The Contractor shall coordinate the shutdown of the Air Handling equipment with the Project Supervisor before starting work, and shall conform to OSHA requirements regarding fan motor disconnect Lock-Out/Tag-Out.

The Contractor's IAQ Assessor shall sample gross debris from the HVAC at a minimum of three (3) locations per system prior to cleaning. Collected debris shall be analyzed for particle characterization, (i.e. asbestos, fiberglass, and lead.

Contractor shall include in their bid price the testing of samples by an Independent Laboratory.

E. CLEAN-UP:

Contractor shall, at the end of each shift, remove all waste, dirt and debris, resulting from the work performed. Such material shall be removed from the property at the end of each work shift and disposed of at Contractor's expense.

F. CLOSING UP OF UNINSPECTED WORK (IF REQUIRED):

The Contractor shall not allow or cause any of the work to be covered up or enclosed until it has been inspected and approved by the Project Supervisor. Should any work be covered up or enclosed before such inspection, the Contractor shall, at his own expense, uncover the work, and have it properly inspected and approved.

The HVAC system includes any interior surface of the facility's air distribution system for conditioned spaces and/or occupied zones. The cleaning and refurbishing work for each building is to include but not limited to the following components:

a. Mixing Boxes

b. Fan Assemblies

c. Replacement of existing Filters and repair of Filter Screens

d. Outside Air and Return Air Plenums

e. Outside Air Intakes

f. All Supply and Return Ductwork Lined and Unlined, including Ductwork Plenums, Branches, Turning Vanes, Risers, etc.

g. Humidifiers/Dehumidifiers

h. Spray Eliminators

i. All Associated Air Terminal Devices, i.e. Supply Diffuses, Return Registers, etc.

j. Variable Air Volume (VAV) boxes

k. Sound Attenuators

l. Exhaust Duct Systems

m. Exhaust and Return Fans

n. Fire and Fire/Smoke Dampers

G. CLEANING PROCEDURES:

The following general cleaning procedures are to be used as a guideline throughout the project. Determination of which method should be used in each area is to be made by the Contractor and the Project Supervisor. Contractor shall provide detailed procedures in their bid proposal. The Project Supervisor prior to their implementation must approve deviations from specified methods of removal.

H. VACUUM EQUIPMENT:

The Contractor shall utilize caution to prevent spreading contamination to other areas. Supply, Return and Exhaust Ducts shall be cleaned using the "Negative Air Pressure" method. Portable air power vacuum equipment, which draws at least 5,000 CFM and provides 4 to 5 inches W.G of vacuum at the duct, shall be attached to the section of the duct being cleaned. The vacuum device, thereby protecting the occupied space from contamination shall then collect all dirt and contamination dislodged during the agitating process. Where the vacuum collection device is exhausting inside the building, final filtration with 99.97% collection efficiency for capturing particles of 0.3 microns in size and larger shall be used. The Contractor shall be required to certify filter effectiveness of 99.97% efficiency of 0.3-micron size particles by submitting test results from an independent testing agency for any filtration device when exhausting inside the building. All duct insulation shall be inspected for any physical damage. Any damage found will be reported, in writing, to the Owner.

All vacuum devices exhausting air outside the building shall exhaust in a manner that will not allow contaminants to re-enter the facility. Contractor must ensure that the release of debris outdoors does not violate any outdoor environmental standards, codes or regulations.

The Contractor shall seal the Supply Plenum opening with plastic sheeting as needed to insure contaminated air does not return to the building occupants.

The Contractor shall be responsible for insuring that all adjacent areas to the work are protected from water run off or seepage resulting from the cleaning process.

The Contractor shall insure the Fan System is clean and ready for operation at the end of each shift.

I. ELECTRICAL REQUIREMENTS:

Electrical requirements shall be the responsibility of the Contractor, and any costs incurred due to modifications to the Owner's electrical systems shall be at the Contractor's expense.

J. ACCESS HOLES:

The contractor shall utilize Access Openings at various points of the HVAC system for physical and mechanical entry, and inspection. Contractor shall utilize the existing access openings already installed in the HVAC system for where possible.

Access Hole locations shall be reviewed with the Project Supervisor prior to installation. Access Holes shall be created so they can be sealed airtight and shall not compromise the structural integrity of the system. Where possible, sandwich type doors as manufactured by Ductmate Industries, Inc. shall be installed. In all other cases, Contractor shall fabricate and install closures in accordance with SMACNA, NAIMA and NADCA 05-1997 construction standards. Access Doors for Medium to High-Pressure (over 2.0"SP) or Stainless Steel ductwork shall be designed for such applications. All sheet metal shall be fabricated and installed by members of the Sheet Metal Union and approved by the Project Supervisor.

Rigid Fiberglass Ductboard duct systems shall be resealed in accordance with NAIMA recommended practices. Only closure techniques, which comply with UL Standard 181 or UL Standard 181, shall be utilized for fiberglass duct system closures.

Closures must be properly insulated to prevent heat loss/gain or condensation surfaces within the system and shall not significantly hinder, restrict, or alter the airflow within the system. In all cases, access openings shall be noted on the drawings and submitted the Project Supervisor. Cutting access openings into Flex duct is not permitted. Flex duct shall be disconnected at the ends as needed for proper cleaning and inspection.

K. CEILING SECTIONS:

Any damage caused by the contractor to ceilings will be repaired to match existing at no additional cost to the Owner unless such work is beyond the control of the contractor.

L. AIR HANDLING UNIT (AHU) SURFACES:

Fan Housings and Scrolls shall be wire brushed, vacuumed and washed thoroughly, using a solution non-caustic to the painted surfaces. Painting of the Fan Units and all designated areas will employ a fast drying, non-toxic, EPA registered paint. The interior of the air-handling units shall be brushed and mechanically vacuumed such that all metal surfaces are visibly clean and capable of Non-Porous Surfaces Cleaning Verification as described in the NADCA Standard (Appendix A). Internally lined ductwork shall be visibly clean but will not be subject to testing as per NADCA Standards. No cleaning method shall be used which damages components of the ductwork or negatively alters the integrity of the system.

The Contractor shall either replace or repair any loose or damaged insulation. AHU fiberglass lining shall be replaced with ¾" Armstrong "Armaflex" to deter further deterioration and breakdown. The decision to repair damage rather than replace will be made by the Project Supervisor.

Air intake screens, fresh air louvers, return air louvers shall be brushed, vacuumed and washed, using a solution non-caustic to painted surfaces.

Automatic and manual dampers shall be inspected and tested to ensure freedom of action. Any mechanical defects will be reported in writing, to the Owner. All manual dampers shall be marked and reset in the exact position as found at the commencement of the project.

M. AHU AND DUCT RE-HEAT COIL CLEANING:

Contractor shall utilize an approved foaming coil cleaner; hand vacuum and pressure wash each coil face insuring the removal of debris while avoiding damage to the fins. An AABC Certified Test and Balance Technician shall perform pressure differential readings across the coil to verify cleanliness. Mechanical Cleaning shall restore Coil-Pressure Drop (ΔP) to within 10 percent of the OEM specifications (as verified by an AABC Certified Test and Balance Technician). Humidifiers and Dehumidifiers shall be HEPA vacuumed and/or washed. After cleaning procedure is complete, damaged fins shall be combed, as best possible.

N. VAV BOXES:

Contractor shall disconnect inlet ducts, open access door, completely brush, and mechanically vacuum all interior surfaces.

O. VOLUME, FIRE, AND ZONE DAMPERS:

Duct mounted volume, fire, and zone damper sets shall be marked to their current setting, then inspected and cleaned if necessary. External moving parts are to be treated with an approved dry lubricant material. After cleaning an AABC Certified Test and Balance Technician shall check and repair dampers as necessary to insure proper operation and return to original settings. Contractor shall report locations of damaged and/or repaired dampers to the Project Supervisor.

P. OUTSIDE AIR DAMPERS:

Shall be steam cleaned and sanitized. The Contractor shall lubricate the dampers and linkages upon completion of the cleaning. After cleaning an AABC Certified Test and Balance Technician shall check and repair dampers as necessary to insure proper operation and settings.

Q. GRILLES, REGISTERS, AND DIFFUSERS:

Whenever the Grilles, Registers, and Diffusers are removable, they shall be disconnected, washed, dried, painted, and reinstalled. When a facade restricts them or welded in place, hand vacuuming and cleaning methods are acceptable. The Contractor shall avoid disturbing the existing Volume Damper settings. Temporary filters shall be placed behind all Supply Grilles to trap any contaminants that might be discharged during the operation. The temporary filters will remain in place approximately two weeks after completion date and then removed by Contractor.

R. FILTER FRAMES:

Shall be cleaned by wire brushing and vacuuming prior to washing using a solution non-caustic to the finished surfaces. Where minor damage is discovered, straightening shall repair the frames. Any major damage will be reported, in writing to the Owner. After cleaning, new filters shall be provided by Los Angeles Unified School District and replaced by contractor. Contractor shall dispose of the old filters at the contractor's expense.

S. DRAIN PANS:

Pans shall be coated with an anti fungicidal drain pan coating, Rusted Coil Supports shall be repaired with steel putty and coated with primer and paint. All surfaces must be thoroughly dried before coating. Application must be scheduled to allow the manufacturers minimum drying time before returning fan to operational status. Caulked seams found to be in poor condition shall be wire brushed clean, and re-caulked.

T. DOOR GASKETS:

Door gaskets shall be inspected and replaced where needed to insure an effective leak free seal.

U. AGITATION EQUIPMENT:

High power/volume vacuum alone is not an acceptable method of agitation. The Contractor shall whenever possible mechanically remove all debris from the inside surface areas, i.e. the top, bottom, and sides of rectangular duct, and the entire inside circumference of round and flat oval duct. Approved agitation systems shall be accepted only if they provide a minimum of 70 cubic feet per minute (cfm) of compressed air at 110 pounds per square inch (psi) must be supplied to the air tool or nozzle.

The air tool or nozzle shall be able to follow the contours of the ductwork; i.e. the tool must be able to come in contact with all sides/surfaces of the interior of the duct.

The air tool or nozzle shall be capable of dispensing coatings or sanitizing solutions to cover the entire interior surface areas of the ductwork.

Where ductwork is large enough, and able to support the weight of a worker, hand tools and HEPA vacuums may be used. If workers enter the inside of the duct they must follow the OSHA Confined Space Requirements (OSHA 29 CFR 19 10.146). HEPA filtrated collection equipment must be used during this process to assure capture of any residual or airborne debris.

Other acceptable agitation equipment are hand, air powered, or electric powered brushes. This equipment shall be selected based on that which will best contact all sides of the duct regardless of size and configuration.

During the cleaning process, Contractor shall provide temporary closures of metal or taped polyethylene on open ductwork, or around the open ceiling area to prevent the dust during the cleaning process from dispersing throughout the work area.

V. CONTROLLING ODORS:

All responsible measures shall be taken to control all offensive odors and/or mist vapors generated during the cleaning process.

W. DEBRIS REMOVAL:

Debris extracted during the cleaning process shall be amassed and tagged as to its origin within the Air Conveyance System (ACS). Contractor will dispose of all collected debris in accordance with applicable State and Federal Laws. Precautions must be taken to ensure that debris is not dispersed outside the ACS during the cleaning process.

X. SANITIZERS:

Biocide agents shall only be applied if active microbiological growth is evident or where unacceptable levels of microbiological contamination have been verified through laboratory testing. Only biocide agents registered by the U.S. Environmental Protection Agency (EPA) specifically for use within HVAC system shall be used.
Application of any biocide coatings shall be in strict accordance with the manufacturer's instructions.

Y. PLENUM PAINT:

Porous Surface:Paint shall contain an EPA registered anti-microbial, Intercept, to inhibit the growth of bacteria, mold, mildew, and fungi.

Non-Porous Surface:Coating shall meet NFPA Standards 90A & 90B and contain an anti-microbial agent.

Z. QUALITY ASSURANCE:

Verification of HVAC System cleanliness will be determined after mechanical cleaning and before the application of any substance to the HVAC system, including biocide agents, coatings or encapsulants.

Accessible areas of the HVAC system shall be inspected visually to ensure that no visible contaminants are present. In cases where system inaccessibility prevents direct visual inspection, inspection shall be performed by use of fiber-optic boroscope inspection equipment. If visible contaminants are evident, those portions of the system where contaminants are visible shall be re-cleaned and subject re-inspection for cleanliness.

If no contaminants are evident through visual inspection, the HVAC system shall be considered clean; however, the Owner reserves the right to further verify system cleanliness through Gravimetric analysis testing.

If Gravimetric analysis determines that levels of debris are equal to or lower than those levels specified in NADCA standards, the system shall be considered clean and shall have passed cleanliness verification.

AA. REPORT:

Contractor shall submit three copies of the final report to the Project Supervisor outlining the conditions and work completed on each HVAC system. The report shall contain at a minimum the following:

a. Tabulation of the Gravimetric Vacuum tests taken before and after the cleaning process.

b. Pressure readings of the system and across the Coils before and after cleaning. Readings shall be taken under a full load condition.

c. Motor Amperage readings shall be taken before and after the fan cleaning. Readings shall be taken under full load conditions.

d. Laboratory findings of tests performed on the Indoor Air Quality.

e. Laboratory findings of tests performed on the debris collected within the ACS.

f. Before-and-after photographic and video documentation of representative areas of the ductwork systems cleaned as part of the project.

g. Using a computer model, the contractor shall provide an Energy Conservation analysis achieved by cleaning. A Certified AABC Test and Balance Technician shall collect data. The analysis shall be stamped and signed by an independent Registered Professional Supervisor (PE).

h. CAD as-built drawings indicating Systems cleaned, Components changed and Contractor installed Access Doors/Points.

i. Any incidences of property damage or poor and/or unsafe construction.

This report shall be presented to the Owner, for review and approval, at the conclusion of the project. Incomplete report(s) will not be reviewed and will be returned to the Contractor for resubmission.

BB. JOB COMPLETION:

The Contractors obligation shall not be considered satisfied until the Project Supervisor has inspected the job site reviewed and approved the test reports submitted by the Contractor.

CC. WARRANTY:

The contractor shall provide one-year free repair of the following:

a. Drain pan and coil support coating.

b. Fan and housing paint.

c. Insulation coating.

d. Door seals.

DD. SAFETY PROCEDURES AND POLICY:

The Contractor shall comply with the safety standards of by the Owner, OSHA, Federal and State Regulatory Agencies as a minimum requirement for safety performance at each job site. The Contractor shall provide adequate and necessary site specific and the Owner's specific safety training and instruction to all employees and sub-contractors.

The Contractor shall provide Safety Education and Training to all field employees, and will verify that the employees understand the Rules of Safety pertinent to each job site. Any of the Contractor's subcontractors and their employees will be expected to abide by the provisions of this policy as if they were employees of the Contractor.

The Contractor shall supply the Owner with a copy of their Code of Safe Practices with their bid. The safety procedures must meet or exceed the requirements of the California State License Board. The Contractor's Safety Policy Statement shall apply to all divisions, subsidiaries and joint ventures of the Owner in each phase of operation, and shall voluntarily abide by all safety regulations as the pertain to the industry. The Contractor shall ensure that safety takes precedence over expedient and unsafe operations.
The Foreman/Crew Leader shall verify that the Fan System to be worked on has been properly locked out and tagged out. Precautions shall be exercised when cleaning around electric motors, conduits and electric fixtures to prevent electrical hazard and damage to equipment. These shall be covered with plastic sheeting as required to prevent contact with water.

Any person operating the Pendant Hoist to bring in equipment and supplies must hold a valid crane operators license.

The Contractor shall provide all training, necessary safety devices and personal protective equipment (PPE) for employee use, and shall require their use when needed.

The Contractor shall report all incidents that have or may lead to an employee accident, injury or illness. In case of any injury, the Contractor shall ensure that the injured employee is taken immediately to the designated area for medical treatment. The Contractor must report and record all accidents to the Owner and OSHA (Log 200).

All Contractor employees and subcontractors shall assist in accident investigation and implement safety measures to prevent a recurrence of that type of accident.
Contractor shall report any incident of property damage, poor quality or unsafe construction.

The Contractor shall provide all Material Safety Data Sheets (MSDS) in compliance with OSHA requirements.

END OF SECTION

SECTION 15950

TESTING, ADJUSTING AND BALANCING

PART 1 GENERAL

1.1 SUMMARY

A. SUMMARY General and Special Provisions and Division 01 requirements apply to this section.

B. SECTION INCLUDES This Section specifies the requirements for test and balance of HVAC and related systems.

C. RELATED SECTIONS

1. Section 15010: Basic Mechanical Requirements.

2. Section 15050: Basic Mechanical Materials and Methods.

3. Section 15070: Mechanical Sound, Vibration and Seismic Control.

4. Section 15180: Heating and Air Conditioning Piping Systems

5. Section 15700: Heating, Ventilating and Air Conditioning Equipment.

6. Section 15800: Air Distribution.

1.2 ACOUSTICAL PERFORMANCE REQUIREMENTS

Noise levels shall be quantified in all project spaces and compared with the specified maximum allowable Background Noise Criteria (NC). Insofar as possible under the jurisdiction of the Air Balance Contractor and the Mechanical Contractor, adjustments shall be made to air handling equipment to insure that maximum NC ratings are not exceeded in any project space.

1.3 ACOUSTICAL PERFORMANCE SUBMITTALS

A. Submit proposed test procedure and measurement equipment before beginning work.

B. Submit as part of the final air balance report the following:

C. Project space by room number.

D. Specified maximum NC (see below).

E. Measured NC at each measurement location.

F. Octave band sound levels in dB from 63 Hz to 8000 Hz. plotted on NC curves at each measurement location.

G. Notes relating to additional noise sources (other than HVAC) encountered.

1.4 QUALITY ASSURANCE

A. The same Air Balance Contractor shall be responsible for all aspects of air balancing including all sound level measurements.

B. The Air Balance Contractor shall have successful experience in air balancing and sound level measurements including no less than five years experience on projects equal to the size and complexity of this work.

C. Measurement equipment shall be of the class specified below and shall have been calibrated within six months prior to this work..

D. Sound Level Meter and Filters: Type 1 Sound Level Meter with Class II Octave Band Filters as defined in ANSI Standards S1.4 and S1.11.

E. Measurement Microphone: Measurement microphone shall be 1/2" diameter, random-incidence type, calibrated in accordance with ANSI S1.10.

1.5 ACOUSTICAL PERFORMANCE REQUIREMENTS

A. Maximum allowable Background Noise Criteria (NC) due to operation of HVAC equipment are listed below.

Space(s)	Recommended NC
Community Rooms, Conference Rooms, Private Offices	30
Guest Rooms, All 1st Floor Spaces (except rooms listed above or below), Garden Room, Art Room	35
Dining Room, Circulation, Open Offices, Workrooms	40
Toilet Rooms, Laundries, Showers, Kitchen, Storage	45

B. Noise Criteria Definition

Noise levels due to single or multiple equipment items in or around Project spaces shall not exceed the above maximum allowable NC in any octave band. The octave band levels (in decibels sound pressure re 0.0002 microbar) associated with each NC limit are tabulated below:

	Octave Band Sound Pressure Level							
	63Hz	125Hz	250Hz	500Hz	1KHz	2KHz	4KHz	8KHz
NC-30	57	48	41	35	31	29	28	27
NC-35	60	52	45	40	36	34	33	32
NC-40	64	56	50	45	41	39	38	37
NC-45	67	60	54	49	46	44	43	42

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 DEFINITIONS AND APPLICABLE PUBLICATIONS

A. For the purposes of this Section definitions are as indicated in applicable publications of AABC, NEBB, ASHRAE, ANSI, and SMACNA.

3.2 QUALITY ASSURANCE

A. The test and balance agency shall be directly subcontracted to the CONTRACTOR. The qualifications of the agency shall comply with Section 3.02, Quality Assurance. The agency shall be responsible for furnishing labor, instruments, and tools required to test and balance the heating, ventilating and air conditioning (HVAC) systems and related plumbing systems, as described and/or as indicated in the Contract Documents.

B. CONTRACTOR shall obtain services of an independent, qualified testing agency acceptable to ARCHITECT to perform testing and balancing Work as specified and as follows:

1. Agency shall be currently certified by either The Associated Air Balance Council (AABC) or The National Environmental Balancing Bureau (NEBB) or Testing, Adjusting and Balancing Bureau (TABB).

2. Work shall be in accordance with the latest edition of the AABC or NEBB National Standards. If the Contract Documents impose a more stringent standard then the Contract Documents shall prevail.

C. Performance Criteria: Work of this Section shall be performed in accordance with approved Testing and Balancing (TAB) agenda.

D. Test Equipment Criteria: Basic instrumentation requirements and accuracy/calibration required by Section Two of the AABC or Section II of the NEBB Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems.

3.3 SUBMITTALS

A. Submit name of agency to perform the Work. Include in the submittal the certified qualifications of all persons responsible for supervising and performing actual Work of this Section. Agency shall submit a minimum of five (5) commercial or industrial HVAC system TAB projects of similar type, size, and degree of difficulty completed within the last two years. Agency shall provide name and telephone number of contact person for each listed project.

B. Submit, for approval, 6 copies of the Agenda as indicated in Section 3.06 to test and balance all mechanical and relevant plumbing systems.

C. Preliminary Report: Review the Contract Documents, examine Work installations and submit a written report to ARCHITECT and/or others indicating deficiencies in Work precluding proper testing and balancing of the Work.

D. Final TAB Report: Submit the final TAB report for review by ARCHITECT and/or others outlining the conditions and Work completed on each HVAC system. All outlets, devices, HVAC equipment, etc. shall be identified, along with a numbering system corresponding to report unit identification.

E. Submit an AABC "National Project Performance Guaranty" assuring the Project systems were tested, adjusted and balanced in accordance with the Specifications and AABC or NEBB National Standards.

F. CADD drawings: Submit single line, multi-color CADD drawings indicating outside return and supply air, volume control boxes, each outlet and inlet, room numbers, duct sizes at traverse locations, temperatures and pressures, systems balanced, components changed and CONTRACTOR installed access points. In addition, drawings shall identify controls, equipment settings, including manual damper quadrant positions, manual valve indicators, fan speed control levers, and similar controls and devices shall be marked on the drawings to show final settings. CADD files shall be submitted on CD-ROM upon final submittal of TAB report. Reports shall identify discrepancies between completed Work and the Contract Documents affecting the performance and /or longevity of the system.

3.4 GENERAL SCOPE OF WORK

A. The general scope of Work shall include but not be limited to the following:

1. Measure airflow rates of HVAC systems and make adjustments to achieve design airflow rates, tabulate results and submit reports.

2. Measure water-flow rates of HVAC systems and make adjustments to achieve design water flow rates, tabulate results and submit reports.

3. Measure flow velocities, temperatures, static pressures or head, rotational speed, and electrical power demand of fans and other related HVAC system components, tabulate results and submit reports.

4. Measure sound levels in each conditioned space, tabulate results and submit reports.

5. Measure ambient sound levels of outdoor HVAC units and system components such as outdoor fans, rooftop packaged units, tabulate results and submit reports.

6. Reports shall contain sufficient data for the system designer to evaluate system performance and solve installation problems.

3.5 SPECIFIC SCOPE OF WORK

A. The specific scope of Work shall include the following HVAC system components as indicated on the Drawings:

1. Heating and Ventilating Units

2. Supply, Return, Relief and Exhaust Fans

3. All Supply and Return Ductwork

9. All associated Air Terminal Devices, i.e. Supply Diffusers, Return Registers, etc.

10. Mixing Boxes and Variable Air Volume (VAV) boxes

11. Exhaust Duct Systems

12. Fire and Fire/Smoke Dampers

3.6 TESTING, ADJUSTING AND BALANCING AGENDA

A. Provide proposed materials, methods, procedures, forms, diagrams and reports for test and balance Work.

B. Agenda to be completed by the test and balance agency and submitted to ARCHITECT and others for review and approval.

C. Agenda shall include one complete set of AABC or NEBB publications listed in Section 3.02, B, 2, applicable publications, or, in case of other test and balance agencies and or organizations, comparable publications to establish an approved, systematic and uniform set of procedures.

D. Agenda shall also include the following detailed narrative procedures, system diagrams and forms for test results:

1. Specific standard procedures required and proposed for each system of the Work.

2. Specified test forms for recording each procedure and for recording sound and vibration measurements.

3. Systems diagrams for each air, water and steam system. Diagrams may be single line.

E. In addition to information recorded for standard AABC or NEBB procedures, the following information is required:

1. Fan Data

2. System number, Location, Manufacturer, Model and Serial Number

3. Fan wheel type and size

4. Motor horse power, type and rpm

5. Drive size, type, number of grooves, and open turns on Variable Pitch Drives

6. Number and size of belts, motor and fan shaft sizes, center-to-center of shafts in inches, and adjustment available motor data, including nameplate data, actual amps, rated and actual motor rpm, volts, phase, hp, kW, starter heater size, and capacity

7. Fan, return and outside air

8. Fan static pressure, suction/discharge, static profile and static control point.

F. The following traverse data is required:

1. TRAVERSE LOCATION, SIZE OF DUCT (INSIDE DIMENSIONS), AREA OF DUCT IN SQUARE FEET

2. Column for each hole traversed/lines for each reading

3. Barometric pressure

4. Temperature/Static Pressure in the duct

5. Actual CFM corrected to SCFM

6. Notes

G. The following air distribution data is required:

1. ROOM IDENTIFICATION

2. Outlet or intake balance sequence number

3. Size of outlet or inlet

4. AK Factor

5. Design and Actual FPM and CFM

6. Notes

H. The following IAQ data is required:

1. Location/room identification, time and date of each test

2. Contaminants as specified in Section 3.10

3. Measured results of contaminant tests

4. Number of occupants in the room

5. Calculated CFM Fresh Air per person

6. CO2 level with corresponding ASHRAE / CAC Title 24 permissible CO2 levels for areas tested

7. Temperature and humidity

8. Pass or fail indications for each space tested

9. Deficiencies

I. The following hydronic coil data is required:

1. Air flow through the coil in CFM
2. Dry bulb and wet bulb temperatures entering/leaving coil
3. Enthalpy or total heat differences in BTU/lb.
4. Capacity in BTU/hr at time of test
5. Water temperature and pressure entering/leaving coil
6. Flow (in GPM) through coil
7. Air pressure drop across coil
8. Water head drop across coil
9. Notes

J. The following boiler and domestic water heater data is required:

1. Performance test results for rated capacity
2. BOILER IDENTIFICATION NUMBER
3. NAMEPLATE DATA; MANUFACTURER, MODEL AND SERIAL NUMBER
4. Water temperature entering/leaving the boiler
5. Outside conditions: temperature, humidity, general cloud cover
6. Barometric pressure

K. The following air-cooled split system condensing unit data is required:

1. Performance test results for rated capacity
2. UNIT IDENTIFICATION NUMBER
3. NAMEPLATE DATA, MANUFACTURER, MODEL AND SERIAL NUMBER.
4. Compressor nameplate and actual amps, volts, phase, and hertz
5. RPM of motors, where applicable
6. Refrigerant type
7. Suction/Discharge pressure when gauge installed
8. Number of stages

9. Low-pressure/High-pressure control setting

10. Condenser fan sequence stages

11. Crankcase heater watts (nameplate)

12. Hot gas bypass installed - yes/no

13. SCFM Air Flow Measurement vs. Design CFM

L. The following air-cooled chiller data is required:

1. IDENTIFICATION NUMBER

2. NAMEPLATE DATA; MANUFACTURER, MODEL AND SERIAL NUMBER

3. Chilled water flow through evaporator in GPM

4. Water temperature entering/leaving evaporator

5. Pressure drop through evaporator

6. Condenser air flow

7. Pressure drop through condenser

8. Air temperature entering/leaving condenser

9. Motor data, amps, volts, rpm, starter type, overload protection type, phase, hertz, nameplate, and actual measured kW input

10. Type of refrigerant

11. Notes

M. The following sound test data is required:

1. AREA OR LOCATION

2. Sound level in dB(A) as specified.

N. The following vibration test data is required:

1. Equipment identification number

2. Vibration levels at all accessible bearings, motors, fans, pumps, casings, and isolators

3. Measurements in mils defection and velocity in inches per second as specified per section XIV of this document

4. Each measurement taken in horizontal, vertical, and axial planes as accessible.

O. The following fan coil data is required:

1. EQUIPMENT IDENTIFICATION NUMBER
2. Nameplate data; manufacturer, model and serial number
3. Tested supply CFM or manufacturer rated CFM if not ducted
4. Tested outside air in CFM
5. Motor data and actual amps and volts
6. Cooling/Heating test data
7. Notes

P. The following pump data, including but not limited to chilled water, heating hot water, domestic hot water circulation, sewage ejectors and sump pumps is required:

1. Pump number
2. Nameplate data; manufacturer, model and serial number
3. Motor data including nameplate data, actual amps, volts, RPM, horsepower, starter heater size and capacity
4. Pump discharge and suction pressure along with total dynamic head in the following modes
5. Shut-off head FT, Wide open Head FT and Final operating Head FT
6. Final GPM Test plotted on a pump curve
7. Notes

Q. The following VAV terminal data is required:

1. TERMINAL IDENTIFICATION NUMBER
2. NODE, ADDRESS OR DESIGNATION ON SYSTEM
3. Terminal size
4. Cooling CFM
5. Minimum CFM (if applicable)
6. Heating CFM (if applicable)
7. Notes

3.7 PROCEDURES

A. Schedule the Work of this Section in order for test and balance activities to be completed prior to the date of Substantial Completion. CONTRACTOR shall place all heating, ventilating, and air conditioning equipment into operation during each day and until all HVAC adjusting, balancing, testing, demonstrations, and instructions on systems are completed. Agency shall prepare and submit reports within ten (10) days from completion of the Work of this Section to allow sufficient time for corrective measures to be completed before Final Completion of the Work. When an individual building or portion thereof is ready for occupancy, all equipment relative to such portion of Work shall be put into service, tested and balanced.

B. Prior to the date of Substantial Completion, and upon completion of test and balance Work, place all exhaust fans in operation, force all air handling units and air conditioning units into a 100% outdoor air economizer mode with heating and cooling locked out and flush the building continuously for a period of fourteen (14) days.

C. Coordinate test and balance procedures with any phased Project requirements so test and balance procedures on each phased portion of the Work will be completed prior to completion of said designated phase.

3.8 FIELD EXAMINATION

A. Before the commencement of test and balance Work, CONTRACTOR shall ascertain that following conditions are fulfilled:

1. Ensure that all water heating systems have been flushed, cleaned, filled and high points vented

2. Water heaters are filled

3. Refrigerant systems are fully charged with specified refrigerant

4. Over-voltage and current protection have been provided for motors

5. Equipment has been labeled as required

6. Curves and descriptive data on each piece of equipment to be tested and adjusted are available as required

7. Operations and maintenance manuals have been supplied

8. Controls manufacturer and boiler-burner representatives shall be available for consultation and supervision of adjustments during tests

9. Verify that heating and cooling coil fins are cleaned and combed and air filters clean and installed

10. Verify that duct systems are clean of debris and leakage is minimized, access doors are closed and duct end caps are in place, fire and volume dampers are in place and open

11. Automatic control systems are completed and operating

12. Start up and initial commissioning of all HVAC equipment except fans shall be by the manufacturer.

B. In addition to the above, CONTRACTOR shall establish a specific, coordinated plan which details how each area of existing building will be balanced during the various phases of the Work. The evaluation shall address, at a minimum, the following concerns:

1. TENANT operations

2. Building safety and security policies. Prior to any fire safety or security systems shutdown at any time during the Work, CONTRACTOR shall first advise and coordinate with ARCHITECT to ensure all concerned parties are notified.

3. Protecting furniture, computers, photocopiers, and other office equipment.

4. Protecting classroom fixtures and equipment.

5. Concerns specific and unique to building related issues.

6. Downtime required for each AHU including projected time to return each portion of the building back to its normal occupancy temperature and humidity.

7. Shutdown and reactivation of the fire alarm system to avoid accidental alarms during test and balance and related Work.

3.9 TEST AND BALANCE

A. For each heating, ventilating, or air conditioning system the following shall be performed, recorded and submitted in a approved format for review. Make, type, and model of unit, and location of each piece of equipment shall be included in the report. Readings shall include but not be limited to following:

1. AIR SYSTEMS:

a. General

1) Verify all ductwork, dampers, grilles, registers, and diffusers have been installed per design and set in the full open position. Agency shall perform the following TAB procedures in accordance with AABC or NEBB National Standards. Where the requirements of the two standards are different, the more stringent requirements shall prevail. Also, if the Contract Documents impose a more stringent standard then the Contract Documents shall prevail.

b. Zone, Branch and Main Ducts:

1) Adjust ducts to within design CFM requirements by means of Pitot-tube duct traverse.

c. Supply Fans:

1) Fan speeds: Test and adjust fan RPM to achieve maximum or design CFM. CONTRACTOR shall provide new belt pulleys when required.

2) Current and Voltage: Test and record motor voltage and amperage, and compare data with the nameplate limits. Ensure fan motor is not in or above the service factor as published by the motor manufacturer.

3) Pitot-Tube Traverse: Perform a Pitot-tube traverse of main supply and return ducts, record total CFM.

4) Outside Air: Test and adjust the outside air using Pitot-tube traverse.

5) Static Pressure: Test and record system static profile of each supply fan.

6) Current and Voltage: Test and record motor voltage and amperage, and compare data with the nameplate limits. Ensure fan motor is not in or above the service factor as published by the motor manufacturer.

d. Return, Relief and Exhaust Fans:

1) Fan speeds: Test and adjust fan RPM to achieve maximum or design CFM. CONTRACTOR shall provide new belt pulleys where required.

2) Pitot-Tube Traverse: Perform a Pitot-tube traverse of the main return ducts to obtain total CFM.

3) Static Pressure: Test and record system static profile of each fan.

e. VVT Systems:

1) Set volume regulators on all zone terminal and bypass dampers to meet design maximum and minimum CFM requirements.

2) Identification: Identify the type, location, and size of each terminal. This information shall be recorded on terminal data sheets.

f. Diffusers, Registers and Grilles:

1) Tolerances: Test and balance each diffuser, grille, and register to within 5% of design requirements.

2) Identification: Identify the type, location, and size of each grille, diffuser, and register. This information shall be recorded on air outlet data sheets.

g. Coils:

1) Air Temperature: Once airflow is set to acceptable limits, agency shall take wet bulb and dry bulb air temperatures on the entering and leaving side of each cooling coil. Dry-bulb temperature shall be taken on the entering and leaving side of each heating coil.

h. Duct Leakage Testing:

1) On existing ductwork, agency shall calculate duct leakage by traversing the unit and reading associated diffusers.

2) On new installations, agency shall base one test per isolated section unless otherwise noted. New ductwork shall be tested at one and one-half times (1-1/2) design static pressure. New supply ducts shall demonstrate 0.5% leakage maximum. New return ducts shall demonstrate 1.0 % leakage maximum.

3). Air Conditioning Units: (Start-up and initial commissioning by manufacturer only.)

a. Suction pressure and temperature.

b. Discharge pressure and temperature.

c Amps and volts.

d. Make, type, and model of unit, capacity rating.

e. Ambient temperature: WB, DB

f. Supply, return, relief and exhaust fans shall be balanced as indicated in Section 3.09, A, 1, Air Systems.

g. Proper operation of controls: Temperature controllers and safety devices shall be tested during operating tests, with all other controls and devices, except one under test, being by-passed.

h. Upon completion of tests, controls and devices shall be returned to their normal operating condition.

4). Condensing and Refrigerating Units: (Start-up and initial commissioning by manufacturer only.)

a. Suction pressure and temperature.

b. Discharge pressure and temperature.

c. Amps and volts.

d. Make, type, and model of unit, capacity rating.

e. Ambient temperature: WB, DB

f. Proper operation of controls: Temperature controllers and safety devices shall be tested during operating tests, with all other controls and devices, except one under test, being by-passed.

g. Upon completion of tests, controls and devices shall be returned to their normal operating condition.

5). Split System Heat Pump Units: (Start-up and initial commissioning by manufacturer only.)

a. Suction pressure and temperature.

b. Discharge pressure and temperature.

c. Amps and volts.

d. Make, type, and model of unit, capacity rating.

e. Ambient temperature: WB, DB

f. Proper operation of controls: Temperature controllers and safety devices shall be tested during operating tests, with all other controls and devices, except one under test, being by-passed.

g. Upon completion of tests, controls and devices shall be returned to their normal operating condition.

3.10 INDOOR AIR QUALITY (IAQ)

A. Agency shall take measurements at design outside air, shall measure temperature and humidity uniformity throughout the Work, check filter installation for proper fit, seal, and operation, and verify condensate drain operation. Agency shall note any water damage or obvious contamination sources from inside or outside.

3.11 VERIFICATION OF HVAC CONTROLS

A. Agency shall verify in conjunction with CONTRACTOR all control components are installed in accordance with the intent of the Contract Documents and are functioning according to the design intent, including all electrical interlocks, damper sequences, air and water resets, fire stat's, and other safety devices.

B. CONTRACTOR shall verify all control components are calibrated and set for design operating conditions and intent.

3.12 TEMPERATURE TESTING

A. To verify system control and operation, agency shall perform a series of three temperature tests taken at approximately two-hour intervals in each separately controlled zone. The resulting temperatures shall not vary more than two (2) degrees Fahrenheit

from the thermostat or control set point during the tests. Outside temperature and humidity shall also be recorded during the testing periods.

3.13 FIRE AND SMOKE DAMPER TESTING

A. This work is to be performed by OWNER and State Fire Marshall. Do not include in agency scope of work.

3.14 LIFE SAFETY CONTROLS TESTING

A. This work is to be performed by OWNER and Local Fire Department. Do not include in agency scope of work.

3.15 FINAL TABULATION

A. After heating, ventilating, and air conditioning components are satisfactorily tested and balanced, entire system shall be put into operation and all pressures, temperatures, gpm, cfm, velocities, etc., shall be recorded and checked against design schedules. Design requirements shall be listed on reports and final tabulation shall be within a tolerance of plus or minus 5% of design requirements.

B. Readings at various locations as described herein will be made every hour for four (4) hours, during normal working hours for three (3) days. Boilers, forced air furnaces and chillers shall be started up far enough in advance to meet design conditions during period of testing.

3.16 VIBRATION TESTING

A. Furnish instruments and perform vibration measurements if specified in Division 15. Provide measurements for all rotating HVAC equipment half horsepower and larger, including centrifugal/screw compressors, pumps, fans and motors.

B. Record initial and final measurements for each unit of equipment on test forms. Where vibration readings exceed allowable tolerance and efforts to make corrections have proved unsuccessful, forward a separate report to ARCHITECT.

3.17 ACOUSTICAL TESTING PROCEDURE

A. Sound pressure level measurements shall be made at 5' above floor level in the center of each project space in all octave bands centered between 63 Hz and 8000 Hz, inclusive. Measured levels shall be recorded in decibels (re .0002 microbar) on paper in tabular form and plotted against NC curves for the record.

B. Testing shall be accomplished only during periods when no other trades are working within the building.

C. Noise from temporary events (aircraft flyovers, vehicle passbys, people talking, etc.) shall not be measured or recorded. If such an event occurs during a measurement, the measurement shall be repeated once noise due to the event has ceased.

D. Insofar as possible, identify and remove all fixed sources of sound other than HVAC. Make note of and record on paper all fixed noise sources which cannot be removed. Such sources might include electrical, lighting, and plumbing systems.

E. Rebalance or adjust all air handling equipment causing noise in spaces in excess of maximum allowable NC. Re-measure sound levels in all such spaces to show compliance with maximum allowable NC. Repeat until noise is minimized to the satisfaction of the Architect, Mechanical Engineer, and Acoustical Consultant.

-- End of Section --

SECTION 16010 - BASIC MATERIALS AND METHODS

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specifications collectively apply to work of this Section.

1.02 WORK INCLUDED

A. The specifications and drawings are intended to cover a complete installation of systems. The omission of expressed reference to any item of labor or material for the proper execution of the work in accordance with present practice of the trade shall not relieve the Contractor from providing such additional labor and materials.

B. All labor, materials, appliances, tools, equipment, facilities, transportation and services necessary for and incidental to performing all operations in connection with furnishing, delivery and installation of electrical system, complete, as shown on the drawings and/or specified herein. Work includes but is not necessarily limited to the following:

1. Conduits for all wiring systems, unless otherwise specifically noted.

2. All electrical wiring and connections to equipment furnished under other sections of Specifications.

3. All electrical wiring and connections to Owner furnished equipment.

4. All wiring and conduit for Air Conditioning and Heating and Ventilating systems, and electrical equipment in Plumbing Section of work.

5. Pull wires in conduit runs indicated as conduit only (CO).

6. Lighting panelboard.

7. Building electrical wiring, conduits, outlet boxes, junction boxes, convenience outlets, switches,

plates and all miscellaneous items of electrical equipment, apparatus and material specified and/or shown on Drawings.

8. All required grounds.

9. All anchors, chases, sleeves and supports for electrical equipment.

10. Excavation necessary for execution and completion of electrical work.

11. Required backing, supports and blocking for lighting fixtures.

12. Public Address System.

13. Master Clock System.

14. Tests of entire system.

15. Lighting fixtures complete with lamps and required accessories.

16. Guarantees.

17. Complete connections to all motors, apparatus, electrically operated devices, etc., as shown on Drawings.

18. Flashing of conduits through roof.

19. Shop Drawings.

20. Include an allowance of $200.00 for the material cost of any lighting fixture where an outlet is shown on drawings without a fixture type designation.

1.03 GUARANTEE

A. In addition to guarantee required in Division 1 or specifically specified elsewhere, all materials and equipment provided and installed under this Division of Specifications shall be guaranteed by Contractor in writing for a period of one year from date of acceptance of work by Owner. Should any trouble develop during this period due to defective materials or faulty workmanship, the Contractor shall furnish all necessary labor and materials to correct the trouble without costs to Owner.

B. Guarantee complete and perfect operation of entire system and that all apparatus will perform in accordance with detailed drawings and Specifications.

C. Guarantee that all equipment will be supported in such a way as to be free from objectionable vibration and noise.

D. Guarantee that all licenses and royalties for use of any patented feature of system will be paid before acceptance of system.

1.04 GENERAL REQUIREMENTS

A. Codes: Construct project in accordance with following codes:

1. Regulations of State and Local Fire Marshal.

2. California State Electrical Safety Orders, Title 8.

3. California Electric Code, National Fire Protection Association, edition in force.

4. Local codes and ordinances.

5. Title 24, California Code of Regulations.

Keep a copy of applicable code available at Site while performing work of this Section. Nothing in these Drawings and Specifications to be construed as authority to violate codes and ordinances. Conflict with applicable regulations to be resolved at Contractor's expense before installation.

B. Permits, Fees and Inspections: Obtain and pay for all necessary permits and fees required by any constituted authority having jurisdiction including utilities. Arrange and pay for all required inspections or examinations and deliver certificates of inspection to Architect.

C. Record Drawings:

1. Provide record drawings for work of this Section.

2. Keep up-to-date a complete "As-Built" record set of blueline prints corrected daily and showing every change from original Drawings and Specifications

and exact "As-Built" locations, sizes, and kinds of equipment.

3. Prints for this purpose may be obtained from Architect at cost of printing. Keep this set of Drawings on job and use only as a record set.

4. Drawings to serve as work progress sheets. Make neat and legible notations in red ink thereon daily as work proceeds, showing work as actually installed. Drawings to be available at all times for inspection, and kept at a location designated by Architect.

5. On completion of work, obtain one set of prints from Architect at cost of printing, and note neatly in scale all changes on record set. Deliver complete set of prints together with one set of blueline prints to Architect together with Contractor's name, address and phone number. Incorrect, non-legible or non-reproducible drawings will not be accepted.

D. Selection and Ordering of Equipment and Materials: Within two weeks after award of Contract, arrange for purchase and delivery of all light fixtures, equipment and materials required in ample quantities and at proper time. Inform Architect immediately of any inability to obtain suitable delivery of any equipment or material. Send copy of letter verifying date of purchases to Architect.

E. Shop Drawings and Material Lists:

1. Submit material lists and shop drawings as called for in Division 1, and as supplemented by this Division, and with sufficient promptness to ensure that overall work of project will not be delayed.

2. Submit six copies of a list of materials and equipment manufacturers that Contractor intends to use.

3. Provide shop drawings for following:

a. Panelboard.

b. Lighting fixtures, lamps and necessary accessories.

c. Electronic lighting ballasts.

4. Do not fabricate work until reviewed shop drawings for work have been received from Architect. Work fabricated or erected in advance of reviewed shop drawings will be at risk of Contractor.

5. Architect's or Engineer's review of shop drawings does not relieve Contractor of responsibility for errors including details, dimensions, or materials, as well as conformance with requirements of Drawings and Specifications.

6. Shop drawings will be checked by Architect and Engineer for conformance to design as a convenience to Contractor. Dimensions will not be checked. Should interferences become evident, notify Architect immediately so that matter may be resolved prior to proceeding with fabrication.

7. No reimbursement based on a claim that work was placed in accordance with dimensions shown on a reviewed shop drawing will be allowed for removing or replacing work already in place.

8. Make available a copy of every reviewed shop drawing at Project Site.

9. Submit shop drawings in coherent groups; e.g., all lighting fixtures at one time.

10. Submit actual samples of specified equipment or material to Architect for review when requested.

F. Substitution and Approval of Material:

1. Base all bids and proposals only upon materials, construction and equipment named or described in specification and/or shown on drawing. Should a Contractor wish to use other equipment than that specified, he shall submit proposed substitution by fully describing equipment he prefers to use and by listing credit or additional cost to his bid as a separate item should substitution be acceptable.

2. All equipment and materials proposed for substitution shall be similar in design and equal in quality and function to those specified herein or on drawings. Contractor (not sales vendor) shall demonstrate his proposed substitution and

shall specifically note all differences between item specified and proposed substitution. Actual samples and test data, certified by an independent testing laboratory, shall be submitted when requested.

3. Each substitution will be given consideration, but without any obligation expressed or implied on part of Architect to change named requirements of specification. Only one substitution for each item of equipment will be permitted. Contractor assumes sole responsibility for performance and space requirements for substitute equipment. Decision of Architect shall be final as to whether or not substitution is acceptable.

G. Terminology:

1. Term "provide" used on Drawings and elsewhere in the Specifications shall be considered to mean "furnish and install".

2. Term "UL" means Underwriters Laboratories Inc.

H. Workmanship: See supplementary Conditions, Architect is sole judge of whether execution is in a workmanlike manner.

I. Safety Conditions: Be responsible in preventing energized switches, circuit breakers or circuits from being turned to "On" position during construction period. Be responsible for damages to personnel and/or property resulting from contact with energized circuits, switches, circuit breakers, busses or other electrical apparatus. Construct all electrical work with electrical system de-energized in area. At no time permit work on equipment or apparatus with energized circuits.

J. Verification of Dimensions: All scaled and figured dimensions are approximate and are given for estimating purposes only. Before proceeding with work carefully check and verify all dimensions and sizes and assume all responsibility for fitting of materials and equipment to other parts of equipment and to structure. Where apparatus and equipment have been indicated on drawings, dimensions have been taken from typical equipment of class indicated. Carefully check drawings and see that equipment will fit into spaces provided.

K. Locations:

1. Locations of conduits, outlets, apparatus and equipment indicated on drawings are approximate only and shall be changed to meet architectural and structural conditions as required.

2. Install conduit and equipment in a manner and in locations avoiding all obstructions, preserving headroom, keeping openings and passageways clear and readily accessible for maintenance and repairs. Make changes in locations of conduit or equipment which may be necessary to accomplish this. Drawings are essentially diagrammatic to extent that many offsets, bends, special fittings and exact locations are not indicated. Examine all drawings prepared by manufacturers, suppliers and installers of all equipment including air conditioning and plumbing fixture shelving, for requirements and locations of equipment and outlets.

3. Should any structural interferences prevent installation of outlets, setting of cabinets for lighting panelboards, running of conduits, or installation of other electrical equipment at locations shown on Drawings, necessary minor deviations therefore as determined by Engineer may be permitted. In event changes in indicated locations or arrangements are necessary due to developed conditions in building's construction or rearrangement of furnishings or equipment, Owner shall be permitted to move any junction box or utility outlet a distance of 10' and such changes shall be made without extra cost providing change is ordered before work is installed. Submit an estimate of cost or credit for other changes and proceed only upon written authority of Architect.

4. Be cautioned that diagrams showing electrical connections are diagrammatic only and must not be used for obtaining lineal runs of wiring or conduit. Wiring diagrams do not necessarily show exact physical arrangement of equipment.

5. Locations of outlets, lighting fixtures, cabinets, panelboards, apparatus, motors, mechanical equipment, etc., shown on Electrical Drawings is only approximate. Do not scale them from Electrical Drawings.

6. Verify locations of outlets, lighting fixtures, equipment etc., with Architectural Drawings of interior and exterior details and finish, and coordinate location of electrical work with mechanical and other equipment.

7. Locate lighting fixtures as per reflected ceiling plans prepared by Architect.

L. These Specifications and attendant Drawings are intended to cover a complete and operable electrical system. Follow Drawings and Specifications and execute all work according to true intent and meaning. Should any error or omission exist in either or both of these Drawings and Specifications, or conflict one with another, have same explained and adjusted by Engineer before submitting bid price for electrical work; otherwise at own expense, supply proper materials and labor to completely install same, make good any damage to or defect in work of results obtained therefore caused by such error, omission or conflict. Most restrictive, greater quantity or size, better quality or other superior condition of all representations shall prevail. It is intended that outlets be located symmetrical with Architectural elements notwithstanding fact that locations indicated on Drawings may be distorted for clarity.

M. Omission of expressed reference in Drawings or Specifications to any item of labor or material necessary for proper execution of work in accordance with present good practice of trade will not relieve Contractor from providing such additional labor and materials.

N. Job Visits by Engineer: Periodic visits to job by Engineer is for express purpose of verifying compliance by Contractor with contract documents. Such visits by Engineer shall not be construed as construction supervision. Neither shall such visits be construed to make Engineer responsible for providing a safe place for performance of work by Contractor or Contractor's employees or safety of supplies of Contractor or his subcontractors.

O. Cooperation with Others: Organize work that will harmonize with work of all trades so that all work may proceed as expeditiously as possible. Be responsible for correct placement of work and connection of work to all related trades.

P. Protection of Finish: Provide adequate means for protecting all finished parts of materials and equipment against damage from any cause during progress of work and until acceptance by Architect. Cover all material and equipment in storage and during construction in such a manner that no finished surfaces will be damaged, marred or splattered with paint. Keep moving parts perfectly clean and dry. No paint spraying will be permitted in building. Replace or refinish damaged material or equipment including face plates or panels without additional costs to Owner.

Q. Cleaning Equipment and Premises: Thoroughly clean all parts of materials, equipment and exposed parts such as receptacles and panelboards, of cement, plaster and other materials. Remove all oil and grease spots with a non-inflammable cleaning solvent. Brush exposed metal work with steel brushes to remove rust and other spots and leave smooth and clean. During progress of work, carefully clean up and leave premises and all portions of building free from debris. At completion of work, remove all waste materials and debris resulting, leaving everything in a complete and satisfactory condition.

R. Cutting and Patching: Include all cutting and patching in bid. Do not cut any structural members without first having received written permission from Architect. Cutting of round openings which can be done by use of a rotary drill shall be done by Contractor requiring same. Cutting and patching finish work shall be performed by workmen of the respective trade.

S. Conditions at Site: Visit Job Site and become familiar with all existing conditions within scope of work and include in Bid Proposal allowance for these conditions. Verify exact locations of services prior to construction. Notify all other Contractors of these utility locations.

T. Documents: Read all relevant documents, become familiar with job, scope of work, type of general construction, Architectural, Structural, Mechanical and Electrical Drawings and Specifications. Also become familiar with purpose for which these Drawings have been prepared and become cognizant of all details involved.

U. Acceptance: Before work will be accepted, demonstrate to Owner and Architect that entire installation is complete and in proper operating condition and Contract has been fully and properly executed. Following items shall be prepared and submitted to Architect:

1. Two copies of all test results required under this Division.

2. Two copies of local and/or state code enforcing authorities final inspection certificates.

3. Copies of as-built record drawings as required.

4. Notify Architect in writing when installation is complete and that a final inspection of this work can be performed. In event defects or deficiencies are found during this final inspection they shall be corrected to satisfaction of Architect before final acceptance can be issued.

5. Two Maintenance and Operating Manuals as required.

V. Field Inspections: Provide proper facilities for access of Owner or Owner's representative to conveniently examine and inspect all portions of work covered in this Contract at any and all reasonable hours.

W. Completing Work: At completion of work, remove all waste materials and debris resulting from work, leaving everything in a complete and satisfactory condition.

X. Electrical Superintendent: Include services of a qualified electrical foreman capable of interpreting intent of Drawings and Specifications, to study Plans, Specifications and references, and coordinate all requirements with other trades, authorized to make decisions and issue instructions; be constantly in charge of work and available at job site at all times and at final inspection. Instruct Owner's representative for proper operation and recommend maintenance of all systems.

Y. Maintenance and Operating Manuals:

1. Before completion and acceptance of work, furnish Owner with two complete sets of operating and maintenance instruction manuals. Bind each set in durable hardboard binder and index.

2. Compile data for manuals upon approval of material list and sketches so as not to delay final approval of work installed. Operating manuals to contain all pertinent data relating to electrical installation such as fixture cuts, manufacturer's

approval, shop drawings, sketches, wiring diagrams and equipment operating instructions.

3. Instruct Owner's operating personnel with electrical operating procedures before work is considered complete.

Z. Extra Work or Costs to This Contractor Due to Other Contractors or Trades: Adjusted between this Contractor and offending Contractor at no extra cost to Owner. Notify Architect before such extra work is done.

AA. Tests:

1. Upon completion of work and adjustment of all equipment, all systems shall be tested under direction of Owner's representative to demonstrate that all equipment furnished and installed and/or connected under provision of these Specifications shall function electrically in manner required. All tests shall be completed prior to final inspection of project.

2. All systems shall test free from short circuits and grounds and shall be free from mechanical and electrical defects. All circuits shall be tested for proper neutral connection.

3. All instrumentation and personnel required for testing shall be furnished by Contractor.

BB. Noise Control:

1. Perform electrical work to a manner in minimize transmission of noise and preserve acoustical properties of building structure.

2. Where equipment is mounted on vibration isolators, use flexible connections to reduce transmission of noise.

3. Where conduits pass through sleeves in interior walls, floors, or ceilings, completely fill space between each conduit and its sleeve to provide an airtight seal.

4. Use glass fiber material, "Duxseal" compound, for acoustic seals.

CC. Seismic Bracing Standards: All pipes, cable trays, conduits, etc. shall be supported and braced in accordance with DSA pre-approval No. R0010, SMACNA "Seismic Restraint Manual, Guidelines for Mechanical Systems", including Appendix B, "Additional Requirements for OSHPD" and "Addendum no. 1, September 2000". Comply with CBC, where requirements are more stringent than SMACNA, including, but not limited to the following:

1. Pipes and conduit shall be braced to resist the forces prescribed in California Building Code, Title 24 C.C.R. & ASCE 7-05, Section 13.6

2. Where possible, pipes, conduit and their connections shall be constructed of ductile materials (copper, ductile iron, steel or aluminum and brazed, welded, or screwed connections.) Pipes, conduits and their connections, constructed of nonductile materials (e.g., cast iron, no-hub pipe and plastic), shall have the brace spacing reduced to one-half of the spacing allowed for ductile material in accordance with California Building Code or SMACNA Seismic Restraint Manual.

3. Seismic restraints may be omitted for the following conditions:

   a. All piping suspended by individual hangers 12 inches or less in length from the top of the pipe to the bottom of the structural support for the hanger.

   b. All electrical conduit less than 2.5 inches trade size.

4. For rigidly supported, electrical conduit, or cable trays, the product of $C_a l_p$ need not to exceed 1.2 for any value of l_p.

5. All Trapeze assemblies supporting, cable trays and conduit shall be braced to resist the forces and relative displacements per ASCE 7 Chapter 13, considering the total weight of the elements on the trapeze. (CBC 1614A.1.13)

6. Conduit supported by a trapeze where none of these elements would individually be braced need not be braced if connection to the pipe/conduit of directional changes do not restrict movement of the trapeze. If this flexibility is not provided,

bracing will be required when the aggregate weight of the pipes and conduit exceed 10 pounds/foot. The weight shall be determined assuming all pipes and conduits are filled with water.

DD. Bracing Standards Application: Comply with bracing standards by evaluating the complete installation of all utilities and equipment, and providing a comprehensive solution based on Contractor's layout, coordination withal other trades, and with the structural design and all other provisions for incorporating systems into the buildings. Show bracing products and layout in shop drawing submittals. The following criteria apply to the bracing of all systems:

1. The design parameters for determining the Total Design Lateral Force shall be as designated on the structural drawing.

2. Seismic Hazard Levels (SHL) shall be as designated on structural drawings.

3. Contractor shall submit documentation for each condition, which is not specifically covered in the SMACNA manual, including piping configurations and conditions, structural systems, structural connection methods, and other issues regarding the application of the standards.

4. Provide expansion anchors, sized per SMACNA guidelines, for use in concrete.

5. For connections to structural steel, wood framing, etc. provide bolted or welded connections, sized per SMACNA guidelines.

6. Seismic bracing components consisting of structural shapes.

7. Seismic bracing cable shall be galvanized steel, conforming to ASTM A603, zinc-coated with minimum 0.4 ounces/sf, pre-stretched, 7 x 19 strand, sized per SMACNA guidelines.

END OF SECTION

SECTION 16060 - MINOR ELECTRICAL DEMOLITION FOR REMODELING

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specifications collectively apply to work of this Section.

1.02 DESCRIPTION

A. Work includes but is not limited to the following:

1. Electrical demolition.

PART 2: PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual Sections.

PART 3: EXECUTION

3.01 EXAMINATION

A. Verify that abandoned wiring and equipment serve only abandoned facilities.

B. Drawings are based on field observation and existing record documents. Report discrepancies to Architect/Engineer before disturbing existing installation.

C. Beginning of demolition means installer accepts existing conditions.

3.02 DEMOLITION

A. Provide all necessary electrical demolition. See Architectural drawings for extent of wall removal and other demolition. Remove existing electrical devices in walls to be demolished. Re-route and reconnect as required, any active circuits feeding through these walls in order to keep upstream and downstream circuits active. Remove exposed conduit, wiring, devices, etc. as required.

B. Where new lighting is shown in an area with existing lighting, demolish existing lights, associated conduits, wires, devices, etc. Dispose of existing ballasts with PCB in accordance with all regulations of all governing agencies having jurisdiction.

C Where mechanical equipment is to be demolished as shown on mechanical drawings, demolish disconnect switches, conduits, wires and associated electrical equipment.

D. Dispose of all demolished equipment and devices. Equipment with salvage value shall be disposed of per Owner's instructions.

END OF SECTION

SECTION 16111 - CONDUIT

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specifications collectively apply to work of this Section.

1.02 DESCRIPTION

A. Work includes but is not limited to the following:

1. Rigid metal conduit and fittings.

2. Intermediate metal conduit and fittings.

3. Electrical metallic tubing and fittings.

4. Flexible metal conduit and fittings.

5. Liquidtight flexible metal conduit and fittings.

PART 2: PRODUCTS

2.01 RIGID STEEL CONDUIT AND FITTINGS

A. Rigid Steel Conduit: Hot dipped galvanized inside and out, galvanized threads, mild steel, zinc coated, inside and outside protective coating. Standard lengths: 10'-0".

B. Bushings: Threaded insulated metallic type except sizes 1" and smaller may be non-metallic type. Setscrew bushings are not acceptable.

C. Couplings, elbows, bends and other fittings: Same material and finish as rigid steel conduit. All shall be threaded type.

2.02 RIGID ALUMINUM CONDUIT AND FITTINGS

A. Conduit: Extruded from 6063-T24 alloy of maximum 1/10% copper content and containing lubricating inside liners; rigid threaded type.

B. Bushings: Insulated metallic except that sizes 1" and smaller may be non-metallic.

2.03 INTERMEDIATE METAL CONDUIT (IMC) AND FITTINGS

A. Conduit: Galvanized steel, zinc coated, protective coating inside and out.

B. Fittings and Conduit Bodies: Use fittings and conduit bodies specified above for rigid steel conduit.

C. Conduit: May be used in lieu of rigid steel conduit where permitted by code, except in concrete, underground, runs longer than 100 feet for all power feeders with conduit greater than 2 inches.

2.04 ELECTRICAL METALLIC TUBING (EMT) AND FITTINGS

A. Conduit: Hot dipped galvanized or sherardized inside and out, zinc coated with protective enamel coating inside. Provide bushings at ends of conduits.

B. Connectors: Steel, insulated, bused tap-on or wrench tightened compression type. (Couplings similar) Indentor or screw type not acceptable.

C. Conduit: May be used in lieu of rigid steel conduit where permitted by code, except exposed, in concrete and for runs more than 100' for all power feeders with conduit greater than 2 inches.

2.05 FLEXIBLE METAL CONDUIT AND FITTINGS

A. Conduit: Steel single strip, hot dipped galvanized on all 4 sides prior to fabrication. Flexible aluminum conduit will not be allowed.

B. Connectors: Die cast with ridges that thread into conduit. (Binding screw type connectors are not acceptable.)

C. Conduit: May be used in lieu of rigid steel conduit where specifically indicated; at connections to vibrating equipment; at drops to light fixtures from J-boxes; at locations judged by Architect impractical to use rigid conduit. Maximum length for any application shall be 6 feet.

2.06 LIQUIDTIGHT FLEXIBLE CONDUIT AND FITTINGS

A. Conduit: Steel, single strip, hot dipped galvanized on 4 sides prior to fabrication.

B. Connectors: Insulated, special Appleton "STN" Series.

C. Jacket: Liquidtight, polyvinyl chloride plastic.

D. Conduit: Use for final connection to motor terminal boxes and transformers. Use at exterior locations, damp locations, wet locations and for flex connections in kitchen, restrooms and similar areas.

2.07 CONDUIT SUPPORTS

A. Conduit Clamps, Straps, and Supports: Steel or malleable iron. Clamps: Unistrut Nos. P111 thru P1124, Kindorf No. C105. Straps: One or two hole as required.

B. Conduit hangers, racks and trapezes: Steel, threaded rods, channel iron "U" shaped racks equal to "Unistrut".

C. Individual conduit hangers: Steel, threaded rods with malleable iron split rings.

D. Hanger rods: 3/8" minimum diameter for 2" and smaller conduit, factory made. 1/2" minimum for 2-1/2" and larger conduit.

E. Wire supports: 12 gauge zinc coated iron tie wire, or 16 gauge galvanized double annealed steel tie wire.

2.08 CONDUIT ROOF JACKS AND FLASHING

A. Roof Jacks:

1. For Single Conduits Through Roof: Stonemen Stormtite Series #1100-4; seamless 4 pound lead flashing assembly, 8" skirt, steel reinforced varipitch boot; caulk type cast iron counterflashing sleeve, with vandalproof set screws, and Perma-seal waterproofing compound.

2. Sleeves for Conduits: Sleeves shall be adjustable type, of 26 gage galvanized iron, Adjust-to Crete Co. Adjust-to-Crete, or Jet Line Products Inc. Jet-Line, or equal.

3. Where conduit enters a building through a concrete foundation below grade, or ground water level, or where it is necessary to seal around a conduit

where it passes through a concrete floor or wall, provide O-Z/Gedney Type FSK Thru Wall and Floor Seal, or equal.

2.09 CONDUIT PULLING CORDS

A. Pull Wire: No. 12 galvanized iron or nylon pull wire rated 250 pounds tensile strength.

2.10 CONDUIT FITTINGS, ELLS AND BUSHINGS

A. Special conduit fittings: Crouse-Hinds "Condulets" or Appleton "Unilets".

B. Ells: Same quality, same finish and same make as conduit.

C. Bushings: Thomas & Betts or approved equal.

D. Seismic separations and expansion joints: OZ type "AX" complete with bonding strap and clamps. At exterior locations use OZ type "EX".

2.11 CONDUIT SEALS AND SEALING COMPOUND

A. Vertical seals: Crouse Hinds type "EYD" or Appleton type "SF".

B. Horizontal Seals: Crouse Hinds type "EYS" or Appleton type "ESU".

C. Sealing compound: Crouse Hinds "CHICO" or Appleton "APELCO".

D. Fireproofing Compound: Dow Corning No. 3-6548 RTV or equal by 3M Company or Nelson.

2.12 MC CABLE

A. Metal Clad (MC) cable system is not allowed.

PART 3: EXECUTION

3.01 CONDUIT SIZING, ARRANGEMENT, AND SUPPORT

A. Arrange conduit to maintain headroom and present a neat appearance.

B. Unless indicated otherwise, conceal conduit within or behind finished walls and ceiling.

C. Route exposed conduit and conduit above accessible ceilings parallel and perpendicular to walls and adjacent piping.

D. Maintain minimum 6 inch clearance between conduit and piping. Maintain 12 inch clearance between conduit and heat sources such as flues, steam pipes, and heating appliances.

E. Arrange conduit supports to prevent distortion of alignment by wire pulling operations. Fasten conduit using galvanized straps, lay-in adjustable hangers, clevis hangers, or bolted split stamped galvanized hangers.

F. Group conduit in parallel runs where practical and use conduit rack constructed of steel channel with conduit straps or clamps. Provide space for 25 percent additional conduit.

G. Do not fasten conduit with wire or perforated pipe straps. Remove all wire used for temporary conduit support during construction, before conductors are pulled.

H. Do not support conduit from any equipment subject to vibration. Support from structural members only.

I. Structural Considerations for Conduit Routing:

1. Where conduits are to pass through or will interfere with any Structural member, or where notching, boring or cutting of the structure is necessary, or where special openings are required through walls, floors, footings, or other buildings elements, to accommodate the electrical work, such work shall conform to State Building Code.

2. 1" and smaller conduits above metal lath ceilings shall be tied to ceiling channels. 1-1/4" conduits above metal lath ceilings shall be rigidly suspended with pipe hangers or pipe racks or shall be secured to superstructure with factory made pipe straps. Conduits in metal lath or steel stud partitions, shall be tied to furring channels or studs. In ceiling spaces and in partitions, tie wires shall be spaced not more than 5'-0" apart, shall hold conduit tight against channels and studs at point of tie and shall not bear any of weight of

conduit. Tie wire shall be #16 gage galvanized double annealed steel tie wire.

3. Where auxiliary supports, saddles, brackets, etc., are required to meet special conditions they shall be made rigid and secure before conduit is attached thereto.

4. Conduit in ceiling spaces, in stud walls and under floors shall be supported with factory made pipe straps or shall be suspended with pipe hangers or pipe racks. Pipe straps shall be attached to and shall hold conduit tight at point of support against ceiling and floor joists, rafters, and wall studs, or 2" x 4" headers fitted between joists or wall studs.

5. Conduits installed on exposed steel trusses and rafters shall be fastened with factory made conduit straps or clamps which shall hold conduit tight against supporting member at point of support.

6. Pipe hangers for individual conduits shall be factory made, consisting of a pipe ring and threaded suspension rod. Pipe ring shall be malleable iron, split and hinged, and shall securely hold conduit, or shall be springable wrought steel. Rings shall be bolted to or interlocked with suspension rod socket. Rods shall be 3/8" for 2" conduit hangers and smaller and shall be 1/2" for 2-1/2" conduit hangers and larger.

7. Pipe racks for groups of parallel conduits and for supporting total weights not exceeding 500 pounds shall be trapezed type and shall consist of a cross channel, Steel City Kindorf #B-900, Unistrut #P-1000 suspended with a 3/8" minimum diameter steel rod at each end. Each rod shall be fastened with nuts, top and bottom to cross channel and with a square washer on top of channel. Each conduit shall be clamped to top for cross channel with conduit clamps, Steel City Kindorf #C-105 or Unistrut Nos. P-1111 through P-1124. Conduits shall not be stacked one on top of another, but a maximum of 2 tiers maybe on same rack providing an additional cross channel is installed. Where a pipe rack is to be longer than 18", or if weight it is to support exceeds 500 pounds, submit details of installation to the Architect for approval.

8. Factory-made pipe straps shall be one or 2-hole formed galvanized clamps, heavy duty type, except where otherwise specified.

9. Hangers straps, rods, or pipe supports under concrete shall be attached to inserts set at time concrete is poured. Under wood use bolts, lag bolts, or lag screws; under steel joists or trusses use beam clamps.

3.02 CONDUIT INSTALLATION

A. Cut conduit square using a saw or pipe cutter; de-burr cut ends.

B. Bring conduit to the shoulder of fittings and couplings and fasten securely.

C. Use conduit hubs or sealing locknuts for fastening conduit to cast boxes, and for fastening conduit to sheet metal boxes in damp or wet locations.

D. Use conduit bodies to make sharp changes in direction, as around beams.

E. Use hydraulic one-shot conduit bender or factory elbows for bends in conduit larger than 2 inch size.

F. Avoid moisture traps where possible; where unavoidable, provide junction box with drain fitting at conduit low point.

G. Support rigid, intermediate and thin wall conduit at 8'-0" maximum on centers and 3'-0" from junction boxes.

H. Support flexible and liquidtight flexible conduit at 4'-0" maximum on centers and 12" from junction boxes.

I. Provide No. 12 AWG insulated conductor or suitable pull string in empty conduit, except sleeves and nipples.

J. Install expansion-deflection joints where conduit crosses building expansion or seismic joints.

K. Where conduit penetrates fire-rated walls and floors, seal opening around conduit with UL listed fire barrier, "3M" calk or equal.

L. Route conduit to roof mounted devices and equipment through roof jacks. Provide flashing/roof jacks for all new and existing conduits which penetrate roof to appropriate Roofing Section(s) for installation.

M. Run conduit to equipment on roof concealed in attic space. Penetrate roof at equipment locations only.

N. For conduits to roof mounted HVAC equipment, penetrate roof with roof jacks outside footprint of HVAC units. Do not penetrate roof inside HVAC units.

O. Cut threads on rigid conduit to standard taper and to a length such that all bare metal exposed by threading operation will be completely covered by couplings or fittings used. In addition, cut lengths of thread such that all joints will become secure and wrench tight just preceding point where conduit ends would butt together in couplings and where conduit ends would butt into ends or shoulders of other fittings. Securely tighten all threaded connections.

P. Make joints in rigid conduit installed in concrete or masonry liquid-and-gas-tight, with red lead and oil, or other approved joint compound and engage not less than five threads.

Q. Keep bends and offsets in conduit runs to an absolute minimum. Replace all deformed, flattened or kinked conduit. Provide large radius factory made bends or power bend rigid metal conduit of 1-1/4" trade size or larger.

R. Run exposed conduit parallel with or at right angles to building line, beams, or ceilings. Place symmetrical bends or metal boxes at changes in direction or taps.

S. Stub from each panel which is flush mounted in a wall, from top of panel a minimum of 3-3/4" conduits to nearest ceiling space or other accessible locations and cap for future use. Tag to indicate panel origination.

T. Provide pull wire in all conduit runs indicated as conduit only (C.O.).

U. Do not run conduit closer than 12" to any hot water pipe, steam pipe, heater flue or vent.

V. Use rigid metal conduit where legally required, where exposed to weather, where located in unheated areas, or

where subject to mechanical injury, here defined as exposed conduit less than 7'-6" above floor in areas accessible to anyone other than authorized operating or maintenance personnel.

W. Where a conduit from one structure crosses to another structure, e.g., from a building to an arcade or from one arcade to another arcade, use a section of liquid-tight flex conduit at the crossing with sufficient slack to allow the two structures to move during an earthquake without breaking the conduit.

X. Provide PVC deflection - expansion joint fittings where underground run passes through expansion joint or is necessary for seismic conditions.

Y. Provide a green insulated ground wire in all flexible conduit runs regardless of length.

Z. Do not install PVC conduit above grade for any reason.

AA. Flash and counterflash all conduit runs passing through roof.

BB. Use electrical metallic tubing above grade in dry locations only and where not subject to mechanical injury or otherwise prohibited. Concrete and masonry in contact with earth are not considered dry locations.

CC. Use liquid tight flexible conduit for final connections to motors and vibrating equipment. Use flexible conduit where required for equipment servicing for connections to recessed lighting fixtures from nearby accessible junction boxes, and for concealed runs in dry locations where structural conditions prevent use of other types of conduit.

DD. For conduits for computer cables and coax cables, use large radius bends. Do not use j-box or pull box to change direction. Install boxes at straight conduit sections only and sweep conduit to make turns. Do not use condulet fittings to change directions.

EE. Minimum radius for conduits designated for computer LAN wiring, coax cable wiring, data wiring, fibre-optics wiring, and TV cable wiring shall be as follows:

3/4"C	-	12"
1"C	-	12"
1-1/4"C	-	18"

2"C	-	24"
2-1/2"C	-	24"
3"C	-	30"
3-1/2"C	-	30"
4"C	-	30"
5"C	-	36"
6"C	-	42"

FF. Size all conduits as legally required or larger where indicated or preferred. Where portions of a conduit run are increased in size, for whatever reason, make all remaining portions in that run same size.

END OF SECTION

SECTION 16120 - WIRE AND CABLE-RATED 600 VOLT

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specifications collectively apply to work of this Section.

1.02 DESCRIPTION

A. Work includes but is not limited to the following:

1. Building wire.
2. Ground Conductors.
3. Wiring connections and terminations.
4. Conductor Identification.

B. Related Work:

1. Section 16010 - Basic Materials and Methods.
2. Section 16111 - Conduit.
3. Section 16195 - Electrical Identification.
4. Section 16450 - Grounding.

PART 2: PRODUCTS

2.01 BUILDING WIRE

A. Feeders and Branch Circuits Larger than 6 AWG: Copper, stranded conductor, 600 volt insulation, THW or THWN.

B. Feeders and Branch Circuits 6 AWG and Smaller: Copper conductor, 600 volt insulation, THW or THHN/THWN; 6 and 8 AWG, stranded conductor; smaller than 8 AWG, solid conductor.

C. Control Circuits: Copper, stranded conductor 600 volt insulation, THWN/THHN.

D. Minimum branch circuit wiring: No. 12 AWG copper, 600 volt insulation.

E. Minimum wire size except for control wiring: No. 14 AWG copper, 600 volt insulation.

F. Wiring for fluorescent lighting fixtures mounted end-to-End: Type "THHN".

2.02 GROUND CONDUCTORS

A. Equipment ground: Insulated conductor green in color.

B. Isolated circuit ground: Insulated conductor green in color.

C. Ground Wires: Bare copper or with green colored insulation.

2.03 CONDUCTOR ARRANGEMENT AND IDENTIFICATION

A. Ties: T & B "Ty-rap" or 3M Company.

B. Lacing: Nylon twine.

C. Markers: Adhesive type, Brady.

2.04 CONDUCTORS

A. All Wire: New and delivered to job site in unbroken packages.

B. Each package shall bear Underwriter's and Manufacturer's labels and seals indicating date of manufacture and maximum allowable voltage.

C. Conductors: Soft drawn annealed copper not less than 98 percent conductivity, 600 volt.

PART 3: EXECUTION

3.01 GENERAL WIRING METHODS

A. Use no wire smaller than 12 AWG for power and lighting circuits, and no smaller than 14 AWG for control wiring.

B. Place an equal number of conductors for each phase of a circuit in same raceway or cable.

C. Run branch circuit and feeder wires continuous from switch to terminal or farthest outlet. No joints to be made except in pull, junction or outlet boxes or in panelboards, switchboard or distribution sections.

D. Neatly train and lace wiring inside boxes, and panelboards.

E. Make Conductor lengths for parallel circuits equal.

F. Wire Fluorescent fixtures mounted end-to-end with THHN wire.

G. Color code all No. 6 gauge and smaller branch circuit wiring. Be consistent throughout all systems.

120/208 volt wiring	277/480 volt wiring
Phase A hotleg, black	Phase A hotleg, brown
Phase B hotleg, red	Phase B hotleg, orange
Phase C hotleg, blue	Phase C hotleg, yellow
Neutral, white	Neutral, white
switch legs, yellow or other color	Switch legs, other color

H. Run all wiring systems in conduit unless specifically indicated otherwise.

3.02 WIRING INSTALLATION IN RACEWAYS

A. Pull all conductors into a raceway at same time. Use UL listed wire pulling lubricate for pulling 4 AWG and larger wires.

B. Install wire in raceway after all mechanical work likely to injure conductors has been completed.

C. Completely and thoroughly swab raceway system and dry before installing conductors.

D. Do not exceed allowable conductor fill in any conduit run.

3.03 WIRING CONNECTIONS AND TERMINATIONS

A. Use no blocks, tackles or other mechanical means in pulling wires and cables smaller than 4/0. Lugs: Large

enough to take all strands of wire used or specified without removing any of strands. Foreign materials: Thoroughly cleaned from contacting surfaces of lug before installing on binding post. Stranded cable connections to switches and equipment: Made with cable terminals (lugs).

B. Terminate wire in accordance with manufacturer's instructions.

C. Use solderless pressure connectors with insulating covers for copper wire splices and taps, 8 AWG and larger. For 10 AWG and smaller, use insulated spring wire connectors with plastic caps.

D. Use split bolt connectors for copper wire splices and taps, 6 AWG and larger. Tape uninsulated conductors and connectors with electrical tape to 150 percent of insulation value of conductor.

E. Thoroughly clean wires before installing lugs and connectors.

F. Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.

G. Terminate spare conductors with electrical tape.

H. Terminate conductors with not less than 12" of free ends for connections.

I. Splice only in accessible junctions boxes and pull boxes.

J. Unless specifically indicated on drawings, do not splice in underground pull box, pull through only. Where splice is indicated, splice conductors 6 AWG and smaller complete with 3M Company epoxy resin Scotchlok #3570 for watertight installation suitable for size, type and number of wires and spring connectors used. Provide slack wires in pull box by looping wires completely around pull box.

3.04 TAGGING AND MARKING OF FEEDERS AND BRANCH CIRCUIT WIRING

A. Tag feeders in panelboards, switchboard, and distribution sections.

B. Tag with adhesive type of marker.

C. Apply markers after wire is installed in conduits. Identification as follows: 2A-11, feeder MS-2, GND, etc.

D. Where it is impractical to use printed markers on certain wires and cables, use blank type with identification marked thereon with indelible pencil.

E. Tag branch circuits in panelboard and in ceiling junction boxes where unused circuits terminate for purpose of identifying various circuits.

3.05 FIELD QUALITY CONTROL

A. Inspect wire and cable for physical damage and proper connection.

B. Perform continuity test on all power and equipment branch circuit conductors. Verify proper phasing connections.

C. Employ the service of an independent testing company to perform an insulation type "Megger" test on all feeders after they have been installed but are still open circuited. Submit test data to Architect/Engineer.

END OF SECTION

SECTION 16130 - BOXES

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specifications collectively apply to work of this Section.

1.02 DESCRIPTION

A. Work includes but is not limited to the following:

1. Wall and ceiling outlet boxes.

2. Pull and junction boxes.

3. Sealant.

B. Related Work:

1. Section 16010 - Basic Materials and Methods.

2. Section 16111 - Conduit

3. Section 16141 - Wiring Devices.

PART 2: PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS-OUTLET BOXES

A. Raco

B. Steel City

C. Bowers

2.02 OUTLET BOXES

A. Sheet Metal Outlet Boxes: One piece galvanized, pressed steel, knockout type, 4-11/16" sq. by 2-1/8" deep in all locations unless otherwise indicated or required.

B. Cast Boxes: Aluminum, or Cast feralloy, deep type, gasketed cover, threaded hubs.

C. Where Wiremold type box have to be used, e.g., on existing concrete wall, provide proper box such that the total depth of a box including the device mounted on the box, will not exceed 4 inches.

2.03 PULL AND JUNCTION BOXES

A. Interior and non-weatherproof boxes shall be constructed of blue or galvanized steel with ample laps, spot welded, and shall be rigid under torsional and deflecting forces. Boxes shall have auxiliary angle iron framing where necessary to ensure rigidity. Covers shall be fastened to box with a sufficient number of brass machine screws to ensure continuous contact all around. Flush type boxes shall be drilled and tapped for cover screws at Site if boxes are not installed plumb. All surfaces of pull and junction boxes and covers shall be given one coat of metal primer, and one coat of aluminum paint.

B. Weatherproof pull and junction boxes shall conform to foregoing for interior boxes with following modifications: Cover of flush mounting boxes shall have a weather-tight gasket cemented to and trimmed even with cover all around. Surface or semi-flush mounting pull and junction boxes shall be UL approved as rain-tight and shall be complete with threaded conduit hubs. All exposed portions of boxes shall be galvanized and finished with a prime coat and coat of baked-on gray enamel.

C. All junction and pull-boxes shall be rigidly fastened to the structure and shall not depend on conduits for support.

D. Cast Metal Boxes for Outdoor and Wet Location Installations: Type 4 and Type 6, flat-flanged, surface-mounted junction box, UL listed as rain-tight. Galvanized cast iron OR Cast aluminum box and cover with ground flange, neoprene gasket, and stainless steel cover screws.

2.04 ACCEPTABLE MANUFACTURERS-SEALANT

A. Crouse Hinds "CHICO"

B. Permacel

C. Ductseal

2.05 ACCEPTABLE MANUFACTURERS - FIRE PROOFING SEALANT

A. Dow Corning

B. 3M Company

C. Nelson

PART 3: EXECUTION

3.01 COORDINATION OF BOX LOCATIONS

A. Provide electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and code compliance.

B. Electrical box locations shown on Contract Drawings are approximate unless dimensioned. Verify exact location of floor boxes and outlets in offices and work areas with Owner's representative prior to rough-in.

C. Locate and install boxes to allow access.

D. Locate and install to maintain headroom and to present a neat appearance.

3.02 OUTLET BOX INSTALLATION

A. Unless otherwise noted on plan or specifically allowed by the Engineer, conceal all boxes flush in wall or in ceiling space above drop ceiling. In finished areas and where it is not possible to conceal conduits and boxes, for example, in existing concrete wall provide Wiremold type metallic surface raceways and boxes.

B. Do not install boxes back-to-back in walls. Provide minimum 6 inch separation, except provide minimum 24 inch separation in acoustic-rated walls.

C. Provide knockout closures for unused openings.

D. Support boxes independently of conduit except for cast box that is connected to two rigid metal conduits, both supported within 12 inches of box.

E. Use multiple-gang boxes where more than one device are mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.

F. Install boxes in walls without damaging wall insulation.

G. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.

H. Position outlets to locate lighting fixtures as shown on reflected ceiling plans.

I. In inaccessible ceiling areas, position outlets and junction boxes within 6 inches of recessed lighting fixture, to be accessible through lighting fixture ceiling opening.

J. Provide recessed outlet boxes in finished areas; secure boxes to interior wall and partition studs. Accurately position to allow for surface finish thickness. Use stamped steel stud bridges for flush outlets in hollow stud wall, and adjustable steel channel fasteners for flush ceiling outlet boxes. Install plaster rings to interface with equipment to be mounted thereon.

K. Align wall-mounted outlet boxes for switches, thermostats, and similar devices.

L. Provide cast outlet boxes in exterior locations and wet locations. Provide cast bell-boxes at interior locations where box is exposed to view. (do not use regular 4/s or handy box with exposed knockouts and unfinished appearances for these interior exposed applications).

M. Where boxes are installed in fire rated ceiling or walls, be responsible for preserving integrity of fire rating as required.

N. In fire-rated wall, use 4" square deep boxes. Do not aggregate more than 100 square inches of boxes for any 100 square feet of wall or partitions. Separate outlet boxes on opposite sides of walls or partition by a minimum horizontal distance of 24 inches. Where the separation cannot be achieved due to site condition, provide 2-hour rated fire-proof material behind boxes to maintain fire rating of walls.

3.03 PULL AND JUNCTION BOX INSTALLATION

A. Locate pull boxes and junction boxes above accessible ceilings or in unfinished areas.

B. Support pull and junction boxes independent of conduit.

END OF SECTION

SECTION 16141 - WIRING DEVICES

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specifications collectively apply to work of this Section.

1.02 DESCRIPTION

A. Work includes but is not limited to the following:

1. Wall Switches
2. Receptacles.
3. Device plates and box covers.

B. Related Work:

1. Section 16010 - Basic Materials and Methods.
2. Section 16130 - Boxes.
3. Section 16195 - Electrical Identification.

PART 2: PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - WALL SWITCHES

A. Harvey Hubbell Company.

B. Pass and Seymour.

C. Leviton.

2.02 WALL SWITCHES

A. Wall switches for Lighting Circuit AC general use snap switch with toggle handle, rated 20 amperes and 120/277 volts AC. Handle: Gray or color as selected by Architect, plastic.

2.03 ACCEPTABLE MANUFACTURERS - RECEPTACLES

A. Harvey Hubbell Company.

B. Pass and Seymour.

C. Leviton.

2.04 RECEPTACLES

A. Convenience and Straight-blade Receptacles: NEMA Configuration 5-15R: No. 5252-GRY, 15 ampere, or color as selected by Architect.

B. Convenience and Straight-Blade Receptacles: NEMA configuration 5-20R, No.5362-GRY, 20 ampere, or color as selected by Architect.

C. Convenience receptacle, isolated ground type, orange in color: No. IG 5262.

D. GFI Receptacles: Duplex convenience receptacle with integral ground fault current interrupter, Leviton No. 8598-HG. Unit shall comply with UL 2003 GFCI requirements including lockout action.

E. Receptacles: Highest specification grade.

2.05 ACCEPTABLE MANUFACTURERS - WALL PLATES (Match manufacturer of Device)

A. Harvey Hubbell Company.

B. Pass and Seymour.

C. Leviton.

D. TayMac.

E. Match manufacturer of switches and receptacles.

2.06 WALL PLATES

A. Interior Device Plates: Sierra Electric .040 stainless steel to suit device; multi-gang where required; blank plates at junction boxes and capped outlets.

B. Weatherproof Cover Plates: Receptacles in wet locations shall be installed with an outlet enclosure clearly marked "Suitable for Wet Locations While In Use". There must be a gasket between the enclosure and the mounting surface, and between the cover and base to assure a proper seal. The enclosure must employ stainless steel mounting hardware and enclosure shall be recessed where possible.

C. Highest specification grade.

PART 3: EXECUTION

3.01 INSTALLATION

A. Install wall switches 48 inches above floor to top of wall box, "OFF" position down. Verify mounting height with Architect prior to installation.

B. Install convenience receptacles 18 inches above floor, or as noted on drawings, grounding pole on bottom.

C. Install specific-use receptacles at heights shown on Contract Drawings.

D. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface-mounted outlets in non-public places.

E. Install devices and wall plates flush and level.

F. Provide etched plates with 3/16" high black letters for:

1. Outlets where voltage is other than 120 volt.

2. When switch controls device other than lighting fixture.

3. When switch is located out of sight of unit being controlled.

4. Lock switches.

5. Where more than one switch occurs under a common plate.

6. Air Distribution System control switches.

G. Install plates with all four edges in continuous contact with finished wall surfaces without use of mats or similar devices.

H. Provide blank cover plates for all boxes as required.

END OF SECTION

SECTION 16195 - ELECTRICAL IDENTIFICATION

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specifications collectively apply to work of this Section.

1.02 DESCRIPTION

A. Work includes but is not limited to the following:

1. Nameplates.

2. Wire and cable markers.

B. Related Work:

1. Section 16010 - Basic Materials and Methods.

2. Section 16111 - Conduit.

3. Section 16120 - Wire and Cable -Rated 600 Volt.

4. Section 16130 - Boxes.

5. Section 16470 - Panelboards.

PART 2: PRODUCTS

2.01 MATERIALS

A. Nameplates: Engraved three-layer laminated plastic, white letters on a black background.

B. Wire Markers: Cloth markers, split sleeve or tubing type.

PART 3: EXECUTION

3.01 INSTALLATION

A. Degrease and clean surfaces to receive nameplates.

B. Install nameplates parallel to equipment lines.

C. Secure nameplates to equipment fronts using screws or

rivets. Secure nameplate to outside face of panelboard doors.

D. Embossed tape will not be permitted for any application.

3.02 WIRE IDENTIFICATION

A. Provide wire markers on each conductor in panelboard gutters, pull boxes, and at load connection. Identify with branch circuit or feeder number for power and lighting circuits, and with control wire number as indicated on schematic and interconnection diagrams or equipment manufacturer's shop drawings for control wiring.

3.03 NAMEPLATE ENGRAVING SCHEDULE

A. Provide nameplates of minimum letter height as scheduled below.

B. Panelboards, Switchboards, and Distribution Sections: 1/4 inch identifying equipment designation; 1/8 inch identifying voltage rating and source.

C. Individual Circuit Breakers, Switches, Motor Starters in Panelboards, and Distribution Sections: 1/8 inch identifying circuit and load served, including location.

D. Individual Circuit Breakers, fused and non-fused disconnect Switches, and Motor Starters: 1/8 inch identifying load served.

E. Exterior metal pull boxes: 1/4 inch identifying systems in boxes.

3.04 MARK CONDUCTOR RUNS

A. Apply markers after conductors installed in conduits.

B. Apply in panelboards and in junction boxes.

C. Mark feeders in panelboards, switchboards and distribution sections.

3.05 MARK JUNCTION BOXES

A. Mark covers of junction boxes with non-erasable marker to indicate circuit numbers or systems contained within boxes.

END OF SECTION

SECTION 16470 - PANELBOARD

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specifications collectively apply to work of this Section.

1.02 DESCRIPTION

A. Work includes but is not limited to the following:

1. Lighting branch circuit panelboards.

B. Related Work:

1. Section 16010 - Basic Materials and Methods.
2. Section 16111 - Conduit.
3. Section 16120 - Wire and Cable.
4. Section 16195 - Electrical Identification.

1.03 SUBMITTALS

A. Submit shop drawings for equipment and component devices.

B. Include outline and support point dimensions, voltage, main bus ampacity, circuit breaker arrangement and sizes.

PART 2: PRODUCTS

2.01 ACCEPTABLE MANUFACTURER - PANELBOARD

A. Square D.

B. General Electric.

C. Cutler Hammer

D. ITE.

2.02 BRANCH CIRCUIT PANELBOARD

A. Lighting panelboards: Safety type with 120/208 volt, three phase, four wire. Circuit breakers: Molded case thermal magnetic type quick-make, quick-break approved by designated use and voltage, bolt-on, 20 ampere single pole branch circuit unless otherwise indicated on schedules. Toggle type mechanism shall have trip indicator. Circuit breakers where used to switch light fixtures: Type "SWD". Breakers for HVAC equipment shall be HACR rated. Minimum interrupting capacity rating for 120/208 volt units: 10,000 amperes.

B. Panelboard cabinets for lighting panels: Single door, with Underwriters' label.

C. Cabinets: Constructed in accordance with N.E.C. Standards, of not less than No.12 gauge galvanized sheet steel and painted inside with rust resistant paint. Minimum width: 20 inches; depth: 5-3/4".

D. Panelboard cabinets shall be sufficient height and width to allow a minimum of 4 inch wiring gutters around all sides, except feeder entrance side, which shall be 6 inches wide.

E. Fronts of all cabinets shall be constructed of one (1) piece of code gauge galvanized sheet but not less than 12 gauge steel, fastened with screws and countersunk washers.

F. Doors: Fastened to trims with substantial continuous flush hinges, flush spring catch latch and cylinder lock with two (2) keys for each floor. All locks: Master keyed.

G. Directory frames: 1/32", Lucite.

H. Interiors: Factory assembled rigid frame, supporting bus, mains and neutral bar. Bussing: Copper and arrange for sequence phasing throughout with a current density in copper not to exceed 1000 amperes per square inch. Neutral bar: Located at opposite end of structure from mains.

I. Circuit number labels shall be engraved laminated plastic, white letters on a black background. Stick on decal paper label is not acceptable.

J. Equipment supplier shall provide "Flash Hazard" warning signs as required by the NEC.

K. Panelboards shall be by "Original Equipment Manufacturer" that also manufactures circuit breakers. Load center type panelboards are not acceptable.

PART 3: EXECUTION

3.01 INSTALLATION

A. Install panelboards plumb.

B. Height: 6 ft maximum to top of panelboard.

C. Provide filler plates for unused spaces in panelboards.

D. Provide typed circuit directory for each panelboard. Do not revise branch circuit numbers for any reason.

E. Stub three empty 3/4 inch conduits to accessible location above ceiling out of each recessed panelboard and cap.

F. Provide padlocking device for each and every circuit breaker in "Off" position in each and every panelboard.

G. Use common internal trip element for two and three pole circuit breakers.

H. Finish panels gray.

I. Rigidly support cabinets to building construction in an approved manner.

J. Provide approved lock-in devices on all circuit breakers serving fire alarm panels and devices, motors, heaters, clocks, signal circuits, night lights, drinking fountains, or equipment remotely located. (Lock-in devices are not padlocking devices.)

K. Provide identifying screwed on bakelite nameplate to face of each panelboard.

L. Coordinate with other trades and ensure that no pipes or ducts are installed in the space within 6 feet above top of panelboards. Be responsible also that all doors from electrical rooms swing out from room.

3.02 FIELD QUALITY CONTROL

A. Measure steady state load currents at each panelboard feeder. Should difference at any panelboard between phases exceed 20 percent, notify Electrical Engineer

immediately. Take care to maintain proper phasing for multi-wire branch circuits.

B. Visual and Mechanical Inspection: Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers.

END OF SECTION

SECTION 16510 - LIGHTING FIXTURES

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specifications collectively apply to work of this Section.

1.02 DESCRIPTION

A. Work includes but is not limited to the following:

1. Lighting fixtures and accessories.

2. Lamps.

3. Ballasts.

B. Related Work:

1. Section 16010 - Basic Materials and Methods.

2. Section 16111 - Conduit.

3. Section 16120 - Wire and Cable.

4. Section 16130 - Boxes.

1.03 SUBMITTALS

A. Submit Shop Drawings.

B. Include outline drawings, lamp and ballast data, support points, weights, and accessory information for each lighting fixture type.

PART 2: PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - LIGHTING FIXTURES

A. See Lighting Fixture Schedule on drawings.

2.02 FLUORESCENT LAMPS

A. Approved manufacturers

1. Osram Sylvania ("Sylvania" or "OSI")

2. General Electric

3. Philips

B. Color temperature

1. All lamps shall be 4100k unless otherwise noted on drawings.

C. T-8 lamps

1. Nom. 4' 32 watt, 3' 25 watt, or 2' 17 watt per schedule, do not use "energy saving" T-8 lamps.

2. 4' lamps shall be rated at least 3150 initial lumens at 32 watts, GE "HL", Sylvania "Xtreme" or Philips "Advantage".

3. Minimum CRI 82 employing rare earth phosphors.

4. Low mercury type meeting federal "Tclip" standards.

5. All lamps from same manufacturer and batch.

D. T-5 lamps

1. Standard T-5 lamps shall be nom. 4' 28, 3' 21 watt, or 2' 14 watt per schedule.

2. High output lamps shall be nom. 4' 54 watt, 3' 39 watt, or 2' 24 watt per schedule.

3. Minimum CRI 82 employing rare earth phosphors.

4. Low mercury type meeting federal "Tclip" standards.

E. All lamps from same manufacturer and batch twin tube lamps.

1. Nom 22.5" 40 watt or as scheduled.

2. Minimum CRI 80.

3. All lamps from same manufacturer and batch.

F. Compact fluorescent lamps.

1. CF32: triple tube, amalgam, four-pin preheat start lamp, per schedule.

2. CF26: triple tube, amalgam, four-pin preheat start lamp, per schedule.

3. CF13: twin tube, four-pin preheat start lamp, per schedule.

4. Other lamps as scheduled.

5. All lamps from same manufacturer and batch.

2.03 FULL SIZE T-8 FLOURSCENT BALLASTS

A. Approved Manufacturers

1. Osram Sylvania

2. Advance

3. General Electric

4. Universal and Triad

B. Electronic, High Frequency Type

1. Unless otherwise noted, ballasts shall be "program start" type.

2. Instant start and dimming ballast need to be approved.

3. Electronic high frequency dimming ballasts specifically compatible with the control system being provided. The following are approved:

a. For 0 - 10 volt DC control circuits only: Lutron ECO-10TV, Advance Mark VII, Universal Ballastar or Sylvania "Helios".

C. Latest Generation "Efficient" Type meeting the following performance requirements. Ballast efficacy factor (BEF) is defined as ballast factor divided by ANSI input watts times 100.

LAMPS	MINIMUM BEF WITH INSTANT START BALLASTS	MINIMUM BEF WITH RAPID OR PROGRAM START BALLAST

1 F32T8	NA	2.84
2 F32T8	1.58	1.47
3 F32T8	1.04	0.97
4 F32T8	0.79	0.75

D. Ballasts and lamps shall be warranted for operation together for minimum 2 years warranty on lamps and 5 years on ballasts.

E. Power factor > 90%

F. Harmonic distortion < 20%

G. ANSI 82.11 color coded

H. Class a noise rated

I. Complying with FCC 47 cfr part 18 non consumer RFI/EMI standards.

J. Ballast per schedule as follows:

1. RLO = reduced light output, ballast factor 78% or less.

2. NLO = normal light output, ballast factor nominal 88%.

3. HLO = high light output, ballast factor nominal 120%.

2.04 T5 and T5HO fluorescent ballasts (T5 linear and twin)

A. Approved manufacturers

1. Osram Sylvania

2. Advance

3. Universal and Triad

B. Electronic, high frequency type

1. Unless otherwise scheduled, ballasts shall be programmed start type.

C. UL or ETL listed, class p type 1.

D. ANSI 82. 11 color coded.

E. Class a noise rated.

F. Complying with FCC 47CFR part 18 non consumer RFI/EMI standards.

G. NO PCB's.

H. Ballasts and lamps shall be warranted for operation together for minimum 2 years warranty on lamps and 5 years on ballasts.

I. Power factor > 90%

J. Harmonic distortion < 20%

K. Ballast factor as follows:

1. RLO = reduced light output, ballast factor 84% or less.

2. NLO or not noted = normal light output, ballast factor 85 - 100%.

3. HLO = high light output, ballast factor > 100%.

L. End of life sensing circuit.

2.05 SWITCHING AND CONTROLS

A. General

1. All devices color per architect.

2. Observe manufacturers installation instructions with particular attention to derating requirements for multiple gang installations.

3. Use factory made multiple gang faceplates matching device color.

4. Daylight Controls may be integrated into luminaires Performance shall equal or exceed specification for individual devices.

B. Switches

1. Standard snap style

2. 120/277 volt, 20A

3. Listed

4. Specification grade

5. Color per architect

C. Motion sensors

1. Provide a dual technology sensor that detects presence in the control area by detecting Doppler shifts in transmitted ultrasound and passive infrared heat changes. Detection verification of both technologies must occur in order to activate lighting systems. Upon verification, detection by either shall hold lighting on.

2. Sensor shall have a retrigger feature in which detection by either technology shall retrigger the lighting system on within 5 seconds of being switched off.

3. Sensor shall be mounted and adjusted in order to eliminate detection through open doorways and outside of controlled area. To provide small motion diction and immediate activation upon entry, coverage of both technologies must be complete and overlapping throughout the controlled area.

4. The PIR technology shall utilize a temperature compensated, dual element sensor and a multi-element Fresnel lens. The lens shall be Poly IR4 material. The lens shall cover up to 2000 square feet for walking motion when mounted at 10 feet and 1000 square feet of desktop motion.

5. Ceiling or high wall mounted. Coordinate location for best detection when used with suspended lighting.

6. Ultrasonic sensing shall be volumetric in coverage with a frequency of 40 KHz. It shall automatically adjust the detection threshold dynamically to compensate for constantly changing levels of activity and air flow throughout controlled space.

7. Sensors shall have a time delay that is adjusted automatically or shall have a fixed time delay of 5 to 30 minutes, set by DIP switches.

PART 3: EXECUTION

3.01 INSTALLATION

A. Install lamps in lighting fixtures and lampholders.

B. Support surface-mounted lighting fixtures directly from building structure. Provide additional blocking, unistruts, steel channels, etc. as required.

C. Install recessed lighting fixtures with attached accessible junctions boxes to permit removal and access from below. Use plaster frames in plaster, gypsum wallboard or acoustic ceilings. In grid ceiling rated for light fixture support, support recessed fluorescent light fixtures directly from T-bar using approved earthquake clips and in addition, 2 No. 12 wires (slack wires), one at each diagonal end of fixture attached directly to a structural member. If two opposite ends of a fixture do not rest on ceiling main runners, provide 4 No. 12 wires (support wires) to structural member. In grid ceiling not rated for fixture support, attach fixture to grid using approved earthquake clips and in addition 4 No. 12 support wires directly to structural member.

D. Provide safety chain between fixture and structure for recessed light fixtures. Mount hanger channels to span structural and/or T-bar ceilings.

E. Provide required backing for all lighting fixtures.

F. Join continuously mounted fixtures by use of chase nipples.

G. Provide spacers where required.

H. Mount light fixtures so that fixture labels are not visible when viewed from below.

I. For recessed fixtures in fire rated ceiling, provide fireproofing enclosure equal to rating of ceiling.

J. In each pendant of a pendant mounted light fixture, provide a safety wire or cable attached to the fixture and structure at each support capable of supporting four

times the supported load. Provide swivel mounts at ceiling and longitudinal sway mounts at fixtures to allow fixtures to swing freely a minimum of 45 degrees from vertical.

K. Test motion sensors.

L. Contractor is responsible for setting up and adjusting all control devices per the manufacturer's adjustments and resulting performance.

3.02 TESTS

A. Immediately before turning completed job over to Owner, clean all light fixtures inside and out, including plastics and glassware, adjust and tighten all trim, replace broken or damaged parts, lamp and test fixtures for electrical and mechanical operation. Replace all inoperative lamps, ballasts and other inoperative equipment.

B. Replace noisy ballasts immediately.

C. Include in bid the service of a California Registered Professional Engineer or a Professional recognized by the State of California to review and certify the final installed lighting control system as required by the California Energy Code (Title-24). The Professional shall sign the required documents, submit to the proper agency and be responsible for certifying the installed lighting control system.

END OF SECTION

SECTION 16821 - PUBLIC ADDRESS AND MASTER CLOCK SYSTEM

PART 1: GENERAL

1.01 SUMMARY

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specifications collectively apply to work of this Section.

B. Section Includes:

1. The building presently has a Master Clock system. Provide new speakers and clocks as shown on the drawings and connect to the existing headends. Provide all other work to extend the existing systems.

2. Provide new speakers and clocks and connect to the existing System. Provide all conduits, wires, terminal cabinets, terminal strips, programming, addition modules and all other work necessary to extend the existing System.

3. Provide labor, engineering, design, testing, materials, components and supervision necessary to provide a complete operable installation.

C. Related Sections:

1. Section 16010: Basic Materials and Methods.

1.02 SUBMITTALS

A. Submit in accordance with Division One.

B. Material List Submission with Shop Drawings: Submit for review and approval as follows:

1. Each submittal shall contain product data sheets or catalog cut sheets for each item. The product data shall be sufficiently detailed to allow the Engineer to evaluate the suitability of the product and to allow other trades to provide necessary coordination.

2. Drawing that are specific to this section shall be included in the submittal. Size A (8-1/2 inches x

11 inches) and size B (11 inches x 17 inches) shall be bound into the manual. Larger drawings shall be folded and inserted into transparent envelopes which shall be bound into the manual.

3. Include a list of 5 projects of similar scope. Contractor shall have a service organization capable of responding to warranty service requests within 24 hours of receipt of written notification. Contractor shall include, in the material list submission, a list of projects with the telephone number of the customer's client contact for each project and a letter signed by a corporate officer, a partner or the owner of the contracting company describing the service capability of the company and stating the company's commitment to maintain that service capability through the warranty period.

4. Submit a copy of a letter from the manufacturer of the submitted equipment certifying that the Contractor is an authorized distributor of the submitted equipment. Include copies of training certificates specified herein and the name and resume of the sound engineer.

C. Shop Drawings:

1. Shop drawings shall show interfaces to equipment furnished by other Contractors, identifying numbers of wires, termination requirements, voltages, and other pertinent details. Include front elevations, cabinet dimensions, types of mounting, doors, barriers, catalog number of locks, and finishes for terminal cabinets.

2. Contractor shall submit shop drawings to the Architect, for approval, indicating proposed wire tag designations for cables and terminal block layout for terminal cabinets and backboard locations.

D. Engineering Documentation:

1. Floor plans indicating devices, conduit runs, wire types, and terminal cabinets.

2. Block diagrams indicating items and their point-to-point connections in a manner following floor plan layout.

1.03 QUALITY ASSURANCE

A. Work shall conform to CCR, Part 3, California Electrical Code.

B. Work shall be done by a qualified installer holding licenses required by legally constituted authorities having jurisdiction over work. Installer shall have completed at least 5 systems of equal scope to system described herein and shall have been engaged in business of supplying and installing specified type of systems for at least 5 years. Installer shall maintain a fully equipped service organization capable of furnishing adequate repair service to equipment.

C. Installation shall be carried out under direction of a qualified sound engineer.

D. Qualifications of Installer: Installer shall be an authorized distributor of the submitted PA equipment and shall have one or more engineers and/or technicians who have been trained by the manufacturer and certified as competent in the design, installation and maintenance of the submitted equipment.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. PA system shall match existing to extend existing.

2.02 LOUDSPEAKERS AND ACCESSORIES

A. Loudspeakers:

1. Each loudspeaker mechanism shall be mounted in flush back-box or surface baffle as indicated on drawings and as specified herein.

2. Frequency response of loudspeakers shall be considered to be frequency response of speaker together with its associated line transformer. Power rating of each speaker shall be its capacity to reproduce, with satisfactory frequency response and performance, at rating level specified. Adjust power delivered to each speaker, as necessary, to insure a satisfactory sound level, with reproduction of good quality, in each of locations where speakers are installed.

3. Speaker mechanism shall be 8 inches diameter, cone type radiating element, 10,000 gauss per square inch Alnico 5 magnet, and moving coil type. Cone shall be seamless. Power handling capacity shall be a minimum of 10 watts of audio. Magnet shall have a minimum weight of 10 oz. Frequency response shall be 40 to 15,000 Hz. Speakers shall be Soundolier No. C10AT25 or equal unless otherwise specified.

B. Impedance Matching:

1. Speakers: Each loudspeaker shall be provided with a line transformer having taps as necessary for proper matching and proportioning power to speaker. Frequency response of each transformer shall be within 3dB from 70 to 10,000 Hz. Minimum power handling capacity of each transformer shall be a minimum of 2.5 watts for Type A speakers. Transformers shall be Triad No. S-79Z or equal.

2. Line:

a. Each line-matching transformer shall have similar frequency response as speaker transformer and be shielded, No. TC-LS-34 or equal.

b. Speaker line impedances shall be selected as necessary to limit distortion to a minimum. Line loss to any speaker operating at normal input shall not exceed one dB. Speaker matching transformer shall be connected to provide a satisfactory division of power among speakers. Sum of power distributed to speakers connected to any one-power amplifier shall not exceed amplifier power output ratings specified herein.

c. Impedance and signal level matching is required to comply with sound engineering principles and accepted trade practices.

C. Types of Speakers:

1. Flush-Mounted Speakers: match existing

2.03 CLOCK

A. New clocks shall match existing used throughout the building.

2.04 CONDUCTOR/CABLES

A. Provide 2-pair, 22 gage, fully annealed copper wire. One twisted pair (black and red) conductors shall be shielded and the other twisted pair (green and white) shall be unshielded. Both pairs shall be under one jacket. This cable is to be used on combination intercom and PA work. Use shielded pair for speaker lines. Mohawk No. 1772, West Penn CL2 No. 355 or equal. For outdoor and underground applications, West Penn No. AQC 355 or equal shall be used

B. Provide 3-conductor jumper wire shall consist of solid copper conductors, insulated with polyvinyl chloride and color-coded, 22 gage. Colors shall be blue/red and white, Brand-Rex or equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Wiring within console and cabinets shall be installed to conform to standard engineering practice, and shall be terminated on terminal strips having a terminal for each required external connection. Wiring shall be cabled, laced and securely fastened in place so that no weight is imposed on any equipment, control switches, or terminals. Wires shall be contiguous between console and cabinets. Splices are permitted only at cross connect points where terminated on punch blocks.

B. Wires carrying audio power shall be shielded. Input and output circuits and terminal strips shall be installed to provide separation necessary for proper operation. Wires shall be identified by number and chart.

C. Conductor shields for each system shall be grounded at one location only. Grounding shall be done within console and cabinet racks. There shall be no metallic connection between systems. Conduits for system and 120 volt AC system shall be bonded together at console and cabinet racks.

D. Terminate 120 volt AC supply conductors directly on disconnect switches specified and in approved raceway.

3.02 GENERAL PERFORMANCE REQUIREMENTS

A. Reproduction of speech shall be clear, high fidelity, and with frequencies within range of system faithfully reproduced without detectable noise, hum and distortion.

B. Reproduction shall be attained at sound levels sufficient to override noise levels typical for this type of building, to provide a thoroughly satisfactory and serviceable system.

3.03 SPECIAL PA SYSTEM TESTS

A. Provide instruments for testing and demonstrate, in presence of the Owner, that circuits and wiring test free of shorts and grounds.

B. Furnish labor, instruments, appliances, equipment and materials necessary to demonstrate to the Owner that installation performs as required and specified.

C. The Owner reserves the right to make independent tests of equipment furnished, to determine whether or not equipment complies with requirements specified, and to accept or reject equipment on basis of results obtained.

END OF SECTION