

PROJECT MANUAL

LifeMoves
Maple Street Shelter Renovations
for
the County of San Mateo

1580 Maple Street
Redwood City, California

2015-2801
June 17, 2016
Building Plan check Review



C J W ARCHITECTURE

ARCHITECTURE • CONSTRUCTION MANAGEMENT • PLANNING

130 Portola Road, Suite A Portola Valley, CA 94028

COUNTY OF SAN MATEO

STATE OF CALIFORNIA

PROJECT MANUAL

and

CONTRACT DOCUMENTS

for

MAPLE STREET SHELTER RENOVATION
1580 MAPLE STREET
REDWOOD CITY, CA

PROJECT NO. PC019

APPROVED: (DATE)

JAMES C. PORTER
(R.C.E. No. 48056)
Director of Public Works

Department of Public Works
San Mateo County
555 County Center, 5th Floor
Redwood City, California 94063-1665

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PROJECT DIRECTORY

PROJECT: **MAPLE STREET SHELTER RENOVATION**
1580 MAPLE STREET
REDWOOD CITY, CA 94363
PC019

SCOPE OF WORK: Maple Street Shelter renovation and seismic upgrades

CONSTRUCTION MANAGER: **N/A**

ARCHITECT: **CJW ARCHITECTURE**
130 Portola Road
Portola Valley, CA 94028
(650) 851-9335
Contact: Bill Gutgsell

STRUCTURAL ENGINEER: **BCA STRUCTURAL ENGINEERING, INC.**
1300 Industrial Road, Suite 1
San Carlos, CA. 94070
(650) 508-2500
Contact: Geoff Clifford

ELECTRICAL & MECHANICAL ENGINEER: **TANTECH ENGINEERS, INC.**
1431 Cedar Street
San Carlos, CA 94070
(415) 269-4283
Contact: John Tankeh

LANDSCAPE ARCHITECT: **RON HODGES**
367 Bridle Path
Healdsburg, CA 95448
(707) 481-4500
Contact: Ron Hodges

GEOTECHNICAL CONSULTANT: **BAGG**
138 Charcot Avenue
San Jose, CA 95131
(650) 852-9133
Contact: Anthony N. Lusich

OWNER REPRESENTATIVE: **PROJECT MANAGER**
County of San Mateo
Department of Public Works
555 County Center, 5th Floor
Redwood City, CA 94063-1665
Phone: (650) 599-1487
Fax: (650) 361-8220
Contact: Johnny Chiem

File: F:\users\Capital Projects\Operations Manual\Project Manual Front End Docs\003 Project Directory.doc

NOTICE TO CONTRACTORS

NOTICE IS HEREBY GIVEN that the Board of Supervisors of the County of San Mateo, State of California, (Owner) will receive sealed bids for the construction contract titled

**MAPLE STREET SHELTER EXPANSION AND RENOVATION
1580 MAPLE STREET
REDWOOD CITY, CA 94063
PROJECT NO. PC019**

Bids shall be received in accordance with the Contract Documents. The Contract Documents may be examined and/or downloaded in pdf format at the Department of Public Works website at <http://publicworks.smcgov.org/projects-out-bid> (includes complete bid packages).

A mandatory pre-bid conference and site visit is scheduled for **July 14, 2016 at 10:00AM**. The conference will be held at 1580 Maple Street, Redwood City, CA 94063. Because of the nature of this project, it is mandatory that bidding contractors attend the pre-bid conference to become familiar with existing conditions. Bids will not be accepted from any contractor not present for the mandatory pre-bid conference as evidences on the attendance roster.

Questions regarding this project should be directed to Department of Public Works, 555 County Center, 5th Floor, Redwood City, California, 94063-1065 (Project Manager is Johnny Chiem, jchiem@smcgov.org, 650-599-1349)

Bids shall be submitted using forms furnished and bound in the Project Manual and in accordance with Instructions for Bidders, and shall be accompanied by a Certified or Cashier's Check or Bid Bond for ten percent (10%) of the bid amount.

Bids shall be sealed and filed with the Clerk of the Board of Supervisors of the County of San Mateo at the Hall of Justice and Records, 400 County Center, (formerly 401 Marshall Street) 1st Floor, Redwood City, California, on or before **the 28th day of July 2016, at 2:30 p.m.** and will be opened in public in the Chambers of said Board of Supervisors or at another location as designated by Owner shortly thereafter.

The Board of Supervisors of the County of San Mateo, State of California, reserves the right to reject any and all bids, alternate bids, or unit prices and waive any irregularities in any bid received.

No bidder may withdraw his bid for a period of ninety (90) days after the date set for the opening thereof.

Pursuant to Labor Code Sections 1770, et seq., the Director of the Department of Industrial Relations has determined the general prevailing rate of wages in the County

of San Mateo for each craft, classification, or type of workman needed to execute the contract. The prevailing rates so determined are based on an 8-hour day, 40-hour week, except as otherwise noted. Existing agreements between the Building Trades and the Construction Industry groups relative to overtime, holidays and other special provisions shall be recognized. It shall be mandatory upon the Contractor and upon any sub-contractors under him, to pay not less than the said specific rates to all laborers, workmen or mechanics employed by them in the execution of this contract.

Pursuant to State Senate Bill SB 854 (Stat. 2014, Chapter 28) effective January 1, 2015:

- (1) No contractor or subcontractor may be listed on a bid proposal for a public works project (submitted on or after March 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code Section 1725.5 [with limited exceptions from this requirement for bid purposes only under Labor Code section 1771.1(a)].
- (2) No contractor or subcontractor may be awarded a contractor public work on a public works project (awarded on or after April 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code Section 1725.5.
- (3) This project is subject to compliance monitoring and enforcement by the Department of Labor Relations.

Contractors are further advised that, pursuant to State Senate Bill SB 854 (Stat. 2014, Chapter 28), effective January 1, 2015, all contractors and subcontractors working on a contract for public work on a public works project (awarded on or after April 1, 2015) must furnish electronic certified payroll records to the Labor Commissioner.

A bond will be required for the faithful performance of the contract in amount of not less than one hundred percent (100%) of the amount of the bid, and a bond will be required to guarantee the payment of wages for services engaged and for materials used in the performance of the contract in an amount of not less than one hundred percent (100%) of the bid.

Contract time is specified at **(270)** calendar days. Liquidated damages are **\$500** per calendar day.

INSTRUCTIONS TO BIDDERS

1. General
 - 1.1 Bids shall be received in accordance with the Contract Documents. Each bidder shall carefully read the complete Contract Documents including these instructions.
 - 1.2 Before submitting a bid, each Bidder shall visit the Site and evaluate all conditions and limitations involved thereon as no allowance will be made because of the lack of such examination and knowledge.
 - 1.3 Only Licensed Contractors, authorized to do business under the laws of the State of California and able to qualify as follows will be eligible to submit a bid. Bidders shall meet the following:
 - A. Contractors bidding to the Owner shall have a minimum five years continuous experience as prime on projects of comparable quality, size, complexity and type.
 - B. Contractors bidding to the Owner shall have completed as the prime three projects of comparable quality, size, complexity and type.
 - C. Subcontractors shall meet the above two requirements as it pertains to their Work.
 - D. Within three calendar days of request by Owner, Contractor shall submit evidence of compliance to the above qualifications and a list of all work performed, both complete and incomplete, within the previous five years including the names and phone numbers of the Owners and Architects.
 - 1.4 Before a contract is awarded, the Director of Public Works may, at his sole discretion, require from the proposed contractor evidence of his ability to faithfully, capably, and reasonably perform such proposed contract within the Contract Time and for the Contract Amount, and may consider such evidence before making a decision on the award of such proposed contract.
 - 1.5 The Owner reserves the right to reject any and all proposals, to contract work with whomever and in whatever manner, to abandon work entirely, or waiver of any irregularities in receiving bids.
 - 1.6 The contract shall be awarded to the lowest and most responsible bidder as interpreted by the Owner in accordance with the Contract Documents. The Base Bid shall be used to determine the lowest bidder. Alternates may be accepted and awarded to the lowest and most responsible bidder, as determined above, in any combination or order.

- 1.7 Questions regarding the Contract Documents, such as discrepancies, conflicts, omissions, doubt as to meanings, or regarding scope of Work shall be referred to the Owner. Inquiries must be received by the Owner not later than 96 hours before bid time. Inquiries will be answered in writing to all bidders of record if written clarification is warranted in the opinion of the Owner. The Owner will not be responsible for oral clarifications. Regarding questions on the Contract Documents in the absence of written clarifications, Contractor is instructed to bid the more expensive method or materials.

2. Proposals

- 2.1 Bids shall be submitted in accordance with the Contract Documents. Bids, which shall be submitted on Proposal Forms incorporated with the Project Manual, are to be properly and fully filled out including, but not limited to, bid bond, the Equal Employment Opportunity Program questionnaire and report, Certifications, Contractor's Declaration Form, Anti-Trust Law questionnaire, and the designation of all subcontractors who will perform work or labor or render service on behalf of bidder, in an amount in excess of one-half of one percent of the Contractor's total bid.
- 2.2 No bid will be considered which makes exceptions, changes, or in any manner makes reservations to the terms of the Contract Documents.
- 2.3 Unit Prices on all classes of work as specified or required shall be submitted. Additions to or deductions from the contract sum shall be based on these unit prices. However, none will be acceptable that are definitely above and beyond a fair and just amount and will be subject to reasonable adjustment before the signing of the Contract or bid disqualification.
- 2.4 Each bid must give the full business address of the bidder and be signed by the bidder with his usual signature. Bids by partnerships must furnish the full name of all partners and must be signed in the partnership name by one of the members of the partnership or by any authorized representative, followed by the signature and designation of the person signing. Bids by corporations must be signed with the legal name of the corporation, followed by the name of the State of incorporation and by the signature and designation of the president, secretary, or other person authorized to bind it in the matter. Corporations must furnish a Certificate attesting to the existence of the corporation. The name of each person signing shall also be typed or printed below the signature. When requested by the Owner, satisfactory evidence of the authority of the officer signing on behalf of the corporation shall be furnished.

- 2.5 Bids are to be submitted in separate sealed envelopes. Envelopes shall be marked in lower left corner "Bid for" (provide contract title) and "Bid Opening" (provide bid opening date and time).
Deliver all bids to the Department of Public Works, 555 County Center, 5th Floor, Redwood City, California.
- 2.6 Opening of bids shall be as soon after the hour set for bid opening as possible. Opening and declaration to be in the Offices of the Department of Public Works, 555 County Center, 5th Floor, Redwood City, California or at another location as designated by Owner. The bid opening is open to bidders and the public.
- 2.7 No bid will be considered which is received after the time set for bid opening as determined by Owner.

3. Bonds and Insurance

- 3.1 Bids shall be accompanied by a certified or cashier's check or bid bond for 10 percent of the amount of the bid.
- 3.2 Two bonds, as itemized below and in the forms presented in these Contract Documents, shall be furnished by the successful bidder within ten days after notification of award, which documents will be filed with the Department of Public Works, Capital Projects Division, 555 County Center, 5th Floor, Redwood City, California. The bonds shall be in the form of surety bonds issued by corporations duly and legally licensed to transact business in the State of California, satisfactory to the Owner. Premiums for said bonds shall be paid by the Contractor and maintained at Contractor's expense during the period prescribed herein for the completion of the work to be done under the contract.
- 3.3 Performance Bond in amount of 100 percent of the Contract Amount to insure Owner during construction and for the guarantee period after completion against faulty or improper materials or workmanship and to assure Owner of full and prompt performance of Contract.
- 3.4 Payment Bond in amount of 100 percent of the Contract Amount in accordance with the laws of the State of California to secure payment of any and all claims for labor and material used or consumed in performance of this Contract.
- 3.5 Workers' Compensation Insurance, Comprehensive General Liability Insurance, and Motor Vehicle Liability Insurance shall be maintained by the contractor as detailed in the General Conditions.

4. Wage Rates

- 4.1 The Director of Industrial Relations has determined the general prevailing rate of wages in the County of San Mateo.
- 4.2 In accordance with the General Conditions, it shall be mandatory upon the Contractor and sub-contractors to pay not less than the said prevailing wage rates to all laborers, workmen, or mechanics employed by them in the execution of this Contract. **When applicable, both Contractor and Subcontractor hereby agrees to pay not less than prevailing rates of wages and be responsible for compliance with all the provisions of the California Labor Code, Article 2-Wages, Chapter 1, Part 7, Division 2, Section 1770 et seq and Section 1810 et seq. A copy of the prevailing wage scale established by the Department of Industrial Relations is on file in the office of the Director of Public Works, and available at www.dir.ca.gov/DLSR or by phone at 415-703-4774. California Labor Code Section 1776(a) requires each contractor and subcontractor keep accurate payroll records of trades workers on all public works projects and to submit copies of certified payroll records upon request.**
- 4.3 The Contractor's attention is further directed to the following requirements of State Senate Bill SB 854 (Stat. 2014, chapter 28), effective January 1, 2015:
- (1) No contractor or subcontractor may be listed on a bid proposal for a public works project (submitted on or after March 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5 [with limited exceptions from this requirement for bid purposes only under Labor Code section 1771.1(a)].
 - (2) No contractor or subcontractor may be awarded a contract for public work on a public works project (awarded on or after April 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5.
 - (3) This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations.
- 4.4 The Contractor is further advised that, pursuant to State Senate Bill SB 854 (Stat. 2014, chapter 28), effective January 1, 2015, all contractors and subcontractors working on a contract for public work on a public works project (awarded on or after April 1, 2015) must furnish electronic certified payroll records to the Labor Commissioner.

5. Non-Discrimination

- 5.1 All Contractors with contracts over \$5,000 must comply with the County Ordinance Code with respect to the provision on employee benefits; as set forth in the ordinance, such Contractors are prohibited from discriminating

in the provision of employee benefits with a domestic partner and an employee with a spouse. A copy of the ordinance is included in this project manual.

6. Contractor Employee Jury Service Ordinance

6.1 For contracts over \$100,000, Contractor shall comply with the County Ordinance with respect to provision of jury duty pay to employees and have and adhere to a written policy that provides that its employees shall receive from the contractor, on an annual basis, no less than five days of regular pay for actual jury service in San Mateo County. The policy may provide that employees deposit any fees received for such jury service with the contractor or that the contractor deduct from the employees regular pay the fees received for jury service. A copy of the ordinance is included in this project manual.

7. Recycling and Diversion of Debris From Construction and Demolition Ordinance

7.1 All Contractors with demolition contracts exceeding \$5,000 in value; or construction contracts exceeding \$250,000 in value; or construction contracts consisting of at least 2,000 square feet shall comply with the County Ordinance with respect to construction and demolition debris. A copy of the ordinance is included in this project manual.

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GENERAL CONDITIONS

1 THE CONTRACT

1.1 CONTRACT DESCRIPTION

The Contract Documents form the entire Contract between the Contractor and the Owner. The Contract supersedes prior negotiation and representations, either written or oral.

1.2 CONTRACT DOCUMENTS

- A The Contract Documents consist of the Notice to Contractors, Instructions to Bidders, Agreement, General Conditions, Special Provisions, Supplementary Conditions, Specifications, Drawings, Addenda, Revision Orders, Change Orders, Field Orders, other documents listed in the Agreement or included in the Project Manual, and written interpretations and instruction when issued in accordance with the provisions herein.
- B The Contract Documents are complementary and what is required by any one shall be as binding as if required by all. The Contract Documents are not necessarily complete in every detail. The Contract is to include all labor, materials, equipment and other items as necessary for the proper execution and completion of the work as specified or reasonably inferable as being necessary to produce the intended results in accordance with high quality industry standards.
- C An item designated by reference to the number, symbol, or title of a specific standard such as a commercial standard, a Federal Specification, a Trade Association Standard or other similar standard, shall comply with the requirements in the latest revision thereof and any amendments or supplement thereto in effect on the date of the bid. The standards referred to shall have full force and effect as though printed in the Specifications.
- D The County will arrange for the Contractor to have access to one set of reproducible Drawings. The Contractor may at his expense, reproduce the Drawings and Specifications as needed. All Drawings and Specifications and copies thereof are the property of the Owner. They are not to be used on other projects.
- E For convenience, the Specifications may be arranged in sections and the Drawings may be arranged by system or otherwise. Such separation shall not be considered as the limit of Work required of any separate trade. The terms and conditions of such limitations are wholly between the Contractor and his Subcontractors.
- F In general, the Drawings will indicate dimensions, position, quantity and kind of construction; and the Specifications will indicate quality and method. Work

indicated in one but not the other shall be furnished as though fully set forth in both. Work not specifically detailed, marked or specified, shall be the same as similar work that is marked, specified or detailed.

- G The Project Manual is a collection of documents assembled for the convenience of the parties and usually includes, but is not limited to, the Notice to Contractors, Instructions to Bidders, General Conditions, Supplementary General Conditions, Special Provisions, Bid Documents, Agreement, and Specifications.

1.3 ERROR IN THE DOCUMENTS

- A Should an error or conflict appear in the Contract Documents, or a conflict with the documents and actual conditions, the Contractor shall notify the Architect at once, and the Architect will issue instructions. If the Contractor proceeds with the work without such instructions, he shall make good any resulting unacceptable work or consequences.
- B Whenever the documents could be construed to be ambiguous or conflicting, the Contractor is deemed to have included the cost of the more expensive material, method, or requirement in the Contract Amount.
- C Figured dimensions shall govern over scaling and large scale details shall govern over smaller scale details.

1.4 SEPARATE CONTRACTS

- A The Owner reserves the right to let other contracts in connection with this Project. Contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work, and shall properly connect and coordinate his work with theirs.
- B If any part of Contractor's Work depends for proper execution or results upon the work of another contractor, the Contractor shall inspect and measure the work of other contractor and promptly report to the Owner all defects or discrepancies that render it unsuitable for such proper execution or results. Contractor's action of proceeding with his work shall constitute his acceptance of the prior work as fit and proper for the reception of his work.
- C The Contractor shall make good any damage he may do to another contractor's work to the Owner's satisfaction.

1.5 CONTRACT TERMINATIONS

- A Owner's Right to Terminate Contract for Cause

If Contractor should be adjudged a bankrupt, or if he should make a general assignment for the benefit of his creditors, or if a receiver should be appointed on

account of his insolvency, or if he should fail to supply enough properly skilled workmen or materials to maintain the schedule, or if he should fail to diligently and expeditiously prosecute the Work, or if he should fail to commence the Work on the Project site within ten calendar days of the date of the Notice to Proceed, or if he should fail to make prompt payments to Subcontractors or for materials or labor, or persistently disregard laws, ordinances or the instructions of the Owner or Architect, or otherwise breach any provision of the Contract between the Contractor and Owner, the Owner may without prejudice to any right or remedy the Owner may have and after giving the Contractor seven days' written notice, terminate the Contract or terminate the Contractor's right to proceed with the Work and take possession of the premises and of all materials, tools and appliances thereon and finish the Work by whatever method the Owner may deem expedient. In such case, Contractor shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Amount shall exceed the expense of finishing the Work, including compensation for additional managerial and administrative services, such excess shall be paid to the Contractor. If such expense shall exceed such unpaid balance, the Contractor shall pay the difference to the Owner.

B Owner's Right to Terminate Contract for Convenience

The Owner reserves the right to terminate this contract at any time. Contractor shall be compensated on the basis of the reasonable value of the portion of Work completed as prorated against the Contract Amount or shown as a separate price and the cost incurred for portions of the Work performed but not completed. The total payments to contractor shall not exceed the Contract Amount.

C Contractor's Right to Terminate Contract

Except as provided by paragraph 1.5 D Emergency Termination, if the Work should be stopped by the Owner, or an order of the court, or other public authority for a period of six months, through no act or fault of the Contractor or of anyone employed by him, then the Contractor may, upon twenty-one (21) days written notice to the Owner, terminate this Contract and recover from the Owner the amount owed under the Contract for the portion of Work, if any, which was completed.

D Emergency Termination

This Contract is subject to termination as provided by Section 4410 and 4411 of the Public Contracts Code of the State of California, being portions of the Emergency Termination of Public Contracts Act of 1949. Said Sections read as follows:

"Sec. 4410. TERMINATION OF CONTRACT FOR PUBLIC WORK IN EVENT OF NATIONAL EMERGENCY. In the event a national emergency occurs, and public work, being performed by Contract, is stopped, directly

or indirectly, because of the freezing or diversion of materials, equipment, or labor, as the result of an order or of a proclamation of the President of the United States, or of an order of any federal authority, and the circumstances or conditions are such that it is impracticable within a reasonable time to proceed with a substantial portion of the Work, then the public agency and the Contractor may, by written agreement, terminate said Contract."

"Sec. 4411. INCLUSION OF TERMS AND CONDITIONS OF TERMINATION OF CONTRACT IN AGREEMENT: COMPENSATION TO CONTRACTOR. Such an agreement shall include the terms and conditions of the termination of the Contract and provision for the payment of compensation or money, if any, which either party shall pay to the other or any other person, under the facts and circumstances in the case."

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

1.6 ALLOWANCES

- A The Contractor shall include in the Contract Amount all allowances stated in the Contract Documents. Items or services covered by these allowances shall be supplied as the Owner may direct.
- B Allowances for material and equipment shall cover the cost to the Contractor, less any applicable trade discount, delivered at the site, and all applicable taxes. The Contractor's costs for unloading and handling on the site, labor, installation costs, overhead, profit and other expenses required to complete the Work shall be included in the Contract Amount and not in the allowance.
- C Whenever the cost of the material, equipment or service is more than or less than the allowance, the Contract Amount shall be adjusted by the procedure in Section 2, Contract Modifications.

1.7 DISPUTES

Should any dispute including breach, arise out of or relate to this Contract the Contractor shall continue to perform the Work in accordance with the Contract Documents and the Owner and Contractor agree to pursue resolution of the disagreement by whatever means available. Neither the dispute resolution process, the resolution, nor lack of resolution shall delay, hinder, or alter the completion of the Work in accordance with the undisputed portion of the Contract

Documents and in accordance with the Owner's direction to Contractor regarding disputed portions of the Contract.

1.8 SEVERABILITY

In the event that any provision or any part of a provision of this Contract shall be finally determined to be superseded, invalid, illegal or otherwise unenforceable pursuant to applicable laws by an authority having jurisdiction, such determination shall not impair or otherwise affect the validity, legality, or enforceability of the remaining provisions or parts of provisions of this Contract, which shall remain in full force and effect as if the unenforceable provision or part were deleted.

1.9 HEADINGS

The headings of any section or provision of this Contract are for convenience only and shall not be deemed to limit, restrict or alter the content, meaning or effect thereof.

2 CONTRACT MODIFICATIONS

2.1 MODIFICATION DOCUMENTS

- A The Owner, without invalidating the Contract and without consent of surety, may accomplish changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Amount and the Contract Time being equitably adjusted accordingly. All such changes in the Work shall be accomplished by Revision Order, Change Order, Field Order, Owner's Instructions or Architect's Instruction as may be applicable in accordance with the provisions herein. The Contract Amount and the Contract Time may be changed only by a Revision Order. Changes to the Work shall be performed under the applicable provision of the Contract Documents for similar Work. Contractor agrees to promptly proceed with the Work as so changed. All changes to the Work and all Contractor requests for additional compensation shall be resolved in accordance with this Section 2, Contract Modifications.

- B A Change Order is a written order from the Owner or Architect ordering a change in the Work. Upon receipt of a Change Order, the Contractor shall promptly proceed with the Work as changed. Within twenty (20) calendar days after receiving a Change Order and prior to or simultaneously with proceeding with the change in the Work, Contractor shall advise the Architect of Contractor's disagreement, if any, with the terms of the Change Order, and shall state the nature and extent of the disagreement. Proceeding with the Work as changed without submitting a notice of disagreement indicates Contractor's full acceptance of the Change Order including the proposed adjustment, if any, in Contract Amount and Contract Time. A Revision Order is required to adjust the Contract Amount and Contract Time for changes in the Work ordered by Change Order. The Contractor will not delay the Work for any reason including pending Revision

Orders or unresolved price or time adjustment.

- C A Revision Order is a written document issued after execution of the Contract acknowledging a change in the Work and modifying the Contract Amount and Contract Time in full compensation for the change and its effects on the schedule and all other impacts on the Work and the Project.
- D The signature of the Owner and Contractor on the Revision Order indicates their final and conclusive acceptance of the stated terms and provisions as full compensation for the change to the Work. In the event the Owner and Contractor do not agree upon the adjustment to the Contract Amount and Contract Time the Owner may issue a Revision Order unilaterally. A Revision Order issued unilaterally is signed by the Owner and issued to the Contractor authorizing an adjustment in the Contract Amount and Contract Time as the Owner deems equitable. A Revision Order issued unilaterally may be signed by the Contractor and delivered to the Owner thereby indicating Contractor's acceptance of the Revision Order. The Owner may withdraw a unilaterally issued Revision Order at any time prior to receiving the Contractor's signature on the Revision Order.
- E If Contractor is in disagreement with the terms or provisions of a unilaterally issued Revision Order, the Contractor shall give the Owner and Architect written notice of his disagreement, the basis thereof, and supporting documentation within twenty (20) calendar days of receiving the unilateral Revision Order. Such notice of disagreement does not excuse performance by the Contractor of all obligations under the Contract Documents and the Contractor shall proceed with the Work including the Work involved with the disagreement. Payments shall be made to the Contractor on the basis of the unilateral Revision Order. Failure to present such notice of disagreement constitutes a waiver by the Contractor of any entitlement to additional cost or time.
- F The Owner and Architect have the authority to issue instructions to the Contractor which may require minor changes in the Work not involving an adjustment in the Contract Amount or an extension of Contract Time. If contractor believes an adjustment of Contract Amount or Time is warranted, Contractor shall not incur additional cost or delay and notify the Owner or Architect in writing within 24 hours of receiving the notice.
- G A Field Order is a written document signed by the Owner and issued to the Contractor to perform as so specified. The Contractor shall immediately comply with Field Orders. If the Contractor believes an adjustment of Contract Amount or Time is justified, a request may be submitted in accordance with Section 2.4, Contractor Claims. If the Owner concurs with the Contractor a Revision Order will be issued.

2.2 VERBAL INSTRUCTIONS

Contractors shall not act or rely upon verbal instructions. No work will be

accepted by the Owner that differs from the Contract Documents as modified in writing.

2.3 METHOD OF DETERMINING ADJUSTMENT

- A An adjustment to the Contract Amount or Contract Time pursuant to a Change Order, Field Order, Claim, or other provision herein shall be determined in one or more of the following ways at the Owners discretion.
- 1 By negotiation based upon Contractor's estimate. The estimate shall include quantities of materials and man hours, and a breakdown of cost showing labor, materials, profit, overhead, and all other items of cost. General requirements, project supervision, project management and facilities are not allowed. Estimated unit prices used to calculate cost shall not exceed published unit prices, such as those published by R. S. Means Company, Inc., unless it can be justified that the published unit prices do not apply. Such estimates shall be provided within 20 (20) calendar days after the Change Order is issued. Overhead and profit shall not exceed the percentages specified in the Contract Documents.
 - 2 By unit prices stated in the Contract or subsequently agreed upon.
 - 3 By acceptance of a lump sum proposal.
 - 4 By determination of the Owner and issued unilaterally by Revision Order.
- B If the adjustment is not determined by the above methods prior to the Contractor starting work involved with a Change Order, Field Order or Claim, Contractor, shall proceed with the Work and keep daily accurate records of the labor hours, materials, and other items of cost used in the performance of the changed Work. Copies of the records shall be given to the Owner or Architect daily. Contractor shall present at such time and in such form as Owner may prescribe, an itemized accounting together with appropriate supporting data as may be required by Owner to fully substantiate the cost of the changed Work. Owner shall consider such accounting in its determination of equitable adjustment. Overhead and profit shall not exceed the percentages specified in the Contract Documents.
- C Extension of Contract Time will be granted only to the extent that the time required to complete the Work as changed or delayed extends the schedule critical path beyond the contract completion date. If changes or delays do not extend the critical path of the schedule beyond the contract completion date, there will be no contractor entitlement to extended or additional home office expenses. Float, as used in this agreement, is the sum of the amount of time available to a task before the task becomes critical and the amount of time between the scheduled completion date and the contract completion date. Float may be used in the order needed by either the Owner or the Contractor.

2.4 CONTRACTOR CLAIMS

- A If the Contractor wishes to request an adjustment in the Contract Amount or Contract Time, other than pursuant to a Change Order or Field Order, Contractor shall give the Owner and Architect a written Notice of Claim within seven calendar days after the occurrence or beginning of the event giving rise to such Claim except that notice shall be given immediately if delays or extra costs occur within such seven-day period. The Notice of Claim shall be given by the Contractor before disturbing conditions which are the basis for the Claim, except in an emergency endangering life or property in which case the Contractor should proceed in accordance with Section 6.7, Emergencies. Failure to present such Notice of Claim constitutes a waiver of such Claim. The adjustment to the Contract Amount or Contract Time, if any, shall be determined and issued in accordance with this Section 2, Contract Modifications.
- B Notices are valid only if written and shall be a document issued for the sole purpose of notification and titled clearly "Notice of (specify category i.e., delay, claim)." A separate written notice is required for each subject and issue.
- C Written notice shall be deemed to have been duly served if delivered in person to the individual to whom it is addressed, or if sent by certified mail to the address specified in the Contract Documents as may be revised in writing.

2.5 DELAYS BEYOND CONTRACTOR'S CONTROL

- A. If the Contractor is delayed at any time in the progress of the Work by acts or neglect of the Owner or by any separate contractor employed by Owner, or by labor disputes, fire, unusual delays in transportation, unusually adverse weather conditions, unavoidable casualties or by any other unforeseeable cause of delay beyond the Contractor's control, which the Owner decides justifies the delay, then the Contract Time may be extended for such reasonable time as the Owner in his discretion may decide. Contractor's Claim for extension of time shall be made in writing to the Owner in accordance with Section 2.4, Contractor Claims. Only one Claim is necessary in the case of continuing delay.
- B. Unusually adverse weather conditions for the purposes of this Project are agreed to be work days lost from weather or the effects of weather greater than the number of lost days specified in Section 7.5, Schedule.

2.6 HIDDEN CONDITIONS

Should concealed or unknown conditions be encountered in the performance of the Work below the surface of the ground or in an existing structure be at variance with the conditions indicated by the Contract Documents, or differ materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in this Contract, the Contract Amount and Contract Time shall be equitable adjusted as provided herein upon Claim by Owner or

Contractor. Contractor Claims shall be in accordance with Section 2.4, Contractor Claims.

2.7 HAZARDOUS MATERIALS

Asbestos or other hazardous material may be present in County buildings or on County property. Asbestos is typically in the form of pipe lagging, fire proofing, floor tiles, mastic, and plaster. Soil may be contaminated by petroleum products or other substances. In the event any suspected asbestos or other hazardous material is encountered during construction that may be disturbed by the Work, the Contractor shall stop immediately and notify the County. The Contractor and all Subcontractors shall instruct their employees of the type and location of the most likely forms of hazardous material to be encountered and of the procedure to be taken if encountered. Contractor will be responsible for the mitigation and abatement of the hazardous material upon authorization of Owner. All Claims for adjustment in time or money shall be processed in accordance with Section 2.6, Hidden Conditions.

2.8 OVERHEAD AND PROFIT

A Adjustments to the Contract Amount due to changes in the Work or any other reason, shall include overhead and profit as follows:

- 1 Contractor's overhead and profit on the direct cost of Work performed by his forces shall be a total sum not exceeding fifteen percent (15%) of such costs.
- 2 Contractor's overhead and profit on the direct cost of Work performed by Subcontractors shall be a total sum not exceeding five percent (5%) of such Work.
- 3 Subcontractor's overhead and profit on the direct cost of Work performed by Subcontractor shall be a total sum not exceeding fifteen percent (15%) of the cost of the Work. Subcontractor overhead and profit will be allowed for one tier only.
- 4 Changes to the Work ordered by the Architect or Owner which decrease the Contract Amount shall include overhead and profit in accordance with the above provisions. Value engineering revisions initiated by the Contractor and accepted by Owner which decrease the Contract Amount shall be at cost only.
- 5 The "direct cost of the work" is considered to be the cost of labor and material incorporated into the construction. Supervision and administration of the work, changes, or claims shall not be included in direct cost.

2.9 MAINTAIN RECORDS

Contractor and Subcontractor shall maintain records, in accordance with generally accepted accounting principles, relating to costs of changes to the Work or Claims for 4 years after the final completion. The Owner will have the right to audit these records at any time up to 4 years after completion of the Project and recover from the Contractor or Subcontractor any amount paid by Revision Order but not substantiated by audit.

2.10 PROPOSAL REQUESTS

Contractor is required to provide preliminary estimates using their best judgment of time and cost impact of potential changes to the Project as requested by the Architect. Estimates shall be provided to the Architect within seven (7) days of receiving the Proposal Request. Contractor will be responsible for any cost increase or schedule impact resulting from Contractor's failure to respond within the allowed time.

3 CONTRACTOR

3.1 DEFINITIONS

- A The term Contractor, as used herein, is the person or organization identified as such in the Agreement, and is referred to as if singular and masculine and includes his authorized representatives.
- B The term Subcontractor, as used herein, includes only those persons or organizations having a direct Contract with the Contractor to perform a portion of Contractor's Work. Subcontractor includes one who furnishes material worked to a special design according to the plans or Specifications but does not include one who furnishes material not so worked.

3.2 GENERAL

- A Contractor agrees to perform all Work required by the Contract Documents.
- B All Work shall be done in accordance with the best practices of the various trades involved and highest industry standards.
- C The Contractor shall keep on the Project site during the progress of the Work a competent superintendent satisfactory to the Owner. The Superintendent shall not be changed except with the consent of the Owner. The Superintendent shall represent the Contractor and all directions given to him shall be as binding as if given to the Contractor.
- D It is the Contractor's responsibility to diligently prosecute the Work, using his best

skills and attention, and the most appropriate techniques and equipment that are required to provide a finished product in compliance with the Contract requirements. He shall insure that no Work is done that does not comply with the Contract Documents.

- E The Contractor shall attend a preconstruction meeting, weekly progress meetings and other meetings as necessary to accomplish the Work and administer the provisions of the Contract.
- F Contractor shall submit to Owner a daily record of Contractor's activity. Such record shall be delivered to Owner daily for previous day's activity and shall include Project name, date, weather, names of Subcontractors, count of personnel by company, material deliveries, description and location of activity and events. The record of daily activity shall not be used as a Notice to Owner.

3.3 SUBCONTRACTS

- A The Contractor shall not be permitted to substitute any person or organization for any Subcontractor, person or organization listed by him in his bid without the prior, written consent of the Owner, as provided for in Chapter 2 of Division 5, Title 1 of the California Public Contracts Code.
- B In addition to the information required in Form of Proposal regarding Subcontractors, the Contractor, after execution of the Contract but prior to execution of the subcontract, shall submit the following information on each Subcontractor: name, address, and nature of Subcontractor's work, Subcontract Amount, and all other information the Owner deems relevant. The Contractor shall not Contract with any such proposed person or entity to whom the Owner objects.
- C Contractor shall bind every Subcontractor and every Subcontractor agrees to be bound by the terms of the Contract Documents insofar as applicable to their work. The Contractor shall be responsible for the acts and omissions of Subcontractors.
- D Contractor agrees to pay to each Subcontractor promptly upon receiving payment from Owner.
- E Neither the acceptance of the Subcontractor nor any other act of the Owner, nor anything contained in any contract document is to be construed as creating any contractual relation between the Owner and any Subcontractor.

3.4 PERSONNEL AND LABOR POLICY

- A Contractor shall at all times enforce strict discipline and good order among his employees and shall not employ any unfit person or anyone not skilled in the work assigned to him. The Contractor shall be responsible to the Owner for the acts and omissions of his employees and other persons performing work for the

Contractor.

- B No person shall be excluded from participation in, denied benefits of, or be subject to discrimination under this contract on the basis of their race, color, religion, national origin, age, sex, sexual orientation, pregnancy, childbirth or related conditions, medical condition, mental or physical ability, or veteran's status. Contractor shall ensure full compliance with federal, state and local laws, directives and executive orders regarding non-discrimination for all employees and subcontractors under this Contract.

Violation of the non-discrimination provisions of this Contract shall be considered a breach of this Contract and subject the Contractor to penalties, to be determined by the County Manager, including but not limited to: i) termination of this Contract; ii) disqualification of the Contractor from bidding on or being awarded a County contract for a period of up to 5 years; iii) liquidated damages of \$2,500 per violation; iv) imposition of other appropriate contractual and civil remedies and sanctions, as determined by the County Manager.

To effectuate the provisions of this paragraph, the County Manager shall have the authority to: i) examine Contractor's employment records with respect to compliance with this paragraph; ii) set off all or any portion of the amount described in this paragraph against amounts due to Contractor under the Contract or any other Contract between Contractor and County.

Contractor shall report to the County Manager the filing by any person in any court of any complaint of discrimination or the filing by any person of any and all charges with the Equal Employment Opportunity Commission, the Fair Employment Housing Commission or any other entity charged with the investigation of allegations within 30 days of such filing, provided that within such 30 days such entity has not notified Contractor that such charges are dismissed or otherwise unfounded. Such notification shall include the name of the complainant, a copy of such complaint and a description of the circumstance. Contractor shall provide County with a copy of its response to the complaint when filed.

For contracts over \$5,000, with respect to the provision of employee benefits, Contractor shall comply with the County Ordinance which prohibits contractors from discriminating in the provision of employee benefits between an employee with a domestic partner and an employee with a spouse.

- C Contractor shall ensure equal employment opportunity based on objective standards of recruitment, selection, promotion, classification, compensation, performance evaluations, and management relations, for all employees working on the Project. Contractor's affirmative action policies shall be made available to Owner upon request.
- D It is the policy of the Owner that Contractors on public Projects employ their

workers from the local labor market whenever possible. Consistent with that policy, the Contractor is requested to employ his workers from the local labor market. Local labor market within the meaning of this section is defined as the labor market within the geographical confines of the County of San Mateo, State of California.

- E The Contractor shall forfeit, as penalty to the Owner, twenty-five Dollars (\$25) for each laborer, workman, or mechanic employed in the execution of the Contract by him, or by any Subcontractor under him, upon any of the Work hereinabove mentioned, for each calendar day during which said laborer, workman, or mechanic is required or permitted to labor more than eight hours in violation of the provisions of Article 3, chapter 1, part 7, division 2 of the Labor Code.
- F The Contractor shall forfeit as penalty to the Owner, twenty-five dollars (\$25) for each laborer, workman or mechanic employed for each calendar day or portion thereof, if such laborer, workman, or mechanic is paid less than the general prevailing rate of wages hereinafter stipulated for any Work done under the attached Contract, by him, or by any Subcontractor under him, in violation of the provisions of Article 2, chapter 1, part 7, division 2 of the Labor Code.
- G Apprenticeship Program: Contractor shall comply with the provision of Section 1777.5, chapter 1, part 7, division 2 of the Labor Code.
- H The Contractor's attention is directed to the provisions of the California Labor Code, Division 2, Section 1776, and the regulations implementing it in Title 8, California Administrative Code. The Contractor shall be responsible for compliance by his Subcontractors. A certified copy of all weekly payroll records shall be furnished upon request of the Owner, the Division of Labor Standards Enforcement, or the Division of Apprenticeship Standards of the Department of Industrial Relations.
- I Payrolls shall contain the full name, address, and social security number of each employee, his correct classification, rate of pay, daily and weekly number of hours worked, itemized deductions made and actual wages paid. They shall also indicate apprentices and ratio of apprentices to journeymen.
- J The penalties specified in subdivision (f) of Labor Code Section 1776 for noncompliance with the provisions of said Section 1776 may be deducted from any moneys due or which may become due to the Contractor.

4 OWNER

4.1 DEFINITION

The Owner is the person or organization identified as such in the Agreement, and is referred to as if singular in number and masculine in gender and includes his authorized representatives. The Owner may be the County of San Mateo,

sometimes called "The County", or it may be a non-profit corporation.

4.2 GENERAL

- A The Owner may furnish information after the bid date and not included in the Contract Documents in the form of drawings, reports, survey data, utility locations, plans of existing facilities and such other information. This information is not part of the Contract Documents.
- B The Owner shall receive copies of all correspondence, notices, approved shop Drawings, test reports and such material pertinent to the Contract. The Owner shall have access to the Work at all times.

4.3 THE DIRECTOR OF PUBLIC WORKS

The Director of Public Works for the County of San Mateo or his duly appointed representative is the duly appointed agent for the Owner and as such is empowered to act for the Owner in all matters as stated in the Contract Documents or as provided by law.

4.4 OWNER'S CONSTRUCTION OBSERVER

- A The Owner may engage a Construction Observer. The Owner's Construction Observer shall receive copies of all communications regarding the Project, have full access to the Work, and be kept informed of all actions taken.
- B The Owner's Construction Observer shall not interpret the plans, coordinate the Work, order changes in the Work, supervise the workmen, or perform any duty which is the responsibility of the Architect or the Contractor.

5 ARCHITECT

5.1 DEFINITION

For the purpose of this Contract, the Architect is identified in the Project Manual. The Owner may also be the Architect. The term "Architect" shall include his appointed representatives and consultants. The person is referred to throughout the Contract as if singular in number and masculine in gender. Nothing contained in the Contract Documents shall create any contractual relationship between the Architect and the Contractor.

5.2 GENERAL

- A The Architect will provide general administration of the Contract between Owner and Contractor.
- B The Architect will have authority to act on behalf of the Owner to the extent pro-

vided in the Contract Documents. The Owner's instructions to the Contractor may be issued through the Architect.

- C The Architect shall at all times have access to the Work. The Contractor shall provide facilities for such access so the Architect may perform his functions under the Contract Documents. The Architect will make periodic visits to the site to familiarize himself with the progress and quality of the work and to determine if the work is proceeding in accordance with the Contract Documents. Architect will endeavor to guard the Owner against defects and deficiencies in the Work.
- D The Architect will be the interpreter of the requirements of the Contract Documents and the judge of the Contractor's performance thereunder. The Architect will, within 14 calendar days, render interpretations or answers to questions submitted by Contractor. All interpretations and decisions of the Architect shall be consistent with the intent of the Contract Documents. In his capacity as interpreter and judge he will exercise his best efforts to insure faithful performance by all parties of the Contract. The Architect's decision in matters relating to esthetic effect will be final.
- E The Architect will review submittals, samples, adjustments to the Contract, applications for payment, written guarantees, operation and maintenance manual and other documents required by the Contract.

6 PERFORMANCE OF THE WORK

6.1 DEFINITION

- A The term "Work" as used herein is all of the Contractors obligations under the Contract including, but not limited, to providing all labor, material, equipment and services indicated by the Contract Documents, as-built drawings, punchlist, inspections and approvals required or necessary for occupancy, and guarantees.
- B The term "Project" is the total construction planned or contemplated by the Owner of which the Work may be the whole or a part. The Owner may perform or contract for other work on the Project site during the progress of the Work.

6.2 GENERAL

- A The Contractor shall provide, maintain and remove upon completion of the Work, all tools, machinery, equipment, temporary rigging, scaffolding, hoisting equipment, rubbish chutes, barricades around openings and excavation, ladders between floors, fences around buildings, and all other items as required for safe completion of the Work, whether specifically designated or not and shall conform to all requirements in regard to operation, safety, and fire hazards of State and local authorities and of underwriters.
- B Deliver all materials and equipment in the manufacturer's original sealed, labeled

- containers and protect items against moisture, rust, dust, tampering, or damage.
- C Place all materials and equipment orders in time to avoid job delay or hindrance. Schedule deliveries to coincide with the construction schedule so that materials and equipment are promptly installed upon delivery.
 - D Except as specifically noted otherwise, the installation and/or maintenance directions provided by the manufacturer shall be followed for all materials and equipment.
 - E All materials and equipment shall be new, unless specifically marked otherwise.
 - F All materials and equipment not conforming to the Contract Documents shall be rejected and shall be immediately removed from the site of the Work.
 - G All utilities and services required by the Contractor including electrical power, water, temporary telephones, temporary sanitary facilities, and temporary heat as required for the proper installation of materials and the completion of the Work shall be provided by Contractor.
 - H Shut down of utilities for any reason or duration shall be subject to approval by the Owner. The Owner requires a minimum of 14 days notice prior to authorizing a utility shut down. When shut-downs of 30 minutes or more are required, the Contractor shall provide alternate service for normal occupancy requirements. Utility shut-downs shall be scheduled during non-business hours.
 - I Prior to ordering materials, the Contractor shall verify all measurements at the site and shall be held responsible for their accuracy. No extra compensation will be allowed for differences between actual measurements and the dimensions shown on the Drawings.
 - J Fences, office facilities, enclosures, storage sheds, etc., required by the Contractor in the performance of the Work shall be located where approved by the Owner.
 - K The Contractor shall confine operations at the site to areas permitted by law, ordinances, permits and the Contract Documents and shall not unreasonably encumber the site with any materials or equipment.
 - L During the progress of the Work, Contractor shall keep the premises orderly and safe and free from accumulation of waste materials and rubbish.
 - M At the completion of the Work, Contractor shall remove all waste, surplus materials, and rubbish and shall clean all surfaces, removing all extraneous paint, mortar, dust, and stains, leaving the Work bright, clean and polished.
 - N The project is not exempt from any Federal, State or local taxes.

- O Royalty and License Fees incidental to the use of any patented material, device or process shall be paid by the Contractor and in the event of a Claim of alleged infringement of patent rights, the Contractor shall save the Owner free and harmless from loss on account thereof; and also defend, at his own expense, all suits that may be brought in such connection.
- P Contractor shall continuously maintain adequate protection of all Work and shall protect the Owner's property from damage or loss arising in connection with this Contract.
- Q Precaution shall be exercised at all times for the protection of persons (including Contractor's and Owner's employees) and property. The safety provisions of applicable laws, building and construction codes shall be observed. Machinery, equipment and all hazards shall be guarded or eliminated in accordance with the safety provisions of the latest safety orders of the State of California (General Industrial Safety Orders and Construction Safety Orders), and in compliance with the Occupational Safety and Health Administration.
- R All materials and workmanship shall be subject to inspection, examination, test and acceptance by the Owner at all times during manufacture and construction and at all places where such manufacture and construction are carried on.

6.3 EXISTING CONDITIONS

- A The Contractor by executing the Contract represents that he has visited the site and familiarized himself with the local conditions under which the Work is to be performed and has correlated his site observations with the requirements of the Contract Documents.
- B The contractor shall carefully study and compare the Contract Documents and existing conditions and dimensions and the connection of the Work to existing conditions and shall report to the Architect any error, conflict, inconsistency, omission, or any variance with laws, ordinances, codes, rules or regulations bearing on the Work. Contractor shall report such conditions to the Architect in writing at such time as to allow at least twenty (20) calendar days for a response with no delay to the Work. All necessary changes shall be accomplished in accordance with Section 2, Contract Modifications.

6.4 ADJACENT FACILITIES

- A The Contractor shall provide adequate protection for all parts of the Project site, and adjacent property, its improvements and its occupants throughout the Work. All damage done to existing property shall be neatly repaired or replaced at the Contractor's expense.
- B Work shall be executed in careful, orderly manner, with the least possible

disturbance to public and occupants of the area.

- C The Owner will continue to use adjacent facilities. Contractor shall take care to disrupt the Owner as little as possible. Contractor shall provide legal and safe access to all facilities at all times. In order to facilitate use of adjacent facilities Owner may order Contractor to alter or temporarily cease operations.

6.5 PERMITS

- A It shall be the responsibility of the Contractor to obtain and pay for all permits, licenses, certificates, approvals, utility connections and services necessary for the proper execution and completion of the Work.
- B All fees which are for temporary approvals or services, such as those which are necessary for construction procedures, shall be paid by the Contractor.
- C In the event the Special Provisions require the Owner to pay any fee, the Contractor shall notify the Owner in writing, twenty (20) calendar days in advance of a required fee payment.
- D It is the policy of the County to cooperate with State, County and City officials in regard to the construction of this Project, and it is the responsibility of the Contractor and all his Subcontractors to meet the requirements of government officials having responsibility for inspecting or observing construction by taking out permits for the Work, calling for inspections and adhering to safety practices in accordance with standard practice. In the case of conflict of any of these provisions, the Owner shall be notified. The term Inspector means a Public Building Construction Inspector or an individual performing the inspection as required by building codes or jurisdiction.

6.6 LAWS

- A The Contractor shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the Work. If the Contractor performs any Work contrary to such laws, ordinances, rules and regulations, he shall bear all costs and delays arising therefrom.
- B Owner and Contractor have all rights provided by law not specifically waived by this contract.

6.7 EMERGENCIES

- A In an emergency affecting the safety of life, the Work, or property, the Contractor, without special instruction or authorization from the Owner, is hereby permitted to act, at his discretion, to prevent such threatened loss or injury; he shall so act without appeal if so instructed or authorized. Any compensation, claimed by the Contractor on account of emergency work, beyond Contractor's contractual

obligations, shall be determined by agreement. The Contractor shall immediately notify the Owner in writing.

- B In an emergency affecting the safety of life, the Work, or property or if an unsafe condition exists, the Owner may, but is not obligated, take measures to mitigate the condition. Such measures may include expending labor or material, engaging other contractors, entering the Project site utilizing materials, equipment or facilities of Contractor. The Owner's actions may be performed immediately and without notice to Contractor. Contractor shall pay Owner for all costs which are attributable to Contractor.

6.8 SUBMITTALS

- A Submittals are shop drawings, product data, maintenance information, samples, manufactures instructions, certifications, and similar documents or items which demonstrate the way the Contractor proposes to conform the Work to the information in the Contract Documents. Contractor shall review the entire Contract Documents for other provisions relating to submittals and individual submittal requirements, if any.
- B The Contractor shall review, stamp with his approval and submit to the Architect in orderly sequence so as to cause no delay in his Work or in the work of any other contractor, all submittals required by the Contract. Submittals shall be properly identified with specification section. At the time of submission, the Contractor shall note in writing any deviation in the submittals from the requirements of the Contract Documents. By approving and submitting shop drawings and samples, the Contractor thereby represents that he has determined and verified all field measurements, field construction criteria, materials, catalogue numbers and similar data, and that he has checked and coordinated each shop drawing and sample with the requirements of the Work and of the Contract Documents.
- C The Architect will review submittals for conformance with the designed concept and with the information given in the Contract Documents. A minimum of 14 calendar days is required for each submittal review. The Architect's review will not relieve the Contractor of responsibility for complying with the Contract Documents. If a submittal is required to be resubmitted, the time and cost of resubmission is the responsibility of the Contractor.

6.9 SUBSTITUTIONS

- A The intent of the Specifications is to specify high grade equipment and materials. It is not the intent of the Specifications to exclude or limit the products of any responsible manufacturer, except when the Owner has adopted a specific system or product which will be noted, "No Substitutions Allowed", or similar language. Where equipment, material, or process is specified by trade name or by patentee, manufacturer or dealer, it shall mean the specified item or any other product which is equal in every respect including quality, utility, serviceability, and aesthetic

effect. The Architect shall be the sole judge of equality between products, materials or methods.

- B Should the Contractor wish to use equipment or materials different from those specified, he shall request approval for the desired substitution. His request shall include all substantiating data required for the Architect to make any evaluation of the request. No substitution shall be made without written approval of the Architect. The Architect's refusal to approve a substitution shall not effect the progress of the work and is not grounds for a Claim against the Owner.
- C The Contractor shall pay \$200, lump sum, for the Architect's time to review substitution requests. Payment is to be included with the substitution request package.

6.10 CORRECTING WORK

- A The Contractor shall promptly correct all Work rejected by the Owner or Architect, whether observed before or after the Notice of Completion and whether or not fabricated, installed or completed. The Contractor shall not receive a time extension for correcting such rejected Work. All such defective or non-conforming Work shall be corrected to comply with the Contract Documents without cost to the Owner. The Contractor shall bear the cost of making good all Work of separate contractors destroyed or damaged by such removal or correction.
- B If any Work should be covered before it is inspected, the Contractor at his expense, must uncover the Work for inspection and then replace the cover.
- C If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents, or fails to perform any provisions of the Contract Documents, the Owner may, after seven days written notice to the Contractor and without prejudice to any other remedy Owner may have, and without Contract termination or ordering the Contractor to stop Work make good such deficiencies in any manner the Owner deems expedient. In such case an adjustment to the Contract shall be made in accordance with section 2, Contract Modifications, deducting from the payment then or thereafter due the Contractor, the cost of correcting such deficiencies, including the cost of additional services made necessary by such default, neglect or failure.
- D If the Owner deems it not expedient to correct Work damaged or not done in accordance with the Contract Documents, a deduction from the Contract price shall be made.
- E If the Contractor fails to correct defective Work or fails to supply materials or equipment in accordance with the Contract Documents, the Owner may order the Contractor to stop the Work or any portion thereof until the cause of such order has been eliminated. Contractor shall not receive a time extension or compensation as a result of stopping Work as required by this provision.

6.11 TESTING

- A The Owner will provide for testing of materials or workmanship as required by these Specifications. The Contractor shall coordinate and schedule tests directly with the testing firm. The costs of tests on materials at the Project site will be borne by the Owner, except for retesting, as specified below, the material required for testing, and the Contractor's labor required to facilitate the test or delayed by the test, which the Contractor shall furnish. The Contractor will cooperate with the Owner's testing representative in the taking of test Samples. The Contractor shall pay for all tests which are not at the job site.
- B Required tests are specified elsewhere in the Specifications.
- C Should the results of any required tests fail to meet the requirements of the Contract Documents, Contractor shall either correct the unacceptable condition or furnish new materials, as directed by the Owner. Additional tests shall be made at the Contractor's expense until the materials are found to meet the requirements of the Contract Documents.
- D Should the results of any soil compaction tests fail to meet the requirements of the Specifications, Contractor shall recondition and/or recompact the fill, and additional tests shall be made at the Contractor's expense until the compaction is found to meet the requirements of the Specifications.
- E Testing or inspection services required outside of regular working hours shall be paid for by the Contractor.
- F When existing building systems such as fire alarms, fire sprinkler systems, smoke detectors, halon systems, etc., are modified by the Work, the Contractor shall test the entire system at the completion of the Work and demonstrate to the Owner that the system is functioning correctly and reliably.

6.12 RECORD DOCUMENTS

- A The Contractor shall maintain at the site record documents consisting of all Drawings, Specifications, addenda, approved shop drawings and samples, Revision Orders, Change Orders, instructions from the Architect, and other documents relating to the Project. All record documents shall be marked neatly and legibly by the Contractor to record all changes to the Work, field measurements, actual conditions, and adjustments made during construction.
- B Upon completion of the Work, Contractor shall transfer all record document information to a clean set of Drawing and Specifications and electronic media compatible with the Owner's software and deliver them to the Architect. CAD documents shall be in sheet format. Contractor shall provide any explanation or clarification of the record documents requested by Owner or Architect.

6.13 OPERATING AND MAINTENANCE MANUALS

Assemble and bind three (3) sets of all guarantees, certificates, warranties, operating instructions, as-built specification, and maintenance manuals into clearly organized files with an index, a list of Subcontractors and suppliers including their names, addresses, and phone numbers and present to Architect at the completion of the Work.

6.14 TRAINING OWNER'S REPRESENTATIVE

Contractor shall provide training to Owner's representative for all operating systems, features, and equipment. Training shall be sufficient to explain and demonstrate the location, function, and operation and shall be a minimum of four hours for each item of Work. Training shall be given by a person familiar with the Project. Operation and maintenance manuals must be available to the Owner prior to training and referenced during the training.

7 TIME

7.1 DEFINITION OF OFFICIAL DATES

- A The Contract Time is the period of time indicated in the Contract Documents for achieving Substantial Completion of the Work. Time is of the essence of the Contract. The term day as used in reference to this Contract shall mean calendar day unless specifically designated otherwise.
- B The Notice to Proceed shall establish the official date the Work may commence and the start of the Contract Time.
- C The date of Substantial Completion of the Work is the date established by the Architect as herein provided. A date of beneficial occupancy or acceptance may be determined but they will not have official status in the Contract.
- D The date of Final Completion is the date established by the Architect after Substantial Completion when the Work is complete in every detail. Retention may be withheld until after Final Completion.

7.2 SUBSTANTIAL COMPLETION

- A Substantial Completion is the stage in the progress of the Work when the entire Work, or a designated portion thereof acceptable to the Owner, is sufficiently complete in accordance with the Contract Documents to allow the Owner to use and occupy the entire Work or portion as intended. Prior to Substantial Completion the Contractor shall have inspected the Work, completed corrective measures, obtained all approvals necessary for occupancy, placed into operation all equipment and systems, and obtained the Architects concurrence that Substantial Completion has been achieved.

- B When the Contractor considers that the Work, or designated portion thereof acceptable to the Owner, is substantially complete, the Contractor shall provide a written notice to the Architect and Owner in which the Contractor certifies that the Work or portion is Substantially Complete, lists all deficiencies, and requests inspection and acceptance. The failure to include any items on such list does not alter the responsibility of the Contractor to complete the Work in accordance with the Contract Documents.
- C Upon receiving notice in accordance with paragraph 7.2B the Architect and/or Owner will review the Work or designated portion thereof. If the Architect determines the Work or portion is substantially complete, the Architect will establish a date of Substantial Completion. If the Architect determines the Work or portion is not Substantially Complete the Contractor will be notified. Contractor is required to initiate reinspections by providing notice in accordance with Section 7.2B and reimburse the Owner for the cost of the reinspection.
- D The guarantee period shall begin on the date of Substantial Completion. A separate date of Substantial Completion shall be established for designated portions of Work as agreed to by owner.
- E Any Work used by Contractor prior to Substantial Completion shall be made new as of the date of Substantial Completion. Such Work may include lights, filters and systems or equipment requiring periodic maintenance.

7.3 LIQUIDATED DAMAGES

- A Should the Work not be Substantially Complete, as defined herein, within the Contract Time as may be revised, damages will be sustained by the Owner. It is understood and agreed that it is or may be impracticable or extremely difficult to determine the actual amount of damages the Owner will sustain in the event of and by reason of such delay in completing the Work; and it is therefore agreed that the Contractor will pay the Owner the amount specified in the Special Provisions, as and for the Owner's liquidated damages. This amount covers Owner's damages only and is not in lieu of the indemnification obligations set forth separately at section 9 nor shall these liquidated damages cover damages, including delay damages, claimed by third parties. Third parties shall include other contractors working on the Project. In the event the Contractor fails to make such payment, the Owner may deduct the amount thereof from any money due or that may become due the Contractor under the Contract and should the balance due under the Contract not be sufficient to cover the amount owed, the Owner shall have the right to recover the balance from the Contractor, from other contracts between Contractor and Owner, or from the Contractor's sureties.
- B The Owner may allocate liquidated damages to portions of the Work. In the event the Contractor fails to complete Work remaining after Substantial Completion within the time periods established or fails to adhere to the conditions as agreed

for achieving Final Completion, liquidated damages, and third party claims shall be charged to Contractor.

7.4 USE AND OCCUPANCY PRIOR TO SUBSTANTIAL COMPLETION

- A The Contractor agrees to use and occupancy of a portion of the Work by Owner before Substantial Completion.
- B Prior to the Owner occupying a portion of the Work, a list of Work to be completed or corrected shall be prepared jointly by the Contractor and Architect.
- C Occupancy by the Owner shall not be construed by the Contractor as being an acceptance by Owner of that part of the Work to be occupied.
- D The Contractor shall not be held responsible for any damage to the occupied part of the Work resulting from the Owner's occupancy.
- E Occupancy by the Owner shall not be deemed to constitute a waiver of any claims which Owner or Contractor may have.
- F Use and occupancy of a portion of the Work by the Owner prior to Substantial Completion does not relieve the Contractor of his responsibility to maintain all insurance and bonds required under the Contract until the Work is completed and accepted by Owner.

7.5 SCHEDULE

- A Contractor shall, within two weeks of being awarded the Contract, submit to the Owner and Architect a schedule for the Work. The schedule shall be a series of tasks representing the Contractor's plan for performing the Work including all activities both on site and offsite, submittal due dates, submittal review periods, material purchasing, lead or fabrication times, a period for punchlist and corrections, final inspection and approvals, and other events or activities having an effect on the progress or completion of the Work. For each task, the schedule shall show the duration, the starting and finish dates, predecessors, successors, and the average manpower and equipment planned. The schedule shall be submitted in bar chart and pert chart format and with a separate task list showing all data in spreadsheet format. No single task on the schedule may exceed two weeks in duration.
- B The schedule shall be revised as required by the progress and conditions of the Work, change orders and all other factors that could influence the date of Substantial Completion.
- C Contractor shall post a schedule on the Project site in a location readily accessible to the Owner and Architect. The posted schedule shall be updated at least weekly by the Contractor to show actual progress. At least once a month, Contractor will

provide a written progress report to the Owner in a format approved by Owner.

- D Weather shall be allowed for in the Contractor's Schedule. Additional time will be granted for adverse weather to the extent the number of scheduled work days lost due to weather exceed: July 0, August 0, September 1, October 3, November 6, December 9, January 10, February 9, March 9, April 5, May 1, June 0.

8 PAYMENTS

8.1 CONTRACT AMOUNT

The Contract Amount as stated in the Agreement, including adjustments authorized under the terms of the Contract, is the total amount payable by the Owner to the Contractor for the complete Work.

8.2 CONTRACT AMOUNT BREAKDOWN

The Contractor shall, before the first application for payment, submit to the Architect a Contract Amount breakdown for the various parts of the Work divided into material and installation so as to facilitate payment. The payment breakdown shall be in such form as may be agreed upon by the parties and supported by such evidence as to its correctness that may be required by the Architect. The payment breakdown does not establish the value of Work for contract modifications.

8.3 PROGRESS PAYMENTS

- A The Owner shall make progress payments to the Contractor for labor and materials incorporated into the Work as called for by the Contract Documents and approved Revision Orders. Not more often than once each month and on a day of each month agreed upon between the Owner and the Contractor, the Contractor shall submit to the Owner through the Architect an application for payment consisting of a Certificate of Payment, a calculation of completed Work based on the approved payment breakdown and, if required by Owner, receipts, releases, or other evidence showing the Contractor's payments for materials, labor, Subcontractors, and any such information as the Owner may require. Payment shall not be owed if the application does not conform to these requirements.
- B Payment for materials stored on site which have not been permanently incorporated into the Work is at the discretion of the Owner. Payment for materials stored off-site, whether or not specially fabricated for the Project, can be made only when payment for such materials has been previously approved by the Owner and shown on the approved payment breakdown and such payment shall be conditional upon submission by the Contractor of a Bill of Sale in a form acceptable to the Owner or other such evidence as is required by the Owner to establish the Owner's title to such material. All materials stored off-site shall be stored in a bonded warehouse at no additional expense to the Owner.

- C The Contractor shall present the application for payment, as required herein, to the Architect for approval. Architect will review and adjust the Certificate of payment to such amount as he decides is properly due and deliver it to the Owner for payment.
- D The Owner will retain 5 percent of the amount of each payment due the Contractor until after the date of Final Completion.
- E No Certificate of Payment issued nor payment made to the Contractor nor partial or entire use of occupancy of the Work by the Owner shall be an acceptance of any Work not in accordance with the Contract Documents.
- F The Contractor shall not assign any monies due or to become due hereunder without the written consent of the Owner and of all sureties executing bonds on behalf of the Contractor in connection with this Contract.

8.4 OWNER'S FAILURE TO ISSUE PAYMENT

Should the Owner fail to issue payment for approved amounts owed under the Contract within 30 calendar days after the Architect receives the application for payment from Contractor, then the Contractor may, upon fourteen days written notice to the Owner and provided the Owner does not pay the Contractor within said fourteen days, stop Work only until Contractor receives the approved amount owed.

8.5 PAYMENTS WITHHELD

- A The Owner may withhold payment, on account of subsequently discovered information, nullify the whole or a part of any progress payment or retention payment to such extent as may be necessary to protect the Owner from loss on account of:
 - 1 Defective Work.
 - 2 Third party claims or reasonable evidence indicating probable filing of third party claims.
 - 3 Failure of the Contractor to make payments to Subcontractors or for material, labor or equipment.
 - 4 The Owner's doubt that the Work can be completed for the unpaid portion of the Contract Amount.
 - 5 Damage to another contractor's work.
 - 6 Damage to Owner's property.

- 7 Failure to pay fees in accordance with the Contract Documents.
- 8 Owner's cost of correcting deficiencies in the Work or undertaking any Work.
- 9 Liquidated damages or anticipated liquidated damages.
- 10 Any amount owed to Owner or claimed by Owner.
- 11 Contractor's failure to deliver as-built drawings, guarantees, operating manuals or other documents.
- 12 Failure by Contractor to fulfill any Contract requirement.

8.6 FINAL PAYMENT AND RETENTION PAYMENTS

- A The final payment shall be the one made in response to the 100 percent complete application for payment which will bring the total paid to the Contractor to 95 percent of the Contract Amount. Contractor's acceptance of the final payment shall constitute a waiver of all claims by Contractor except those previously made in writing.
- B The Owner is entitled to retain 5 percent of the amount of each payment due Contractor until at least 35 days after the date of recording the Notice of Completion. At that time if any Work is still not complete, the Owner may continue to withhold all retention or, at the Owners option, the Owner may pay any portion of the retention.
- C As a prerequisite to the release of retention, Contractor shall sign a Release of Liens in a form prescribed by Owner.
- D Contractor shall not be paid interest on retention.

9 INSURANCE

9.1 HOLD HARMLESS

- A To the full extent permitted by law, CONTRACTOR shall indemnify and save harmless the COUNTY, its officers, employees, and servants from all claims, suits, or actions of every name, kind, and description, brought for, or on account of: (A) injuries to or death of any person, including CONTRACTOR, its officers, employees and servants, or (B) damage to any property of any kind whatsoever and to whomsoever belonging, (C) any sanctions, penalties or claims of damages resulting from CONTRACTOR'S failure to comply with applicable laws, or (D) any other loss or cost resulting from the CONTRACTOR'S negligent or reckless acts or omissions or willful misconduct in connection with the performance of any work required of

CONTRACTOR or payments made pursuant to this Agreement, provided that this shall not apply to injuries or damage for which the COUNTY has been found in a court of competent jurisdiction to be solely liable by reason of its own negligence or willful misconduct.

- B The duty of CONTRACTOR to indemnify and save harmless as set forth herein, shall include the duty to defend as set forth in Section 2778 of the California Civil Code.
- C The obligations set forth in this section shall continue beyond the term of this Agreement as to any act or omission which occurred during or under this Agreement.

9.2 INSURANCE

- A The Contractor shall not commence Work under this Contract until all required insurance has been obtained and such insurance has been approved by the Owner. The Contractor shall furnish the Owner with Certificates of Insurance evidencing the required coverage, and there shall be a specific contractual liability endorsement extending the Contractor's coverage to include the contractual liability assumed by the Contractor pursuant to this Contract. Certificates of Insurance shall be filed with the Owner within ten (10) days after award of the Contract. These certificates shall specify or be endorsed to provide that thirty (30) days notice must be given, in writing, to the Owner of any pending change in the limits of liability or of any cancellation or modification of the policy.
- B The Contractor shall have in effect during the entire life of this Contract Workers Compensation and Employers Liability Insurance providing full statutory coverage; and in case any work is sublet, the Contractor shall require all Subcontractors similarly to provide Workers Compensation and Employers Liability Insurance to full statutory limits. In signing this Contract, the Contractor makes the following certification, required by Section 1861 of the Labor Code:

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

- C The Contractor shall take out and maintain during the life of this Contract such Bodily Injury Liability and Property Damage Liability Insurance as shall protect him and any Subcontractor performing Work covered by this Contract, from any and all Claims for damages for bodily injury, including accidental death, as well as any and all Claims for property damage including third party property damage to include coverage on property in the care, custody and control of the Contractor, and also including what are commonly known as the X, C and U exclusions (having to do with blasting, collapse, and underground property damage) which may arise from the Contractor's operations under this Contract, whether such

operations be by himself or by any Subcontractor or by anyone directly or indirectly employed by either of them. Such insurance shall be combined single limit bodily injury and property damage for each occurrence and shall not be less than the amount specified below. Such insurance shall include:

- 1 Comprehensive General Liability \$2,000,000
- 2 Motor Vehicle Liability Insurance \$1,000,000

- D The Owner and its officers, agents, employees and servants shall be named as additional insured on any such policies of insurance, which shall also contain a provision that the insurance afforded thereby to the Owner, its officers, agents, employees and servants shall be primary insurance to the full limits of liability of the policy, and that if the Owner or its officers and employees have other insurance against the loss covered by such a policy, such other insurance shall be excess insurance only.
- E The Contractor shall purchase and maintain at his expense All Risk Property Insurance, excluding Earthquake and Flood coverage, in an amount covering all work and materials in the Contract, including that of Subcontractors, in an amount equal to the Contract Amount including adjustments. Subcontractors shall be included as insureds and the Owner shall be named as a Loss Payee as its interests may appear. Said insurance shall be maintained in complete coverage throughout the duration of the Contract until the date of Substantial Completion.

9.3 FAILURE TO PROVIDE INSURANCE

If Contractor fails to provide insurance as required herein, the Owner, at its option, may take out and maintain such insurance as the Owner deems in its best interest and charge the cost thereof to the Contractor.

10 GUARANTEES

10.1 REQUIRED GUARANTEES

- A In addition to guarantees required elsewhere in the Contract Documents, the Contractor shall guarantee all of the work, and each Subcontractor shall guarantee his own Work, against defective material or faulty workmanship for a minimum of one year after the date of Substantial Completion. All guarantees must be submitted in triplicate to the Architect on the Contractor's own letterhead in the form prescribed by Owner.
- B In addition to the requirements of paragraph 10.1A, all standard manufacturer warranties shall be passed to the Owner which may extend the warranty period beyond one year.
- C In addition to the guarantees and warranties required by the Contract Documents, the Owner has all rights and remedies provided by law including those pertaining

to latent defects.

10.2 REPAIR OF GUARANTEED WORK

- A If repairs are required in connection with guaranteed Work, the Contractor shall promptly upon receipt of notice from the Owner, and without expense to the Owner:
- 1 Place in satisfactory condition in every detail all of such guaranteed Work;
 - 2 Make good all damage to the building, site, equipment, furniture, or contents which, in the opinion of the Owner, is the result of work not in accordance with the terms of the Contract Documents or disturbed in the process of correcting guaranteed Work.
- B If the Contractor disturbs any work guaranteed under another contract in fulfilling the requirements herein he shall restore such disturbed work to a condition satisfactory to the Owner and guarantee such restored work to the same extent as it was guaranteed under such other contract.
- C A new full term guarantee period shall apply to repaired work upon completion of repairs.
- D If Contractor fails to proceed to comply with the terms of the guarantee or make repairs of defective work within 7 days of Notice from Owner, the Owner may remedy the Contractor's failure by whatever means the Owner deems expedient. The Owner may, at any time, take measures to mitigate damage or reduce undesirable effects of defective work. All costs expended by Owner pursuant to this Section shall be paid by Contractor.

+ + END OF GENERAL CONDITIONS + +

**SAN MATEO COUNTY SUPPLEMENTARY GENERAL CONDITIONS
EQUAL EMPLOYMENT OPPORTUNITY (EEO) PROGRAM FOR MINORITY
EMPLOYMENT**

1 STATEMENT OF INTENT

It is the intent of the Board of Supervisors of the County of San Mateo to prohibit and eliminate employment discrimination and to further the opportunities for minority persons to be gainfully employed in the performance of County building contracts. The Bidder's attention is directed to all the provisions set forth herein. The Board of Supervisors has by Ordinance No. 2174 added Title 2, Chapter 2.50 to Division II of the San Mateo County Ordinance Code prohibiting discrimination in employment and providing for an Equal Employment Opportunity Program by Contractors doing business with the County of San Mateo. The following provisions are a part of the contract documents.

2 LOWEST RESPONSIBLE BIDDER

Award of contract to the low bidder shall not be made until the requirements set forth in these Supplementary General Conditions have been complied with and reviewed by the County Compliance Officer and a satisfactory Equal Employment Opportunity Program as submitted by the low bidder has been accepted.

A Criteria for Determining Lowest Bidder. Criteria to determine the acceptability of bids on construction contracts requiring public bidding and involving an expenditure of \$6,500 or more shall include but not be limited to the following:

- 1 Criteria of Compliance with Federal and State Laws. Each bidder shall submit with his bid a certification that he is in compliance with the Equal Employment Opportunity Requirement of Executive Order 11246, Title VII of the Civil Rights Act of 1973, the California Fair Employment Practices Act and any other Federal or State Laws and regulations relating to Equal Employment Opportunities and the provisions of this article and the Board established guidelines implementing them. See report form entitled "Certification of Compliance with Laws Prohibiting Discrimination" bound herein after Form of Proposal.
- 2 Certification of Intent to Develop and Implement an Equal Employment Opportunity Program. Each bidder shall submit with his bid a certification that he will develop, implement and maintain, during the course of work concerned, an affirmative action program in employment conducted without regard to race, religion, color, national origin, ancestry, physical or mental disability, or sex of the

applicants. With this certification he shall submit any and all information which may be required by the County in connection with this program. As used in this Article, the term "minority" or "minority group" pertains to Latinos, Asians and Pacific Islanders, African Americans, American Indians, and women (regardless of her race or ethnicity). See report form entitled "Certification of Intent" bound herein after Form of Proposal.

- 3 Compliance by Subcontractors. The provision of this Section apply to any subcontractor engaged by the successful bidder, and each successful bidder shall notify his subcontractors of their obligations under the provisions of this Section.

3 PENALTIES FOR NON-COMPLIANCE WITH THE PROVISIONS OF THIS SECTION

- A Any bidder who fails to submit a proposed Equal Employment Opportunity Program or who is unable to make the certifications required in this Section of the Supplementary General Conditions may be disqualified from consideration for the award of the contract.
- B If, after an award is made, the Contractor is found by the County or by a Federal or State agency empowered to make such findings to be in substantial or material violation of the Fair Employment Practices Act of the State of California, the Equal Employment Opportunity Requirement of Executive Order 11246, Title VII of the Civil Rights Act of 1964, Section 503 of the Rehabilitation Act of 1973, or of the provisions of this Section, he may be found to be in material breach of his contract, and the County shall have the power to cancel the contract in whole or in part, or alternatively, to deduct for each working day during which the Contractor is found to have been in such non-compliance, two (2) percent of the total amount payable to the Contractor.

4 WAIVER OF COMPLIANCE

In the event that the requirements of this ordinance are found to work an undue hardship upon a low bidder, said bidder shall submit evidence of such hardship to the Board of Supervisors and shall petition the Board for a waiver of these requirements. This waiver shall only be granted by the Board of Supervisors and shall become an integral part of the contract.

5 DEFINITIONS

- A Equal Employment Opportunity Program. Equal Employment Opportunity Program is a set of specific and result oriented procedures to which a

Contractor commits himself in order to achieve equal employment opportunity.

- B Compliance Officer. A Compliance Officer is the County official designated by the County Manager to represent him in the administration of these guidelines and in the enforcement of the provisions of Title 2, Chapter 2.50 of the County Ordinance Code.

6 CERTIFICATION OF COMPLIANCE AND INTENT

Every bidder shall submit with his bid a Certificate of Compliance with laws prohibiting discrimination and a Certification of Intent to implement an equal employment opportunity program on a form furnished by the County, as required by Title 2, Chapter 2.50 of the County Ordinance Code.

7 EQUAL EMPLOYMENT OPPORTUNITY PROGRAM

In addition to furnishing the Certification of Compliance, each Contractor will submit his Equal Employment Opportunity Program with his bid.

The EEO shall contain the following information:

- A Analysis of current work force:
 - 1 Total number of employees
 - 2 Numerical racial breakdown of employees by job classification
 - 3 Information on apprentices

These figures will provide the base by which the Contractor's EEO will be evaluated. Factors to be considered both in the original statistics and in any plans for future employment will include the percentage of minority population in San Mateo County, the availability of minority construction workers and the present minority representation in the various construction trades.

- B The equal employment opportunity actions the Contractor has taken or will take to insure equal employment opportunity. These shall include:
 - 1 Recruiting and hiring minority persons. If non-union personnel are employed this would involve employment advertising through sources which serve areas of minority population. These include local minority newspapers, referral agencies, high schools, vocational schools, and community groups. Specific information on these sources may be obtained from the Compliance Officer. Union employees will be recruited in accordance with applicable

labor agreements. The Contractor will seek to have included or will reaffirm clauses in all labor agreements prohibiting discrimination based on race, religion, color, national origin, age, ancestry, physical or mental handicap, or sex. Assistance for admission into the craft of minorities over the traditional apprenticeship age is also suggested. The Contractor will support Bay Area Construction Opportunity Program or similar groups as recruiting sources and will urge all labor organizations with which he has agreements to use BACOP.

- 2 Providing adequate opportunity for the upgrading or further training of all employees to insure equal opportunity in advancement and promotion. This might include a counseling service, information and assistance with night classes, or special career-directed program information.
- 3 Appointing an Equal Employment Opportunity Coordinator - full time or as an additional duty. He will have the responsibility of administering an active program, informing company personnel and union representatives of this company policy and advising all subcontractors of their obligation to this program.
- 4 Establishing or maintaining an apprenticeship or training program designed to insure hiring of additional minority employees in the journeyman or skilled classes, if possible. The Contractor is urged to support the Joint Apprenticeship Committee on this trade.
- 5 Selecting minority subcontractor or subcontractors who are known for their ongoing program of apprenticeship for minorities. This includes advising minority contractor associations of bids for subcontractors. Joint ventures with minority subcontractors are encouraged.

- C. The EEO should state any previous experience the Contractor has had with similar plans and result of that effort. Any current equal employment opportunity plans should be described in detail and a copy attached, if printed plan is available. The Compliance Office will review the EEO submitted by each bidder in order to determine whether the program submitted complies with Title 2, Chapter 2.50 of the County Ordinance Code and these guidelines.

The EEO as submitted will be kept on file by the Compliance Officer. If the Contractor bids for other county contracts, he may refer to the EEO on file and state any changes, but will not be required to refile his program.

The Compliance Officer may request additional information from the bidder and will be available to answer questions relative to the guidelines and to advise those seeking assistance of resources known to him. He will not be responsible for the service or lack of service rendered by the resources recommended, nor will he develop an EEO for any bidder, or serve as a recruiter for any bidder.

Bidders may revise their EEO after consultation prior to award of contract. Deficiencies will be discussed and appropriate remedies suggested. If bidders withdraw their EEO for revision, their revised program must be submitted by a date established by the Compliance Officer.

The Compliance Officer will determine whether the low bidder's EEO is acceptable and will report to the appropriate county department. The EEO's of each subcontractor of the low bidder will also be evaluated by the Compliance Officer.

8 INCLUSION OF EEO AND CERTIFICATIONS

Upon award of the contract by the Board of Supervisors, the EEO and Certifications for the prime contractor and all subcontractors, which have been approved and accepted by the County, will become an integral part of the contract and subject to the provisions thereof.

9 PERFORMANCE OF CONTRACTOR

- A The Contractor will post, in conspicuous places available to employees and applicants for employment, notices to be provided by the County, stating that the Contractor is obliged to comply with the provisions of these guidelines and Title 2, Chapter 2.50 of the County Ordinance Code. These notices will also be sent to all union and employee organizations and other recruiting sources providing employees to the Contractor.
- B All announcements of job openings will include the statement: "An Equal Opportunity Employer".
- C The Contractor will make written Progress Reports on a form provided by the County to illustrate the effectiveness of his EEO at intervals established by the County.
- D The Compliance Officer will monitor the performance of the EEO until completion of the contract and will report the progress of the Contractor in living up to his EEO to the County Manager.
- E The Contractor shall permit, during Contractor's normal business hours and at Contractor's place of business, access by the County to his records of employment, employment advertisements, application forms and other

data and records pertaining to Contractor's employment practices, for the purpose of determining whether Contractor is complying with the Non-Discrimination and Equal Employment Opportunity rules of the County.

10 PERFORMANCE OF SUBCONTRACTORS

- A All subcontractors listed in a general Contractor's bid are subject to all the provisions of these guidelines and Title 2, Chapter 2.50 of the County Ordinance Code.
- B All subcontractors will file their Certifications of Compliance and Intent and their EEO with the Equal Employment Coordinator of the prime Contractor for transmittal to the County, after award of the contract has been made.

EQUAL BENEFITS COMPLIANCE ORDINANCE NO. 4324, CHAPTER 2.84

2.84.010 Definitions

For the purposes of this chapter:

- (a) "Contract" means a legal agreement between the County and a Contractor for public works, consulting, or other services, or for purchase of supplies, material or equipment for which the consideration is in excess of \$5,000.
- (b) "Contractor" means a party who enters into a Contract with the County.
- (c) "Contract Awarding Authority" means the Board of Supervisors or the individual authorized by the Board of Supervisors to enter into Contracts on behalf of the County.
- (d) "Domestic Partner" means any person who is registered as a domestic partner with the Secretary of State, State of California registry or the registry of the state in which the employee is a resident.
- (e) "Employee Benefits" means the provision of any benefit other than pension and retirement benefits provided to spouses of employees or provided to an employee on account of the employee's having a spouse, including but not limited to bereavement leave; disability, life, and other types of insurance; family medical leave; health benefits; membership or membership discounts; moving expenses; vacation; travel benefits; and any other benefits given to employees, provided that it does not include benefits to the extent that the application of the requirements of this chapter to such benefits may be preempted by federal or state law. (Ord. 4324, 08/15/06)

2.84.020 Discrimination in the provision of benefits prohibited

(a) No Contractor on a County Contract shall discriminate in the provision of Employee Benefits between an employee with a domestic partner and an employee with a spouse, subject to the following conditions:

1. In the event that the Contractor's actual cost of providing a particular benefit for the domestic partner of an employee exceeds that of providing it for the spouse of an employee, or the Contractor's actual cost of providing a particular benefit to the spouse of an employee exceeds that of providing it for the domestic partner of an employee, the Contractor shall not be deemed to discriminate in the provision of Employee Benefits if the Contractor conditions providing such benefit upon the employee's agreement to pay the excess costs.
2. The Contractor shall not be deemed to discriminate in the provision of Employee Benefits if, despite taking reasonable measures to do so, the Contractor is unable to extend a particular employee benefit to domestic partners, so long as the Contractor provides the employee with a cash payment equal to the Contractor's cost of providing the benefit to an employee's spouse.

(b) The Board of Supervisors may waive the requirements of this Chapter when it determines that it is in the best interests of the County. The County Manager may waive the requirements of this chapter for Contracts not needing the approval of the Board of Supervisors where waiver would be in the best interests of the County for such reasons as follows:

1. Award of a Contract or amendment is necessary to respond to an emergency;

2. The Contractor is a sole source;
 3. No compliant Contractors are capable of providing goods or services that respond to the County's requirements;
 4. The requirements are inconsistent with a grant, subvention or agreement with a public agency;
 5. The County is purchasing through a cooperative or joint purchasing agreement.
- (c) Contractors should submit requests for waivers of the terms of this Chapter to the Contract Awarding Authority for that Contract, or in the case of Contracts approved by the Board, the County Manager.
- (d) The Contract Awarding Authority, or in the case of Contracts approved by the Board, the County Manager, may reject an entity's bid or proposals, or terminate a Contract, if the Contract Awarding Authority determines that the entity was set up, or is being used, for the purpose of evading the intent of this Chapter.
- (e) No Contract Awarding Authority shall execute a Contract with a Contractor unless such Contractor has agreed that the Contractor will not discriminate in the provision of Employee Benefits as provided for in this Chapter. (Ord. 4324, 08/15/06)

2.84.030 Application of Chapter

The requirements of this Chapter shall only apply to those portions of a Contractor's operations that occur (a) within the County; (b) on real property outside of the County if the property is owned by the County or if the County has a right to occupy the property, and if the Contractor's presence at that location is connected to a Contract with the County; and (c) elsewhere in the United States where work related to a County Contract is being performed. The requirements of this Chapter shall not apply to subcontracts or subcontractors of any contract or Contractor. (Ord. 4324, 08/15/06)

2.84.040 Powers and duties of the County Manager

The County Manager's office shall have the authority to:

- (a) Adopt rules and regulations, in accordance with this Chapter and the Ordinance Code of the County of San Mateo, establishing standards and procedures for effectively carrying out this Chapter.
- (b) Receive notification from employees of Contractors regarding violations of this Chapter.
- (c) Determine and recommend to the Board of Supervisors for final decision the imposition of appropriate sanctions for violation of this Chapter by Contractors including, but not limited to:
 1. Disqualification of the Contractor from bidding on or being awarded a County contract for a period of up to 5 years; and;
 2. Contractual remedies, including, but not limited to termination of contract;
 3. Liquidated damages in the amount of \$2,500;
- (d) Examine Contractors' benefit programs covered by this chapter;
- (e) Impose other appropriate contractual and civil remedies and sanctions for violations of this chapter;
- (f) Allow for remedial action after a finding of non-compliance, as specified by rule;

(g) Perform such other duties as may be required or which are necessary to implement the purposes of this Chapter. (Ord. 4324, 08/15/06)

2.84.050 Date of Application

The provisions of this Chapter shall apply to any Contract awarded or amended on or after July 01, 2001, provided that if the Contractor is then signatory to a collective bargaining agreement, this Chapter shall only apply to any Contract with that Contractor which is awarded or amended after the effective date of the next collective bargaining agreement. (Ord. 4324, 08/15/06)

CONTRACTOR EMPLOYEE JURY SERVICE ORDINANCE NO. 4324, CHAPTER 2.85

2.85.010 Definitions

For the purposes of this chapter:

(a) "Contract" means a legal agreement between the county and a contractor for public works, consulting, or other services, or for purchase of supplies, material or equipment.

(b) "Contractor" means a party who enters into a contract with the county for which the contractor receives consideration of \$100,000 or more.

(c) "Contract Authority" means the Board of Supervisors or the head of the department or agency presenting the proposed contract to the Board of Supervisors.

(d) "Employee" means any California resident who is a full-time employee of a contractor under the laws of California.

(e) "Full time" means 40 hours or more worked per week, or a lesser number of hours if (1) the lesser number is a recognized industry standard as determined by the County Manager, or (2) the contractor has a long standing practice that defines the lesser number of hours as full time. (Ord. 4324, 08/15/06)

2.85.020 Contractor Jury Service Policy

(a) A contractor shall have and adhere to a written policy that provides that its employees shall receive from the contractor, on an annual basis, no less than five days of regular pay for actual jury service in San Mateo County. The policy may provide that employees deposit any fees received for such jury service with the contractor or that the contractor deduct from the employees' regular pay the fees received for jury service.

(b) At the time of seeking a contract, a contractor shall certify to the county that it has and adheres to a policy consistent with this chapter or will have and adhere to such a policy prior to award of the contract.

(c) The Board of Supervisors may waive the requirements of this chapter when it determines that it is in the best interests of the County for such reasons as follows:

1. Award of a Contract or amendment is necessary to respond to an emergency;
2. The Contractor is a sole source;
3. No compliant Contractors are capable of providing goods or services that respond to the County's requirements;
4. The requirements are inconsistent with a grant, subvention or agreement with a public agency;
5. The County is purchasing through a cooperative or joint purchasing agreement.

(d) Contractors should submit requests for waivers of the terms of this chapter to the Contract Authority or the County Manager.

(e) The County Manager may reject a contractor's bid or proposal, or terminate a contract, if he determines that the contractor is in violation of the requirements of this chapter or was established, or is being used, for the purpose of evading the intent of this chapter.

(f) No contract shall be executed with a contractor unless such contractor is in compliance with this chapter. (Ord. 4324, 08/15/06)

2.85.030 Powers and duties of the County Manager

The County Manager's office shall have the authority to:

- (a) Adopt rules and regulations, in accordance with this chapter and the Ordinance Code of the County of San Mateo, establishing standards and procedures for effectively carrying out this chapter;
- (b) Receive notification from employees of contractors regarding violations of this chapter;
- (c) Determine and recommend to the Board of Supervisors for final decision the imposition of appropriate sanctions for violation of this chapter by contractors including, but not limited to:
 1. Disqualification of the contractor from bidding on or being awarded a County contract for a period of up to 5 years, and
 2. Contractual remedies, including, but not limited to termination of contract.
- (d) Impose other appropriate contractual sanctions for violations of this chapter;
- (e) Allow for remedial action after a finding of noncompliance.
- (g) Perform such other duties as may be required or which are necessary to implement the purposes of this chapter. (Ord. 4324, 08/15/06)

2.85.040 Date of Application

The provisions of this chapter shall apply to any contract awarded or amended on or after September 01, 2005, provided that if the contractor is then signatory to a collective bargaining agreement, this chapter shall only apply to any contract with that contractor which is awarded or amended after the effective date of the next collective bargaining agreement. (Ord. 4324, 08/15/06)

RECYCLING AND DIVERSION OF DEBRIS FROM CONSTRUCTION AND
DEMOLITION ORDINANCE NO. 4099, CHAPTER 4.105

4.105.010 Definitions

For purposes of this chapter, the following definitions apply:

(a) "Construction and demolition debris" means and includes:

1. Discarded materials generally considered to be not water soluble and non-hazardous in nature, including but not limited to steel, copper, aluminum, glass, brick, concrete, asphalt material, pipe, gypsum, wallboard, and lumber from the construction or destruction of a structure as part of a construction or demolition project or from the renovation of a structure and/or landscaping, including rocks, soils, tree remains, trees, and other vegetative matter that normally results from land clearing, landscaping and development operations for a construction project;
2. Remnants of new materials, including but not limited to: cardboard, paper, plastic, wood, and metal scraps from any construction and/or landscape project.

(b) "Contractor" means any person or entity holding, or required to hold, a contractor's license of any type under the laws of the State of California, or who performs (whether as contractor, subcontractor, owner-builder, or otherwise) any construction, demolition, remodeling, renovation, or landscaping service relating to buildings or accessory structures in the unincorporated area of San Mateo County.

(c) "Covered Project" means and includes any project which consists of one or more of the following:

1. Demolition work only, where the cost of the work exceeds \$5,000 as determined by the Building Official;
2. The renovation, remodel or addition to an existing structure, or the construction of a new structure where the cost of the work exceeds \$250,000, as determined by the Building Official;
3. Commercial, residential or multi-family residential development, and any new structure that is equal to or greater than 2,000 square feet.

(d) "Designated recyclable and reusable materials" means and includes:

1. Inert solids
2. Wood materials, including any and all dimensional lumber, fencing or construction wood that is not chemically treated, creosoted, CCA pressure treated, contaminated or painted;
3. Vegetative materials, including trees, tree parts, shrubs, stumps, logs, brush or any other type of plants that are cleared from a site for construction or other use;
4. Metals, including all metal scrap such as, but not limited to, pipes, siding, window frames, door frames and fences;
5. Roofing materials including wood shingles and shakes as well as asphalt, stone and slate based roofing material;
6. Salvageable materials and structures, including, but not limited to doors, windows, fixtures, hardwood flooring, sinks, bathtubs and appliances;
7. Any other materials that the Building Official determines can be diverted due to the identification of a recycling facility, reuse facility, or market accessible from the

County.

(e) "Inert solids" includes asphalt, concrete, rock, stone, brick, sand, soil and fines;

(f) "Salvage" means the controlled removal of materials from a covered project, for the purpose of reuse or storage for later reuse;

(g) "Structure" means anything constructed or erected. (Ord. 4099, 02/26/02)

4.105.020 Deconstruction and salvage and recovery

(a) Contractors are encouraged to make every structure planned for demolition available for deconstruction, salvage, and recovery prior to demolition; and to recover the maximum feasible amount of salvageable designated recyclable and reusable materials prior to demolition.

(b) Recovered and salvaged designated recyclable and reusable materials from the deconstruction phase shall be counted towards the diversion requirements of this chapter. (Ord. 4099, 02/26/02)

4.105.030 Diversion requirements

(a) One hundred percent (100%) of inert solids, and at least fifty percent (50%) of the remaining construction and demolition debris tonnage shall be diverted.

(b) For each covered project, the diversion requirements of this chapter shall be met by submitting and following a Waste Management Plan that includes the following:

1. Deconstructing and salvaging all or part of the structure as practicable. AND

2. Directing one hundred percent (100%) of inert solids to reuse or recycling facilities approved by the County. AND

3. Either

a. Taking all mixed construction and demolition debris to the Mixed Construction and Demolition Debris Recycling facilities approved by the County and taking all sorted or crushed construction and demolition debris to approved facilities. OR

b. Source separating non-inert materials, such as cardboard and paper, wood, metals, green waste, new gypsum wallboard, tile, porcelain fixtures, and other easily recycled materials, and directing them to recycling facilities approved by the County and taking the remainder (but no more than 50% by weight or yardage) to a facility for disposal. In this option, calculations must be provided to show that 50% of construction and demolition debris (in addition to 100% of inert solids) has been diverted. (Ord. 4099, 02/26/02)

4.105.040 Information required before issuance of permit.

Every contractor shall submit a properly completed "Waste Management Plan," on a form prescribed by the County, as an integral part of the building or demolition permit application process for a covered project. The Waste Management Plan shall indicate the intended salvage, reuse, and recycling facilities, chosen from a list of facilities approved by the County, for all construction and/or demolition debris from the project. Approval of alternative facilities or special salvage or

reuse options may be requested of the Building Official. Approval by the Building Official, or designee, of the Waste Management Plan as complying with this chapter shall be a condition precedent to the issuance of any building or demolition permit for a covered project. (Ord. 4099, 02/26/02)

4.105.050 Administrative fee

As a condition precedent to the issuance of any building or demolition permit for a covered project, the applicant shall pay to the County a fee as established by resolution to compensate the County for all expenses incurred in administering this chapter. (Ord. 4099, 02/26/02)

4.105.060 Reporting

(a) No later than thirty (30) days following the completion of a demolition project or construction project, the contractor shall, as a condition of final approval and for issuance of any certificate of occupancy, submit documentation to the County that demonstrates compliance with the requirements of this chapter.

(b) The documentation shall consist of photocopies of receipts and weight tags or other records of measurement or equivalent documentation from recycling companies, deconstruction contractors, and landfill and disposal companies. The contractor's approved "Waste Management Plan" shall be completed by recording and confirming the type of debris diverted and the facilities to which it was taken. The contractor shall sign the completed "Waste Management Plan" form to certify its accuracy as part of the documentation of compliance.

(c) Progress reports during construction may be required.

(d) All documentation submitted pursuant to this section is subject to verification by the County.

(e) It is unlawful for any person to submit documentation to the County under this section which that person knows to contain any false statements, including but not limited to false statements regarding tonnage of materials recycled or diverted, or to submit any false or fraudulent receipt or weight tag or other record of measurement. (Ord. 4099, 02/26/02)

4.105.070 Penalties and enforcement

(a) Each violation of the provisions of this chapter shall constitute a misdemeanor, and shall be punishable by imprisonment in the county jail for up to six (6) months, or by a fine of up to one thousand dollars (\$1,000), or both. Each day that a violation continues shall be deemed a new and separate offense.

(b) The Building Official shall have the authority to enforce this chapter as specified in section 9021 of the San Mateo County Building Regulations, including but not limited to the authority to order that work be stopped where any work is being done contrary to the provisions of this chapter. (Ord. 4099, 02/26/02)

SPECIAL PROVISIONS

(PROJECT NAME)
(PROJECT ADDRESS)
(PROJECT NUMBER)

These Special Provisions are part of the Contract Documents and will govern over specific inconsistencies with the General Conditions.

1. CONTRACT TIME: The Contract Time is (WORDS & NUMBERS) calendar days.
2. SCHEDULE: Contractor's attention is directed to the Contract Time and the requirement to achieve substantial completion within said time period.
3. LIQUIDATED DAMAGES: Liquidated damages are \$500 per calendar day.
4. PERMITS: All work is subject to inspection and acceptance of authority having jurisdiction.

PROPOSAL

To the County of San Mateo
State of California

Bid Opening Date: (DATE)

(PROJECT NAME, PROJECT ADDRESS, PROJECT NUMBER)

1. SCOPE OF BIDS – The undersigned, doing business under the name of

declares that the only persons or parties interested in this Proposal as Principals are those named herein; that this Proposal is made without collusion with any other person, firm or corporation; that he has carefully examined the location of the proposed Work, the annexed proposed form of Agreement, and the Contract Documents therein referred to; that he proposes, and agrees if this Proposal is accepted, that he will contract with the County of San Mateo, in the form of the copy of the Agreement annexed hereto, and do all the Work and furnish all the materials specified in the Contract Documents for the following amount(s). The base bid, unit price bids, alternate bids, allowances, as applicable, shall include all labor, materials, equipment, supervision, overhead, profit, and incidentals necessary to complete the Work in accordance with the Contract Documents. The Base Bid will be used to determine the low bidder.

2. BASE BID – Base bids shall include all Work shown in the Contract Documents. Show base bid in words and numbers. The base bid is the initial contract amount.

_____ Dollars

(\$ _____)

(Optional, add as required for each individual project)

3. UNIT PRICES: Not used

A unit price shall be quoted for each of the following items of work in accordance with the specifications. Unit Prices shall apply to Work added to or deducted from the contract by Change Order. Unit Prices will not apply to work shown on the drawings unless specifically called out to be paid by a unit price. The quantities of unit price work shown are not estimates of work to be performed but are only used to determine the Bid Total.

(Optional, add as required for each individual project)

4. ALLOWANCES: Not used

(Optional, add as required for each individual project)

5. ALTERNATES: Not used

An alternate price shall be quoted for each of the following items of work in accordance with the specifications. Alternate bids maybe accepted at any time during the construction period as authorized by a change order.

a. Additive Alternate Bid 1: ADD all material and labor costs to _____

Dollars
(\$_____)

6. CONTRACT – If written notice of the acceptance of this bid is mailed or delivered to the undersigned within ninety (90) calendar days after the date of opening of the bids, or any time thereafter before the bid is withdrawn, the undersigned will, within ten (10) calendar days after the date of such mailing or delivering of such notice, execute and deliver a contract in the Form of Agreement present in these Contract Documents and give Payment and Performance Bonds in the form provided in these Contract Documents. The undersigned designates the address provided in Section 14 of this proposal to be the office to which such notice of acceptance may be mailed or delivered.

7. TIME OF COMPLETION – We propose, if awarded the Contract, to complete this entire work within Contract Time specified in the Special Provisions.

8. BONDS – The undersigned agrees, if awarded the Contract to execute within ten days, two corporate surety bonds as called for in the “Instruction to Bidders”.

9. INSURANCE – Our Public Liability and Property Damage Insurance is placed with:

Our Workers Compensation Insurance is placed with:

(Optional, add as required for each individual project)

Our All Risk Property Insurance is placed with

10. ADDENDA – Addenda bound with Contract Documents or issued during the time of bidding, are to be included in the proposal, and in the Contractor's Work.

11. ADDENDA RECEIPT – The receipt of the following addenda is acknowledged:

Proposal

File: F:\Users\Capital Projects\PM Folders\Johnny\PC019 - Maple Street Homeless Shelter\Drawings\012 Proposal Updated V1 2122015.doc V.1.Updated 02.12.2015

ADDENDUM NO. _____ DATE _____

ADDENDUM NO. _____ DATE _____

ADDENDUM NO. _____ DATE _____

12. This bid may be withdrawn at any time prior to the scheduled time for the opening of bids or any authorized postponement thereof.

13. **CONTRACTOR'S LICENSE** – The undersigned agrees, if awarded the contract, to maintain and keep current through the completion of the contract the valid licenses for the work to be performed as required by the California Contractors License Law and all other applicable licensing requirements.

License No.	License Class	Expiration Date
-------------	---------------	-----------------

14. By the signature below, the bidder certifies, under penalty of perjury, the accuracy of the representations made in this Proposal.

Dated _____, 20_____.

Company
Business Type _____Corporation _____Partnership _____Sole Proprietorship

State of Incorporation of Location of Business Registration_____

Signed _____

Title_____

Print Name_____

Address_____

Phone:_____ Fax:_____

Tax I.D. No. _____

NOTE: If Bidder is a partnership, give full names of all partners.

15. DESIGNATION OF SUBCONTRACTORS – In compliance with the provisions of Secs. 4100-4108 of the Public Contracts Code of the State of California, and any amendments thereof, each bidder shall set forth below the name and the location of the mill, shop, or office of each subcontractor who will perform work or labor or render service to the Contractor in or about the construction of the Work in an amount in excess of one-half of one percent of the Contractor's bid to Owner.

Reference: Notice to Contractor regarding State Senate Bill SB 854

DESIGNATION OF SUBCONTRACTORS - Please List All Subcontractor's

List subcontractor's, name, address location and license.

Attach additional pages as necessary. Indicate none or number or pages attached
_____ pages attached

Proposal

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NONCOLLUSION DECLARATION
(To Be Executed By Bidder and Submitted With Bid)

Project: (PROJECT NAME, PROJECT ADDRESS, PROJECT NUMBER)

The undersigned declares:

I am the _____ of _____, the party making the foregoing bid. The bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation. The bid is genuine and not collusive or sham. The bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid. The bidder has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or to refrain from bidding. The bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder. All statements contained in the bid are true. The bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof, to effectuate a collusive or sham bid, and has not paid, and will not pay, any person or entity for such purpose.

Any person executing this declaration on behalf of a bidder that is a corporation, partnership, joint venture, limited liability company, limited liability partnership, or any other entity, hereby represents that he or she has full power to execute, and does execute, this declaration on behalf of the bidder.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct and that this declaration is executed on _____date], at _____city], _____state]."

Signature

Title

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned,

_____, as Principal and

_____, as Surety, are hereby held and firmly bound unto the County of San Mateo in the State of California, as represented by the County Board of Supervisors, hereinafter called the "Owner" in the sum of

_____ Dollars (\$_____)

for payment of which sum, well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors, and assigns.

The condition of the above obligation is such that, whereas the Principal has submitted to the Owner a certain Bid, attached hereto and hereby made a part hereof, to enter into a contract in writing for (PROJECT NAME, PROJECT ADDRESS, PROJECT NUMBER) in strict accordance with contract documents.

NOW, THEREFORE,

a. If said Bid shall be rejected, or, in alternate

b. If said Bid shall be accepted and the Principal shall execute and deliver a contract in the Form of Agreement attached hereto and shall execute and deliver Performance and Payment Bonds in the Forms attached hereto (all properly completed in accordance with said Bid), and shall in all other respects perform the agreement created by the Acceptance of said Bid.

Then, this obligation shall be void; otherwise, the same shall remain in force and effect, it being expressly understood and agreed that the liability of the Surety for any and all default of the Principal hereunder shall be the amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligation of said Surety and its bond shall be in no way affected or impaired by any extension of the time within which the Owner may accept such Bid, and said Surety does hereby waive notice of such extension.

IN WITNESS WHEREOF, the above-bounden parties have executed this

instrument under their several seals this _____ day of _____, 20____, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

In presence of:

(Individual Principal) (Seal)

(Business Address)

Attest:

(Corporate Principal)

(Business Address

By _____ (Affix
Corporate
Seal)

Attest:

(Corporate Surety)

(Business Address)

By _____ (Affix
Corporate
Seal)

The rate or premium on this bond is _____ per thousand.

Total amount of premium charge, \$ _____
(The above must be filled in by Corporate Surety.)

EQUAL EMPLOYMENT OPPORTUNITY PROGRAM
QUESTIONNAIRE

THIS QUESTIONNAIRE MUST BE COMPLETED IN FULL BY AN OFFICIAL OF THE
COMPANY AND SUBMITTED WITH THE BID

Project: (PROJECT NAME, PROJECT ADDRESS, PROJECT NUMBER)

Company Name: _____

Name of Company Official: _____

Phone: _____ Date: _____

1. Yes No Have you read and are you acquainted with the Equal Employment Opportunity Requirement of Executive Order 11246, Title VII of the Civil Rights Act of 1964, Section 503 of the Rehabilitation Act of 1973, the California Fair Employment Practices Act and Title 2, Chapter 2.50 of the San Mateo County Ordinance Code?

2. Yes No Is it the policy of your company to recruit, hire, train, upgrade, transfer, compensate, and discharge without regard to race, religion, color, national origin, age, ancestry, physical or mental disability, sexual orientation, or sex?

3. Yes No Have you appointed an Equal Employment Opportunity Officer? Give his name, position in the company, office address, and phone number.

4. Yes No Does your employment advertising state that you are an Equal Opportunity Employer?

5. Yes No Have all recruitment sources been advised that all qualified applicants will be considered for employment without regard to race, religion, color, national origin, age, ancestry, physical or mental disability, sexual orientation, or sex?

6. Yes No Were any employees hired by means other than the union hiring hall in the past year?
How many? _____
What positions? _____

7. If non-union personnel are employed by the company, or if a position cannot be filled by the union hall, specify the advertisement and recruitment sources that are used. (For example, State HRD, newspapers, high schools, vocational schools, referral agencies/organizations, community groups).

8. How many apprentices do you employ? _____
How many of these are minorities? _____

9. Yes No Do you have a program for upgrading and counseling present employees?
Describe: _____

10. Yes No Do you have a collective bargaining agreement with a labor union or other organization?
Please list these groups: _____

11. What percentage of your work force is covered by union agreement? _____

12. Yes No Have you advised the labor union and/or worker organization of your company's responsibility under the Equal Employment Opportunity Program?
13. Yes No Does your company's collective bargaining agreement include a provision for non-discrimination in employment?
14. Yes No Have you notified all subcontractors submitting bids to you that they will be subject to the same minority employment requirements should you be the successful bidder?

15. Describe any previous experience with Equal Employment Opportunity Programs:

16. State what Equal Employment Opportunity Program you plan to take in connection with this project:

If your company has a written Equal Employment Opportunity Program now in effect, please attach a copy of it.

CERTIFICATION OF COMPLIANCE
WITH LAWS PROHIBITING DISCRIMINATION

We are in compliance with the Equal Employment Opportunity Requirement of Executive Order 11246, Title VII of the Civil Rights Act of 1964, the California Fair Employment Practices Act, Section 503 of the Rehabilitation Act of 1973, and any other federal or state laws relating to equal employment opportunity and the provisions of Title 2, Chapter 2.50 of the San Mateo County Ordinance Code and the Board established guidelines implementing them.

We will not discriminate against any employee or applicant for employment based on race, religion, color, national origin, age, ancestry, physical or mental disability, sexual orientation, or sex. This pertains to the areas of recruitment, hiring, training, upgrading, transfer, compensation, and termination.

CERTIFICATION OF INTENT

We will develop and implement, during the course of the work concerned, an Equal Employment Opportunity Program of hiring and employment conducted without regard to race, religion, color, national origin, age, ancestry, physical or mental disability, sexual orientation, or sex of the applicants. With this certification we shall submit any and all information which may be required by the County in connection with this program.

Signature and Title of Authorized Representative

Date _____

EQUAL EMPLOYMENT OPPORTUNITY PROGRAM
CONTRACTOR REPORT FORM

THIS REPORT MUST BE COMPLETED IN FULL AND SUBMITTED WITH THE BID

Project: (PROJECT NAME, PROJECT ADDRESS, PROJECT NUMBER)

Company Name: _____

Date: _____

RACIAL/ETHNIC MAKEUP OF THE COMPANY

Be sure to include the total of all employees in each classification in the first column, not just minorities. Report the number of employees enrolled in formal on-the-job (apprenticeship) training programs in parenthesis () for each classification.

Minority Employees										
Job Classification	Total All Employees	Ethnicity								
		American- Indian or Native Alaskan	Asian	Native Hawaiian or Pacific Islander	Black American or African American	Caucasian	Filipino	Hispanic or Latino (1)	Other (2)	Unidentified (3)
Total(s)										

Notes: (1) "Hispanic" includes all persons of Mexican, South and Central American, Puerto Rican, Cuban or Spanish ancestry.
 (2) "Other" includes all others whose origin consists of two or more races other than Hispanic or Latino.
 (3) Use this category for employees who have chosen not to identify any race or ethnicity, including "Other".

CONTRACTOR'S DECLARATION FORM

THIS FORM MUST BE COMPLETED IN FULL AND SUBMITTED WITH THE BID

Project: (PROJECT NAME, PROJECT ADDRESS, PROJECT NUMBER)

I CONTRACTOR INFORMATION

Contractor Name: _____ Phone: _____

Contact Person: _____ Fax: _____

II EQUAL BENEFITS (check one or more boxes)

Contractors with contracts in excess of \$5,000 must treat spouses and domestic partners equally as to employee benefits.

- Contractor complies with the County's Equal Benefits Ordinance by:
- offering equal benefits to employees with spouses and employees with domestic partners.
- offering a cash equivalent payment to eligible employees in lieu of equal benefits.
Contractor does not comply with the County's Equal Benefits Ordinance.
Contractor is exempt from this requirement because:
- Contractor has no employees, does not provide benefits to employees' spouses, or the contract is for \$5,000 or less.
- Contractor is a party to a collective bargaining agreement that began on _____ (date) and expires on _____ (date), and intends to offer equal benefits when said agreement expires.

III NON-DISCRIMINATION (check appropriate box)

- Finding(s) of discrimination have been issued against the Contractor within the past year by the Equal Employment Opportunity Commission, Fair Employment and Housing Commission, or other investigative entity. Please see attached sheet of paper explaining the outcome(s) or remedy for the discrimination.
No finding of discrimination has been issued in the past year against the Contractor by the Equal Employment Opportunity Commission, Fair Employment and Housing Commission, or any other entity.

IV EMPLOYEE JURY SERVICE (check one or more boxes)

Contractors with original or amended contracts in excess of \$100,000 must have and adhere to a written policy that provides its employees living in San Mateo County up to five days regular pay for actual jury service in the County.

- Contractor complies with the County's Employee Jury Service Ordinance.
Contractor does not comply with the County's Employee Jury Service Ordinance.
Contractor is exempt from this requirement because:
- the contract is for \$100,000 or less.
- Contractor is a party to a collective bargaining agreement that began on _____ (date) and expires on _____ (date), and intends to comply when said agreement expires.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct, and that I am authorized to bind this entity contractually.

Signature

Name

Date

Title

File: F:\users\Capital Projects\Operations Manual\Project Manual Front End Docs\017 Contractor's Declaration Form.doc

ANTI-TRUST LAWS QUESTIONNAIRE

THIS QUESTIONNAIRE MUST BE COMPLETED IN FULL AND SUBMITTED WITH THE BID

Project: (PROJECT NAME, PROJECT ADDRESS, PROJECT NUMBER)

Company Name: _____

In accordance with instructions from the State of California Attorney General's Office, with regard to California and Federal Anti-Trust Laws, answers to the following must be included with the bid.

1. ____ Yes ____ No Were bid depository of registry services used in obtaining subcontractor bid figures in order to compute your bid?
2. If the answer to No. 1 is "Yes" please list the subcontractors using a bid depository or registry service.

3. ____ Yes ____ No Did you have any source of subcontractor's bids other than bid depositories?
4. ____ Yes ____ No Has any person or group threatened you with subcontractor boycotts, union boycotts, or other sanctions to attempt to convince you to use the services or abide by the rules of one or more bid depositories?

Date: _____ Name: _____

Nature of the threats: _____

Additional comments: _____

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AGREEMENT

THIS AGREEMENT, entered into this _____ day of _____, 20____, by and between the COUNTY OF SAN MATEO, a Political Subdivision of the State of California, hereinafter called the "County", and _____, hereinafter called the "Contractor".

WITNESSETH that the Contractor and the County, in consideration of the mutual covenants, considerations and agreements herein contained, agree as follows:

STATEMENT OF WORK – The Contractor shall furnish all labor and materials and perform all work for: (PROJECT NAME, PROJECT ADDRESS, PROJECT NUMBER) in strict accordance with the Contract Documents.

TIME FOR COMPLETION – The work shall be commenced on a date to be specified in the Notice to Proceed issued by the County and shall be completed within (WORDS & NUMBERS) calendar days.

COMPENSATION TO BE PAID TO CONTRACTOR – The County will pay and the Contractor will accept in full consideration for the performance of the contract, subject to additions and deductions and procedures for payment as provided therein, the sum of _____ (\$_____) which is the Contractor’s Bid. The Contract as defined in paragraph 1.1 of the General Conditions constitutes the sole agreement of the parties hereto relating to said work and correctly states the rights, duties, and obligations of each party as of the document’s date. Any prior agreement, promises, negotiations, or representations between the parties not expressly stated in this document are not binding. All subsequent modifications shall be in writing.

PREVAILING WAGE RATES - In accordance with the provisions of Section 1770 of the Labor Code, the Board of Supervisors of the County of San Mateo has ascertained the prevailing rate of wages applicable to the work to be done, which prevailing wage rates have been established as indicated in the Notice to Bidders and are incorporated herein by reference.

The Contractor’s attention is further directed to the following requirements of State Senate Bill SB 854 (Stat. 2014, chapter 28), effective January 1, 2015:

- (1) No contractor or subcontractor may be listed on a bid proposal for a public works project (submitted on or after March 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5 [with limited exceptions from this requirement for bid purposes only under Labor Code section 1771.1(a)].
- (2) No contractor or subcontractor may be awarded a contract for public work on a public works project (awarded on or after April 1, 2015) unless

registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5.

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

IN WITNESS WHEREOF, the parties hereto on the day and year first above written have executed this agreement in three counterparts, each of which shall, without proof or accounting for the other counterparts, be deemed an original thereof.

COUNTY OF SAN MATEO

A Political Sub-Division of the State of California

Attest:

By _____
President, Board of Supervisors

John Maltbie, County Manager
Clerk of the Board of Supervisors

Contractor

By _____

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS:

That WHEREAS, the County of San Mateo hereinafter designated as the "County," has awarded to **[Fill in Contractor's Name]** hereinafter designated as the "Principal," a contract dated **[Fill In Contract Award Date]** hereinafter designated as the "Contract," which Contract is by this reference made a part hereof, for the work described as **[Fill in Project Name, Location, Number]**.

And WHEREAS, pursuant to law, the Principal is required, before entering upon the performance of the work, to file a good and sufficient bond with the body by whom the Contract is awarded to secure the claims to which reference is made in Sections 9550 to 9566 and 9100 to 9364 both inclusive, of the Civil Code of California.

NOW THEREFORE, THESE PRESENTS WITNESSETH:

That the said Principal and the undersigned _____,
(Surety's Name)

as corporate Surety, are held and firmly bound unto all laborers, material men and other persons referred to in said statutes in the sum of

Dollars (\$ _____)

lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, or assigns, jointly and severally, by these presents.

The condition of this obligation is that if the above bonded Principal, contractor, person, company or corporation, or his or its sub-contractor, fails to pay any claimant name in Section 9100 of the Civil Code of the State of California, or amounts due under the Unemployment Insurance Code, with respect to work or labor performed by any such claimant, that the Surety on this bond will pay the same, in an amount not exceeding the aggregate sum specified in this bond, and also, in case suit is brought upon this bond, a reasonable attorney's fee, which shall be awarded by the court to the prevailing party in said suit, and attorney's fees to be taxed as costs in said suit.

It is hereby expressly stipulated and agreed that this bond shall inure to the benefit of any and all persons, companies and corporations entitled to file claims under Section 9100 to 9364 of the Civil Code, so as to give a right of action to them or their assigns in any suit brought upon this bond.

This bond is executed and filed to comply with the provisions of the act of Legislature of the State of California as designated in the Civil Code, Sections 9550-

9566 inclusive, and all amendments thereto.

Should the condition of this bond be fully performed, then this obligation shall become null and void, otherwise it shall be and remain in full force and effect.

And the said Surety, for value received, hereby stipulates and agrees that no change will be made which increases the total Contract price more than twenty percent (20%) in excess of the original Contract price without notice to the Surety, then, this obligation to be void, otherwise to remain in full force and virtue.

Correspondence relating to this bond shall be sent to the Surety at the address set forth below.

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

Principal

Surety

Signature

Signature

Printed Name

Printed Name

Address for Notices:

NOTE: Notary acknowledgement for Surety and Surety's Power of Attorney must be attached.

PERFORMANCE BOND

KNOW ALL PERSONS BY THESE PRESENTS:

That WHEREAS, the County of San Mateo, hereinafter designated as the "County," has awarded to (CONTRACTOR'S NAME), hereinafter designated as "Principal," a contract dated (CONTRACT AWARD DATE), hereinafter designated as the "Contract," which Contract is by this reference made a part hereof, for the work described as (PROJECT NAME, PROJECT ADDRESS, PROJECT NUMBER).

And WHEREAS, Principal is required to furnish a bond in connection with the Contract, guaranteeing the faithful performance thereof;

NOW THEREFORE, THESE PRESENTS WITNESSETH:

That the said Principal and the undersigned, (SURETY'S NAME), as corporate Surety, are held and firmly bound unto the County in the sum of

_____ Dollars (\$_____)
lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

The condition of this obligation is such, that if the Principal shall well and truly perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of said Contract during the original term of said Contract and any extensions thereof that may be granted by the County, with or without notice to the Surety, and during the life of any guarantee required under the Contract, and shall also well and truly perform and fulfill all the undertakings, covenants, terms, conditions and agreements of any and all duly authorized modifications of said Contract that may hereafter be made, notice of which modifications to Surety being hereby waived, on Principal's part to be kept and performed at the time and in the manner therein specified, and in all respects according to their true intent and meaning, and shall indemnify, defend, protect, and hold harmless the County as stipulated in the Contract, then this obligation shall become and be null and void; otherwise it shall be and remain in full force and effect.

No extension of time, change, alteration, modification, or addition to the Contract, or of the work required thereunder, shall release or exonerate Surety on this bond or in any way affect the obligation of this bond; and Surety does hereby waive notice of any such extension of time, change, alteration, modification, or addition.

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

Principal

Surety

Signature

Signature

Printed Name

Printed Name

NOTE: Notary acknowledgement for Surety and Surety's Power of Attorney must be attached.

The above bond is accepted and approved this _____ day of _____, 20____.

(Contractor's or Subcontractor's own letterhead)

GUARANTEE FOR (PROJECT NAME, PROJECT NUMBER).

(PROJECT ADDRESS.)

We (Contractor's name) hereby guarantee (Trade or Work Scope)

beginning _____ for _____ year(s) in accordance with the Contract Documents.

We agree to repair or replace to the satisfaction of the Owner any and all such work that may prove defective in workmanship or materials within that period, ordinary wear and tear and unusual abuse or neglect excepted, together with all other work which may be damaged or displaced in so doing.

In the event of our failure to comply with the above-mentioned conditions within seven calendar days after being notified in writing, we collectively and separately do hereby authorize the Owner to proceed to have the defects repaired and made good at our expense, and will pay the costs and charges therefore immediately upon demand.

I hereby certify that I am authorized to sign this document.

Date _____

(Signature of Subcontractor)

Print Name and Title

Date _____

(Signature of Contractor)

Print Name and Title

(Contractor must co-sign with Subcontractor)



COUNTY OF SAN MATEO WASTE MANAGEMENT PLAN

Case/Group Number(s):

BLD _____ — _____

Project Address:

Street _____

City _____

SUBMIT TO:

County of San Mateo
Public Works Department – RecycleWorks
555 County Center, 5th Floor
Redwood City, CA 94063
Mon. – Fri. 8:00-12:00, 1:00-4:00

INFORMATION AND SUPPORT: www.RecycleWorks.org/con_dem
1-888-442-2666

WMP REQUIRED BECAUSE PROJECT IS A

- Demolition ≥ \$5000
- Construction project ≥ \$250,000
- Construction ≥ 2000 sq. ft.
- Remodel

SECTION ONE: PERMIT APPLICATION

This Waste Management Plan (WMP) must be completed, submitted for review, and approved to obtain a building permit. Separate WMPs must be completed for demolition and construction at the same site unless the building department requires only one permit.

STEP 1: PROJECT INFORMATION – FILL OUT THE FOLLOWING INFORMATION

Applicant's Name: _____ Owner's Name: _____

Contact Phone Number: _____ Fax Number: _____

Check one: Owner Architect Builder Owner/Builder Other _____

Contractor: _____ Contact Phone Number: _____

Project Type(s): New Remodel Addition Demolition

Project Square Footage: _____

Does this project fall under the Green Building Ordinance requirements? Yes No

Project Description: _____

Estimated Completion Date: _____

STEP 2: WASTE MANAGEMENT REQUIREMENTS

REQUIREMENTS: You are required to recycle or re-use 100% of inert solids (asphalt, brick, concrete, dirt, fines, rock, sand, and stone) and 50% of all other construction and demolition debris.

I understand that I am required by San Mateo County Ordinance No. 04099 to salvage, reuse, or recycle **100% of inert solids** (asphalt, brick, concrete, dirt, fines, rock, sand, and stone) and a **minimum of 50%** of all other construction and demolition debris (C&D). _____ (Initial)

I understand that failure to meet the requirements of Ordinance No. 04099 shall constitute a misdemeanor, and shall be punishable by imprisonment in the county jail for up to 6 months, or by a fine of up to \$1,000, or both. In addition a stop order on the job or a delay of final approval may occur. _____ (Initial)

At the completion of this project, or more frequently if required, all weight tags or other equivalent documentation from salvage, recycling and waste facilities will be provided to the County of San Mateo and I understand that I may not be issued my final inspection unless all receipts and documentation are submitted to the County of San Mateo Public Works Department. _____ (Initial)

Please only include construction and demolition waste weight tags; no household waste.

STEP 3: RECYCLING CONSTRUCTION AND DEMOLITION DEBRIS – ANSWER THE QUESTIONS AND FILL OUT THE TABLE BELOW.

SALVAGE AND REUSE:

What materials will be salvaged? _____
 Salvage Company (if applicable): _____
 What materials will be reused on site? _____
 How will this be documented? _____

MATERIAL TRANSPORTATION:

Will you be using a hauling company, debris box company or hauling the material yourself? (Check one.)
 Hauler Debris Box Self-haul
 If using a hauling or debris box company, which company? _____
 Have they been notified that the diversion of 50% mixed debris is required? Yes No

WASTE MANAGEMENT PLAN:

Check the materials you anticipate generating and fill in the facilities that you plan to use.

SECTION ONE			
Category	Material	√	Reuse, Recycling or Disposal Facility
MIXED C&D	Mixed debris *		
INERTS	Asphalt		
	Bricks		
	Concrete		
	Dirt		
	Other inert solids		
SOURCE SEPARATED	Cardboard		
	Metals		
	Wood		
	Roofing		
	Carpet		
	Drywall		
	Green Waste		
	Other		
DISPOSAL	Waste		

**One compliance option is to take all loads of mixed debris to a facility that will sort your loads of mixed debris. The sorting facilities listed in our Construction Site Recycling Guide will satisfy the County's requirement.*

The undersigned hereby agrees to comply with the Waste Management Plan as submitted and is the owner or authorized agent to sign for the owner of this project.

Applicant Signature _____ **Date** _____

County Approval: Approved Approved with comments Denied

All original receipts, weight tags and documentation for salvage, recycling, and disposal must be submitted:
 On completion of project Other _____

DPW Approval: _____ Date _____
 Building Official Approval: _____ Date _____

COUNTY OF SAN MATEO WASTE MANAGEMENT PLAN

Address _____
 Case/Group Number(s): _____
 BLD _____ — _____

SECTION TWO: FINAL REPORT APPROVAL

Please complete this section, have it approved by the Public Works Department, and then submit to the Development Review Center for final approval no later than 30 days after completion of the demolition or construction project.

This section must be completed and signed, and all original receipts or other supporting documentation must be attached in order to receive final project approval.

CATEGORY	DATE	MATERIAL/ITEMS	FACILITY	WEIGHT (TONS)	VOLUME (CU. YD.)
MIXED C&D WASTE					
SALVAGE					
INERTS Asphalt, bricks, concrete, dirt, rock, sand, soil, stone					
SOURCE SEPARATED Cardboard, wood, metal, sheetrock, wire, carpet, yard trimmings, (reusable items)					
DISPOSAL					

- All original receipts or equivalent documentation for salvage, recycling, and disposal are hereby attached.
- This project has recycled all of the inert solids and at least 50% of all other debris generated.

Applicant Signature _____ **Date** _____

County Approval: Approved Approved with comments Denied

DPW Approval: _____ Date _____

Building Official Approval: _____ Date _____

**LifeMoves Maple Street Shelter Renovation
A/E Team Seals Page**

ARCHITECT

CJW ARCHITECTURE
130 Portola Road
Portola Valley, CA 94028
(650) 851-9335
Contact: Bill Gutgsell

STRUCTURAL ENGINEER

BCA STRUCTURAL ENGINEERING, INC.
1300 Industrial Road, Suite 1
San Carlos, CA. 94070
(650) 508-2500
Contact: Geoff Clifford

CIVIL ENGINEER

LEA & BRAZE ENGINEERING, INC.
2495 Industrial Parkway West
Hayward, CA 94545
(510) 887-4086
Contact: James Toby
Johnny Chiu

SOILS ENGINEER

BAGG
138 Charcot Avenue
San Jose, CA 95131
(650) 852-9133
Contact: Anthony N. Lusich

MECHANICAL/PLUMBING/ ENGINEER

Tantech Engineers, Inc.
1431 Cedar Street
San Carlos, CA 94070
(415) 269-4283
Contact: John Tankeh

ELECTRICAL ENGINEER

Tantech Engineers, Inc.
1431 Cedar Street
San Carlos, CA 94070
(415) 269-4283
Contact: John Tankeh

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Note: Gaps in Section numbering above, indicate that the Section does not apply.

* * * * *

SECTION 01000 – GENERAL REQUIREMENTS**1.00 - GENERAL****1.01 GENERAL CONDITIONS**

Each Specification Section is hereby automatically prefaced by the paragraph; The Invitation to Submit a Proposal, General Requirements, General Conditions, Proposal and Agreement of the Contract are hereby made a part of this Section. These provisions apply to the Contractor and all Subcontractors.

1.02 DESCRIPTION

- A. Scope: Refer to drawings for locations of all items of work.

For bidding purposes, the area at each location is defined. Should it be necessary to increase the scope because of field conditions encountered, the Contract Sum will be adjusted by a Change Order.

- B. It is intended that the Contractor, in the best and most workmanlike manner and exercising due judgment and skills of his craft or trade, provide all labor, materials, tools, equipment, transportation and services necessary for the proper and complete construction, as shown on the drawings and specified herein for the project: Use only workmen skilled and proficient in their respective trades.
- C. Perform all work during regular working hours, 8:00 a.m. to 5:00 p.m., Monday to Friday, unless other arrangements are approved by Owner.
- D. Before submitting the bid, Contractor shall visit the site to determine existing conditions. Contractor, upon the act of submitting a Bid, admits and agrees that drawings and specifications exhibit the intent and purpose of Architect in regard to the work and that they are not necessarily complete in every detail and are to be considered as showing the purpose and intent only, and he further agrees to furnish all labor and/or material for any detail that is necessary to carry out the intent and purpose of the drawings and specifications without extra charge. A pre-bid walk-through of the site will be arranged.
- E. Should concealed conditions encountered in the performance of the work or should concealed or unknown conditions in the existing site be at variance with the conditions indicated by the Contract Documents, or differing material from those ordinarily encountered and generally recognized as inherent in work of the character provided for in this Contract be encountered, the Contract Sum shall be adjusted by Change Order upon written claim by either party made within twenty-one (21) days after the first observance of the conditions.
- F. Contact CJW Architecture, 130 Portola Road, Portola Valley, CA.; telephone (650) 851-9335; fax (650) 851-9337 for all information.

1.03 PROCEDURE

- A. It is the Contractor's responsibility to insure that the Work done on this project shall be in compliance with applicable Code requirements.
- B. Keep all areas around the building well policed daily as the work proceeds. Deposit trash and debris into trucks or containers daily. Dispose all materials removed from work away from site.

1.04 TEMPORARY FACILITIES

- A. Utilities: Shut down of utilities for any reason subject to approval by Owner. Advise the Owner a minimum of 48 hours in advance of any shut down. When extended shut downs are required, provide standby service for normal occupancy requirements.
- B. Toilet facilities: Provide temporary facilities for construction personnel.
- C. Water and electrical services: For construction use, provided by Owner on site in locations as directed. Remove all temporary pipes and wires upon completion. Leave existing equipment in a satisfactory condition.
- D. Enclosures and storage sheds: Locate enclosures and storage sheds as required in areas as designated by Owner.
- E. Removal: Upon completion of work, or prior thereto when so directed, remove temporary facilities, structures and installation from Owner's property. Similarly, return all exterior areas utilized for temporary facilities to their original natural state.

1.05 PROTECTION AND CONTROLS

- A. Provide protection for existing site, its improvements and occupants throughout work. Repair or replace damage done to existing property at Contractor's expense. Execute work in careful, orderly manner, with least possible disturbance to public and occupants of area.
- B. Owner will continue to use the area. Take care not to disrupt their use.

1.06 TESTING

- A. Costs of tests will be borne by Owner, except for retesting as specified below. Cooperate with Owner's representative in taking of test samples.
- B. Should the results of any required tests or samples of materials fail to meet the requirements of Specifications, then furnish new samples of new materials as directed by Architect, and make additional tests at Contractor's expense, until the materials are found to meet requirements of the construction documents.

1.07 MATERIALS AND EQUIPMENT

- A. General:
 - 1. Deliver all materials and equipment to project in manufacturer's original sealed, labeled containers, if any, protect all packaged and unpackaged items against moisture, dust, tampering or damage from improper handling or storage.
 - 2. Place materials and equipment on order in time to avoid job delay or hindrance. Schedule deliveries to coincide, as nearly as possible, with construction schedule.
 - 3. Except as specifically noted otherwise, follow installation and/or maintenance directions provided by manufacturer for all materials and equipment.
 - 4. Materials shown on drawings or specified, new, unused materials unless specifically marked otherwise.

5. Materials not conforming to requirements of the Specifications shall be considered as defective and all such materials, whether in place or not, shall be rejected and removed from the site.
6. Prior to ordering materials or starting work, verify all measurements at site and be responsible for their accuracy. No extra compensation will be allowed for differences between actual dimensions and measurements shown on drawings.

B. Substitutions:

1. Naming of product, brand names, manufacturers, as referenced within Specifications, following will apply:
 - a. Specific names are indicated to establish quality and functional standards required to do the work, and to meet quality and function standard of the Contract.
 - b. Substitute items shall be equal or superior to the items specified, at no cost to Owner.
 - c. It is the responsibility of Contractor to provide the equality of substituted item(s). Submit for Architect's approval all pertinent product data and samples as Architect deems appropriate, to establish said product equality before commencing with that portion of the work. Failure to receive Architect's approval in writing shall cause Architect to reject said product and its related assembly and/or installation, and require complete replacement with that item specified, all at Contractor's expense.

1.09 HAZARDOUS MATERIALS

- A. An Asbestos and/or Lead Survey has not been performed in existing buildings to be demolished. If such substances or materials are encountered, cease work and notify Owner, through Architect, to take appropriate action for removal or otherwise abating the condition.

1.10 FINISH MATERIAL POLLUTANT CONTROL

- A. Finish Material Pollutant Control. Finish materials shall comply with 2013 CGC §5.504.4.1 through §5.504.4.4.
- B. Adhesives, sealants and caulks. Adhesives, sealants and caulks used on the project shall meet the requirements of the standards listed in 2013 CGC §5.504.4.1.
- C. Paints and Coatings. Architectural paints and coatings shall comply with 2013 CGC Table 5.504.4.3 unless more stringent local limits apply.
- D. Verification. Verification of compliance with this section shall be provided at the request of the enforcing agency.
- E. Carpet Systems. All carpet installed in the building interior shall meet the testing and product requirements of one of the standards listed in 2013 CGC §5.504.4.4.
- F. Composite Wood Products. Hardwood plywood, particleboard and medium density fiberboard composite wood products used on the interior or exterior of the building shall meet the requirements for formaldehyde as specified in 2013 CGC Table 5.504.4.5
- G. Resilient Flooring Systems. 80 percent of the floor area receiving resilient flooring shall comply with at least one of the pollutant control measures listed in 2013 CGC §5.504.4.6.

a) Verification of Compliance. Documentation shall be provided verifying that resilient flooring materials meet the pollutant emission limits. 2013 CGC §5.504.4.6.1

H. Filters. In mechanically ventilated buildings, provide regularly occupied areas of the building with air filtration media for outside and return air prior to occupancy that provides at least a MERV of 8. MERV 8 filters shall be installed after any flushed-out or testing and prior to occupancy, and recommendations for maintenance with filters of the same value shall be included in the operation and maintenance manual. 2013 CGC §5.504.5.3

1.11 INDOOR MOISTURE CONTROL (2013 CGC §5.505)

A. Buildings shall meet or exceed the provisions of the 2013 California Building Code, Chapter 12 (Ventilation) and Chapter 14 (Exterior Walls) for indoor moisture control. 2013 CGC §5.505

1.12 INDOOR AIR QUALITY (2013 CGC §5.506)

A. Buildings must meet the minimum requirements of the 2013 California Building Code, Chapter 12 (Ventilation) for mechanically or naturally ventilated spaces. 2013 CGC §5.506.1

B. For Buildings equipped with demand control ventilation, CO₂ sensors and vent. Controls shall be specified and installed in accordance with the 2013 California Energy Code. 2013 CGC §5.506.2

1.13 ENVIRONMENTAL COMFORT (CGC § 5.507)

A. Acoustical Control. Employ building assemblies and components with STC values determined in accordance with ASTM E90 and ASTM E413 or OITC determined in accordance with ASTM E 1332, using either the prescriptive or performance method in 2013 CGC §5.507.4.1 or §5.507.4.2.

1.14 OUTDOOR AIR QUALITY (CGC §5.508)

A. Ozone Depletion and Greenhouse Gas Reductions. Installation of HVAC, refrigeration and fire suppression equipment shall comply with 2013 CGC §5.508.1.1 or §5.508.1.2.

1.15 REFERENCE STANDARDS

A. For products specified by association or Trade Standards, comply with requirements, except when more rigid requirements are specified or are required by codes.

B. Date of the Standard is that in effect as of the Bid date, or date of Owner-Contractor Agreement when there are no bids, except when a specific date is specified.

C. Obtain copies of Standards when required by Contract Documents.

1.16 SPECIFICATIONS

A. Specifications are abbreviated where possible and include incomplete sentences. Omission of words or phrases such as "a", "an", "the", "all", "shall", "as", "as noted on drawings" are intentions.

- B. "Directed", "required", "permitted", "ordered", "designated", "prescribed", and words of like import shall imply desire of Architect. "Approved", "acceptable", "satisfactory" and words of like import shall mean approved by or acceptable to Architect.

* * * * *

SECTION 02202 - TRENCHING AND BACKFILL**1.00 - GENERAL****1.01 WORK INCLUDED**

- A. This section covers trenching and backfill requirements for buried piping systems specified in Water System - Section 02660; Storm Drainage - Section 02720, Sanitary Sewers - Section 02730, and Sanitary Sewers -Section 02810.
- B. This Section also covers requirements for excavation and for compaction of succeeding layers after backfill has been placed around pipe.

1.02 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the general designation only.
- B. American Society for Testing and Materials (ASTM) Publications:
 - C33 (2013) Specification for Concrete Aggregates
 - C 136 (2014) Sieve Analysis of Fine and Coarse Aggregates
 - C 150 (2016) Portland Cement
 - C 260 (2010a) Air Entraining Admixtures for concrete
 - D4318 (2010; E 2014) Liquidity Limit, Plastic Limit; and Plasticity Index of Soils
 - C618 (2015) Fly Ash and Raw or Calcined Natural Pozzolan for use in concrete
 - D1557 (2012) Laboratory Compaction of Soil Modified Effort
 - D2419 (2014) Sand equivalent Value of Soils and Fine Aggregate
 - D2487 (2011) Classification of soils for Engineering purposes

1.03 SUBMITTALS

- A. Certified test reports for the permeable material backfill tested in accordance with ASTM C 136.
- B. Samples: Submit 1 gallon size sample of permeable material for county approval.
- C. Shoring and Sheet piling Plan: Before starting work submit a CAL-OSHA permit for the shoring and sheet piling plan when trench excavation is five feet deep or more.
- D. Dewatering Plan: If required in the Special Conditions, before starting work submit a dewatering plan describing the basic components of the dewatering including silt control, etc.
- E. Traffic Plan: Where lane closures are anticipated, submit a Traffic Control Plan 72 hours in advance for approval prior to starting work.

1.04 QUALITY ASSURANCE

- A. Percentage of compaction specified shall be the minimum acceptable. The percentage represents the ratio of the dry density of the compacted backfill material to the maximum dry density of the material as determined by the procedure set forth in ASTM Designation D1557. For field density tests, ASTM D-3017 may be used.
- B. D-load or class of pipe requirements shown or called for on the plans shall be the minimum acceptable.

1.05 JOB CONDITIONS, PROTECTION, AND SHORING

A. Existing Utilities:

1. Unless shown to be removed, protect active utility lines shown on the Plans or otherwise made known to the Contractor prior to excavating. If damaged, repair or replace at the Contractor's expense. Pothole as required to verify utility location. Contractor shall be responsible for contacting all utility companies and coordinating any work which requires relocation or abandonment of existing utilities.
2. If active utility lines are encountered and are not shown on the Plans or otherwise made known to the Contractor, promptly take necessary steps to assure that service is not interrupted.
3. If a known service is interrupted as a result of work under this section, immediately restore service by repairing the damaged utility at Contractor's expense.
4. If foreseen or unforeseen existing utilities are newly found to interfere with the permanent facilities being constructed under this Contract, immediately notify the Engineer for directions.
5. Do not proceed with permanent repair or relocation of utilities until written instructions are received from the Engineer.
6. No construction water shall be disposed of in the City's storm drain system

B. PROTECTION OF PERSONS & PROPERTY:

1. Install all necessary underpinning, shoring, lagging, cribbing, and bracing of ample strength to support adjoining soils, paving and structures. All such items shall be so constructed that they will not interfere with the building of any structural elements, and shall be removed upon completion of the shoring operation.
2. Barricade open depressions and holes occurring as part of this work, and post warning lights on property adjacent to or with public access.
3. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
4. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by operations of Contractor.
5. No trenches shall be left open during non-working hours.
6. Install fences and barricades to secure the area from the public.

C. SHORING

1. The Contractor is solely responsible for all bracing and shoring. The Contractor shall forward their application for shoring to the California Division of Industrial Safety for their review. Contractor's application shall include the basic design, assumed soils

conditions and estimation of forces to be resisted, together with plans and specifications of the materials and methods to be used, and shall be prepared by a Civil Engineer registered in California.

2. If an application for a shoring permit is required, no excavation in trench section or around structures shall proceed until the approved shoring plan has been received by the County Engineer.
- D. DEWATERING
1. Remove all water, including rain water, encountered during trench and sub-structure work to an approved location by pumps, drains, and other approved methods.
 2. Keep excavations and site construction area free from water.
- E. DUST CONTROL
1. Use means necessary to control dust on and near the work, and on and near off-site areas, if such dust is caused by the Contractor's operations during performance of the Work, or if resulting from the condition in which the Contractor leaves the site.
 2. Thoroughly moisten surfaces as required to prevent dust being a nuisance to the public, neighbors, and personnel performing other work on the site.
 3. Use dust palliatives or reclaimed water (not potable water).
- F. Maintain access to adjacent areas at all times.
- G. Maintain and/or replace all bench marks, monuments, construction stakes and other reference points.
- H. Repair or restore damage to any portion of the work resulting from movement of the sides or bottom of trenches or other excavation which is attributable to the Contractor's acts or omissions, whether sides are braced or not.

2.00 - PRODUCTS

2.01 GENERAL SOIL MATERIALS

- A. In general, soils used for backfill shall be select material free of debris, roots, wood, scrap material, vegetation, refuse, soft unsound particles, frozen, deleterious, or objectionable materials, satisfactory to the Geotechnical Engineer, free of stones or lumps exceeding 3 inches in greatest dimension.

2.02 PIPE BEDDING AND INITIAL BACKFILL MATERIAL

- A. Pipe bedding and initial backfill up to six inches above the top of the pipe. Provide bedding for buried piping in accordance with AWWA C600, except as specified here in compact backfill to top of the pipe to 95 percent of ASTM D698 maximum density. Provide plastic piping with bedding to spring line of pipe. Provide materials as follows:

1. CLASS I

Angular, 0.25 to 1.5 inch, graded stone, including a number of fill materials that have regional significance such as coral slag, cinders, crushed stone and crushed shells.

2. CLASS II

Coarse sands and gravel with maximum particle size of 1.5 inch including various graded sands and gravels containing small percentages of fine generally granular and non-cohesive, either wet or dry. Soil types GW, GP, SW, and SP are included in this class as specified in ASTM D2487.

3. SAND

Clean, coarse-grained sand classified as SW or SP by ASTM D2487 for bedding and backfill.

4. GRAVEL AND CRUSHED STONE

Clean coarsely graded natural gravel, crushed stone or a combination thereof GW or GP in accordance with ASTM D2487 for bedding and backfill.

- B. Material shall contain at least 75% of the particles having one or more fractured faces.
- C. Bedding and backfill material shall be subject to the approval of the Geotechnical Engineer.

2.03 SELECT BACKFILL ABOVE INITIAL BACKFILL OR BEDDING

- A. In non-paved areas unless otherwise shown on plans, select backfill shall conform to the requirements for soil materials above, and shall be classified as (GW), (GP), (GM), (SW), (SP) or (SM) by ASTM D 2487 and meet the following:
 - 1. Sand equivalent shall not be less than 25 when tested in accordance with ASTM D 2419, plasticity index shall not exceed 15 when tested in accordance with ASTM D 424, and not more than 25% by weight shall be finer than the No. 200 sieve.
 - 2. On-site native material may be used as backfill if it conforms to 2.03A.1. above.
- B. In paved areas, select backfill shall be Class 2 aggregate base, 3/4" maximum size gradation.

2.04 SUBDRAIN MATERIAL

- A. Where required for trench drainage and for subsurface drains, bedding shall conform to the requirements of Class 1, Type A Permeable material per Section 68 of State Standard Specifications.

2.05 CONTROLLED DENSITY FILL (CDF) (in trenches)

- A. Controlled density fill will be accepted in lieu of the standard backfill specifications. It shall be mandatory in trenches eight (8) inches wide or less where the prevention of subsequent settlement after placement of backfill is required. CDF shall conform to the following requirements:
 - 1. Strength Requirements
 - a. Non-structural CDF that can be excavated by hand shall produce unconfined compressive 28 day strengths from 50 psi to a maximum of 150 psi. CDF that is to be excavated by hand shall contain aggregate no larger than 3/8" top size nor shall the 3/8" aggregate comprise more than 30% of the total aggregate content.
 - 2. Materials

- a. Cement shall meet the standards as set forth in ASTM C-150, Type II Cement.
 - b. Fly ash shall meet the standards as set forth in ASTM C-618, for Class F pozzolans. The fly ash shall not inhibit the entrainment of air.
 - c. Air entraining agent shall meet the standards as set forth in ASTM C-260.
 - d. Aggregates need not meet the standards as set forth in ASTM C-33. Any aggregate, producing performances characteristics of the CDF, for any project will be accepted for consideration as follows. The amount of material passing a #200 sieve shall not exceed 12% and no plastic fines shall be present.
3. Mix Proportions
- a. CDF shall be a mixture of cement, Class F pozzolan, aggregate, air entraining agent and water. CDF shall be batched by a ready mixed concrete plant and delivered to the job site by means of transit mixing trucks.
 - b. The actual mix proportions shall be determined by the producer of the controlled density fill to meet job site conditions, minimum and maximum strengths, and unit weight. Entrained air content shall be a minimum of 4.0%. The actual entrained air content shall be established for each job with the materials and aggregates to be used to meet the placing and unit weight requirements. Entrained air content may be as high as 20% for fluidity requirements.
4. Mix Design
- a. Mix design shall meet the Engineer's approval.

3.00 - EXECUTION

3.01 GENERAL TRENCHING AND EXCAVATING

- A. Trenches may be excavated either by hand, or by machine. Trenches shall be cut with vertical sides, and shall be of sufficient width to provide adequate space for working therein; such space shall be a minimum clear distance of six (6) inches of shoring and a maximum of nine (9) inches clear of shoring on each side of the pipe barrel when the pipe is properly placed and aligned in conformity with the plans. Glory hole excavation or vee trenches will not be allowed. Trench sides shall be parallel to and at equal distance from the center-line of the pipe, when aligned in conformity with the plans.
- B. Excavated material shall be loaded into trucks immediately upon removal from the trench to prevent stockpiling on roadways or walkways.
- C. Where the excavated trench exceeds the widths specified above, furnish higher strength pipe, or other methods of construction as approved by the Engineer, to adequately provide for the increased loading, which the trench widening will cause. Stepped trenches shall meet the approval of the Engineer.
- D. Pipe trenches shall be excavated to a depth below the bottom of the pipe sufficient to provide for pipe bedding materials as required by Section 3.02.

- E. Where a trench has been excavated below the designed grade, the bottom of the trench shall be refilled to proper subgrade with approved material well compacted in place, in an approved manner.
- F. The Engineer shall have the right to limit the amount of trench which is opened or partially opened at any one time; and also to limit the amount of trench left without backfill, at any one time.
- G. No trench or holes shall be left open overnight. Use steel pating to protect open trenches overnight.
- H. Excavation for thrust blocks shall be neat to the line and dimensions shown or called for on the plans.
- I. Provide for dewatering trenches and excavations and subsequent control of ground water, utilizing such pumps or other equipment as may be necessary to control ground water and seepage until backfilling is completed.

3.02 GENERAL BEDDING

- A. Utilities shall be laid on a firm layer of firm bedding material not less than four (4) inches in depth as shown or as noted on the plans and detail drawings, except that bedding shall not be required for utilities two (2) inches or less in nominal diameter. Compact as specified herein.
- B. Upon completion of bedding operations and, prior to the installation of pipe or appurtenances, notify the Engineer who will then inspect the bedding layer. Pipe laying shall not commence until the bedding has been approved.

3.03 GENERAL BACKFILLING

- A. Backfill shall be as shown on the plans. Place in 6-inch maximum loose lifts to one foot above pipe unless otherwise specified. Bring up evenly on each side, and for the full length of the structure. Ensure that no damage is done to structures or protective coatings thereon. Place the remainder of the backfill in 8-inch maximum loose lifts unless otherwise specified. Compact each loose lift as specified in Paragraph "General Compaction" before placing the next lift. Where unacceptable settlements occur in trenches and pits due to improper compaction, excavate to the depth necessary to rectify the problem, then backfill and compact the excavation as specified herein and restore the surface to the required elevation.
- B. No backfill shall be placed until the line has been inspected and approved for backfilling.

3.04 GENERAL COMPACTION

- A. Use hand-operated plate type vibratory or other suitable hand tampers in areas not accessible to larger rollers or compactors. Be careful to avoid damaging pipes and protective pipe coatings. Compaction shall be in accordance with the following unless otherwise specified. If necessary, the Contractor's selected equipment and construction procedure shall be altered, changed or modified in order to meet the specified compaction requirements.
- B. Initial backfill and bedding shall be carefully packed under the haunches of the pipe and brought up simultaneously on both sides so as to obviate any displacement of the pipe from its true alignment. Bedding shall be compacted in layers not more than eight (8) inches in thickness in a manner that will preclude moving the pipe, to not less than 95% of maximum

dry density as determined by the procedure set forth in ASTM Designation D1557. Jetting of backfill material will not be permitted.

- C. Select backfill above the initial backfill shall be placed in loose lifts not exceeding eight (8) inches in thickness before compaction, and compacted by the use of pneumatic tampers or other mechanical means approved. Water or dry, as required, to bring the soils as close as practicable to the optimum moisture content for proper compaction. Compaction equipment or methods that produce horizontal or vertical earth pressures which may cause excessive displacement or may damage the pipeline will not be permitted. Lifts of backfill shall be compacted to not less than 95% of maximum dry density as determined by the procedure set forth in ASTM Designation D1557. Jetting of backfill material will not be permitted.
- D. For flowable CDF, compaction is not necessary for placement. Trench sections may be filled in one lift above the initial backfill material.
- E. Backfill will be inspected and tested by the Engineer during placement. Contractor shall cooperate with the Engineer and shall provide working space for such tests in his operations. Backfill not compacted in accordance with these specifications shall be recompacted, or removed as necessary and replaced to meet specified requirements prior to proceeding with the work.

3.05 GENERAL BRACING AND SHORING

- A. The Contractor shall furnish, place and maintain such bracing and shoring as may be required to support the sides of the excavations for the proper protection of workmen; to facilitate the work; and to prevent damage to adjacent structures or facilities.
- B. Upon completion of the work, all bracing and shoring shall be removed, unless otherwise directed by the Engineer. Current requirements are for a maximum depth of 5 feet without CAL-OSHA approved shoring.

3.06 SPECIAL EARTHWORK REQUIREMENTS FOR SUBSURFACE DRAINS

- A. Excavate to the dimensions indicated.
- B. Provide a bedding surface of uniform density consisting of permeable material as indicated.
- C. Backfill around and over the pipes after pipe installation has been approved with permeable material to the depth indicated. Place in maximum loose lifts of 8 inches.
- D. Compact each lift with mechanical tampers or rammers. Compact bedding and backfill materials to 90% of ASTM D1557, Method D, maximum density. Place the remainder of the trench backfill as specified.

3.07 SPECIAL REQUIREMENTS FOR CONTROLLED DENSITY FILL (CDF)

- A. Applications of CDF include, but are not limited to: backfills, structural fills, insulating fills, road base, slab base, trench bedding, void and abandoned tank fills caisson and pile fills, abandoned pipes and culverts.
- B. CDF shall be discharged from the mixer by any reasonable means into the area to be filled. CDF shall be brought uniformly to the elevation as shown on the plans. Trench sections to be filled with CDF shall be contained at either end by bulkheads of earth fill.
- C. Permanent pavement may be placed directly upon the CDF as soon as it has sufficiently self-consolidated so that the surface will withstand the process of paving without

displacement or disruption. If the placement of the CDF is not completed early enough to allow for permanent paving to be completed the same day, the contractor shall provide steel plates to span the trench and prevent traffic contact with the CDF overnight or until permanent paving can be placed.

- D. Compaction is not necessary when placing CDF.

3.08 FIELD QUALITY CONTROL

- A. The Geotechnical Engineer will inspect, test and approve trench backfill layers before further construction is permitted thereon. Number of tests required will be determined by the Geotechnical Engineer.
- B. If backfill has been placed, that is below the specified density, provide additional compaction with subsequent retesting until successful compaction is achieved.

3.09 DUST ALLEVIATION AND CONTROL

- A. Contractor shall be responsible for and shall provide pollution and dust abatement and control measures satisfactorily during the course of the work.
- B. The Contractor shall utilize reclaimed water, or dust palliatives, in compliance with the City's Water Conservation Ordinance.

3.10 FINISH OPERATIONS

- A. Pipes shall be laid to finished grades indicated on the plans.
- B. Dispose of all surplus material or material unsuitable for filling or grading off the site in a legal manner.
- C. Satisfactorily restore any existing improvements, paving, landscaping, and other utilities disturbed during the course of constructing the improvements.
- D. Existing traffic markings and control devices damaged or disturbed during construction shall be replaced or repaired to the satisfaction of the Engineer.

* * *

SECTION 02220 - DEMOLITION

1.00 - GENERAL

1.01 DESCRIPTION

A. Work included:

1. Demolish and remove all materials and construction as shown and specified.
2. Related Requirements
 - a. Hazardous material abatement, handling and disposal is a part of this Project.
 - b. If materials, believed to contain asbestos, PCBs or lead, that have not been rendered harmless, are encountered, conduct work in accordance with suitable protocols and as specified in related sections.
3. Owner has retained the services of specialists in hazardous material testing, and has done a survey of the buildings within the project. Sampling and testing of possible hazardous materials was found as follows:
 - a. **Asbestos: See Owner's report for location(s) of found asbestos containing material. Materials will be abated as part of this contract prior to building demolition. See attached report contained herein and abide by all agency abatement requirements. Obtain required permits. Obtain required air clearances prior to continuing with building demolition.**
 - b. **Lead containing paint: See Owner's report for lead containing materials. Materials will be abated as part of this contract prior to building demolition. See attached report contained herein and abide by all agency abatement requirements. Obtain required permits. Obtain required air clearances prior to continuing with building demolition**

1.02 REFERENCES

- A. BAAQMD - Bay Area Air Quality Management District
 1. BAAQMD-11.2 - BAAQMD Regulation 11, Rule 2, Asbestos Demolition, Renovation and Manufacturing
- B. CBC - 2013 California Building Code
 1. CBC-33 – CBC Chapter 33, Safeguards During Construction
- C. CCR-8 – California Code of Regulations (CCR Title 8, Division 1, Dept of Industrial Relations)
 1. CCR-8-3.2 - CCR-8, Div 1, Subchapter 3.2, California Occupational Safety and Health Regulations (Cal/OSHA)
 2. CCR-8.4 - CCR-8, Div 1, Subchapter 4, Construction Safety Orders
- D. CFC –2013 California Fire Code
 1. Chapter 14, Fire Safety During Construction and Demolition.

E. NFPA - National Fire Protection Association

1. NFPA 241- Safeguarding Construction, Alteration and Demolition Operations

1.03 PROJECT CONDITIONS

A. Existing conditions: Visit site and examine existing buildings and site. Note all conditions as to character and extent of work involved.

1. General requirement:

Do not begin demolition or deconstruction until authorization is received from the Owner's Project Manager. The work of this section is to be performed in a manner that maximizes the value derived from the salvage and recycling of materials. Remove rubbish and debris from property daily, unless otherwise directed. Store materials that can't be removed daily in area specified by the county.

B. Protection:

1. Execute demolition work in orderly and careful manner with due consideration for existing structures and all parts of surrounding areas which are to remain. Barricade and cover as necessary to protect employees, workers, property, and public.
2. Provide, erect and maintain all bracing, shoring, light barricades, warning signs, and guards as necessary.
3. Maintain existing utilities indicated to remain, keep in service, and protect against damage during work.
4. Provide protective measure as required to provide free and safe passage of Owner and public to and from occupied portions of site.

C. Occupancy: Owners will be continuously occupying areas of site adjacent to areas of demolition. Conduct work in such a manner that will minimize need for disruption of Owner's normal operation.

D. Damages: Promptly repair damages caused to adjacent facilities by demolition work and at no cost to Owner.

2.00 PRODUCTS

Not Applicable

3.00 EXECUTION

3.01 DEMOLITION

A. Obtain all required permits.

B. For items to be salvaged, carefully demolish portions or anchorage devices required to remove the item from its attachment location. Dismantle in manageable sections maintaining attachment devices required to reinstall the item of indicated. If to be reinstalled as a part of this project, store and protect from damage or theft. If item is not to be reinstalled as a part of this project, package and transport to a storage location as directed by the Owner.

- C. Arrange for all utility disconnections required prior to building demolition and submit certification to the Building Department that all utilities have been disconnected as required.
 - D. Remove all structures and materials as shown. Remove building foundations and utilities as shown. Remove trees including stumps as shown.
 - E. Remove existing pavement and base rock as shown within the limit of works.
 - F. Existing utilities shown on the drawings are schematic only and are intended to aid the contractor in his work. Any facilities or utilities in which the location varies from that shown shall be directed to Architect's attention.
 - G. Execute work in an orderly and careful manner in accordance with specified schedule of operation.
 - H. Provide warning signs to protect the public.
 - I. Keep all through lanes and drives clean and clear.
 - J. Conduct operations so as to not interfere with or damage adjacent streets, drives, walks, landscaping and the like.
 - K. Temporarily disconnect any electrical, water or other utilities within area of work. Scheduled shut-downs only when necessary, and only after giving required notice.
 - L. If unanticipated elements which conflict with intended function are encountered, investigate and measure both nature and extent of the conflict. Immediately submit report to Architect in detail. Pending receipt of directive from Architect, rearrange demolition schedule as necessary to continue overall work progress without delay.
 - M. Take necessary precautions to avoid damage to existing items to remain in place, to be reused, or to remain the property of the county. Repair or replace damaged items as approved by the county. Coordinate the work of this section with all other work indicated. Construct and maintain shoring, bracing, and supports as required. Ensure that structural elements are not overloaded. Repairs, reinforcement, or structural replacement require approval by the county prior to performing such works.
- 3.02 DISPOSAL
- A. Removal from site: Debris, rubbish, and other materials from demolition operation.
 - B. Comply with County required debris sorting and recycling goals. Document recycling efforts and submit to the County so the Owner can be refunded the monetary recycling deposit made with the County
- 3.03 CLEANING
- A. Completion of demolition work: Clean and leave the property and adjacent areas in a clean and debris-free condition.

SECTION 02300 - EARTHWORK**1.00 - GENERAL**

1.01 DESCRIPTION

- A. Work included: Furnish and install all earthwork for the buildings and site as shown and specified:
 - 1. Stripping and excavation for improvements.
 - 2. Sub-grade fill.
 - 3. Backfill and base.

- B. Related work specified elsewhere:
 - 1. Demolition – Section 02220
 - 2. Asphalt Pavement – Section 02740
 - 3. Concrete Work - Section 03300

1.02 QUALITY ASSURANCE

- A. Percentage of compaction specified shall be the minimum acceptable. The percentage represents the ratio of the dry density of the compacted backfill material to the maximum dry density of the material as determined by the procedure set forth in ASTM D-1557.

1.03 APPLICABLE PUBLICATIONS

- A. The publications listed below from a part of specification to the extent referred. The publication is referred to in the text by the general designation only.

- B. American Society for testing and materials (ASTM) Publications:
 - ASTM C136
(2014) standard test method for sieve analysis of fine and coarse Aggregates.

 - ASTM C33
(2013) Standard Specification for concrete Aggregates.

 - ASTM D1557
(2012; E2016) Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbs/ft³)

 - ASTM D2487
(2011) Soils for Engineering Purposes (Unified Soil Classification System)

 - ASTM D4318
(2010; E2014) Liquid Limit, Plastic Limit, and Plasticity Index of soils.

1.04 ENVIRONMENTAL CONDITIONS

- A. Weather limitations: Do not excavate during unfavorable weather conditions. Does not place, spread or compact fill materials during wet or otherwise unfavorable weather conditions.

1.05 PROTECTION

- A. Protection-general: Provide adequate protection for workers and streets and adjacent property throughout operations.
- B. Shoring, sheeting and bracing: Provide to prevent caving, erosion or gulying of sides of excavation.
- C. Site and construction area: Provide for surface drainage during construction period in a manner to avoid creating a nuisance to the adjacent areas. When operations are interrupted by unfavorable weather conditions, prepare areas by grading and compaction to avoid ponding and erosion.
- D. Excavations: Protect from rain or water from any source during construction. Use suitable pumping equipment or other means as required by the conditions. Continue pumping as necessary until the completion of the project or until released by the Architect.
- E. Existing trees, lawns and shrubs: Protect within area of work by fencing or barricades. Protective measures shall not endanger the life, growing and maintenance requirements of the plant material.
- F. Adjacent property: Protect from damage. Restore any damage to the original condition without cost to the owner.
- G. Dust control: Alleviate or prevent dust nuisance on or about the site by watering or other means deemed necessary. Contractor shall assume all liability for all claims relating to dust or windblown materials attributable to his work.

1.06 SUBMITTALS

- A. Samples: Submit for testing and approval, at least 10 days prior to start of earthwork, representative 5 lb. samples of rock fill and any proposed import material. Samples shall indicate material source.

1.07 SOIL INVESTIGATION

- A. See Owner's soils investigation report for the Project site, prepared by Bay Area Geotechnical Group (BAGG). The report is on file in the County Project Manager's office and may be viewed by all interested parties. This report was prepared for the County, Architect and Engineers for their knowledge and information in preparation of the drawings and specifications and is not part of the Contact Documents.

1.08 QUALITY ASSURANCE

- A. Geotechnical Services: The County will retain the services of the Geotechnical Engineer during construction for compliance with the contract documents. He will observe the footing excavations, the exposed grade in floor slab areas and placement and compaction of fill and backfill materials
- B. If results of tests of in-place materials indicate that they do not meet the specifications, remove the materials and replace to achieve the required results.

1.09 DEFINITIONS

- A. Excavation: Consists of removal of material encountered to subgrade elevations indicated to the depth and limits beyond the building pad noted in the soils report and subsequent disposal of materials removed.

- B. Unauthorized excavation: Consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be at Contractor's expense.

Under footings, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position, when acceptable to Architect.

In locations other than those above, backfill and compact unauthorized excavations of same classification, unless otherwise directed by Architect.

- C. Subgrade: Undisturbed earth or the compacted fill layer immediately below granular subbase, drainage fill or topsoil materials.
- D. Structural Fill: All soil or soil-rock material placed at site in order to raise grades or to backfill excavations.
- E. Import Material: Material obtained from off-site borrow areas, as approved by the soils engineer.
- F. ASTM Specifications: Latest edition of the American Society for Testing and Materials (ASTM) Standards.
- G. Relative Compaction: The ratio, expressed as a percentage of the in-place dry density of the compacted fill material to the maximum dry density of the same material, as determined by ASTM Test Designation D-1557 laboratory compaction procedure.

2.00 - PRODUCTS

2.01 MATERIALS

- A. Import structural fill: all import shall be reviewed and approved by the soils engineer prior to being transported to the site. Plasticity Index no greater than 12%, minimum R-value greater than 25, free of rocks greater than 3" in longest diameter and approved by Geotechnical Engineer.
- B. Base rock: Class II aggregate base per Section 26, Standard Specification. For use as fill on top of compacted sub fill and under concrete slab: minimum 6" thick.
- C. Vapor barrier: Vapor barrier must have all of the following qualities:
1. Permeance of less than 0.01 Perms [grains/(ft² · hr · inHg)] as tested in accordance with ASTM E 1745 Section 7.
 2. Other performance criteria:
 - a. Strength: ASTM E 1745 Class A.
 - b. Thickness: 15 mils minimum
 3. Vapor barrier products:
 - a. Basis of Design: Stego Wrap Vapor Barrier (15-mil) by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.
 4. Seam tape:
 - a. Stego Tape by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.
 5. Vapor-proofing mastic:
 - b. Stego Mastic by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.
- D. Sand fill: None

E. SATISFACTORY MATERIALS

Satisfactory materials comprise any material by ASTM D2487 as indicated in the Geotechnical Report. Satisfactory materials for grading comprise stones less than 8 inches, except for fml material for pavements which comprise stones less than 3 inches in any dimension.

F. UNSATISFACTORY MATERIALS

Materials which do not comply with the requirements for satisfactory materials are unsatisfactory. Unsatisfactory materials also include man-made fills; trash; refuse; backfills from previous construction; and matter or frozen material. Notify county officer when encountering any contaminated materials.

3.00 - EXECUTION

3.01 LAYOUT

- A. Layout of all work: Responsibility of Contractor.
- B. Discrepancies: If any discrepancies are found between drawings and actual conditions at the site, Architect reserves the right to make such minor adjustments in work specified, as necessary to accomplish the intent of the Contract Documents, without additional cost to the Owner.

3.02 EXISTING UTILITIES

- A. Existing utilities: Not shown on drawings are encountered, support, shore up, protect same and immediately notify Architect. Allow entrance, opportunity and ample time for measures necessary for continuance and/or relocation of such services.
- B. Repair damaged utilities: To satisfaction of utility owner.
- C. Abandoned utilities: Remove from the site.

3.03 CLEARING and EXCAVATION

- A. Remove all deleterious materials, including trees, concrete, existing foundations, topsoil, roots, vegetation, and designated utility lines from building, driveway and parking areas.
- B. Strip the site to a depth as required for new soils, base rock, paving and slabs.
- C. At all new construction excavate to a depth as indicated by the soils report and 5'-0" beyond the building line.
- D. After the site has been properly cleared, stripped and excavated to the required grades, scarify the exposed soil in areas to receive structural fill to a depth of 12", moisture condition and compact to the specification for structural fill.
- E. Elevations noted on the drawings are for estimated purposes only and may be adjusted in the field by Architect to suit conditions as found. Cost differences shall be adjusted by Change Order to the Contractor.
- F. Do not make unnecessary excavations.

- G. Backfill excess excavation under footings with concrete at the Contractors expense. Where footings are overdug laterally, provide sideforms for backfill with backfill or concrete backfill.
- H. Bottoms of all footings and foundation trenches shall be subject to testing. Execute corrective measures as directed.

3.04 TEMPORARY SLOPES and EXCAVATIONS

- A. Design and construction of all temporary slopes and any required shoring is the responsibility of the Contractor.
- B. Provide shoring and bracing in accordance to regulatory agencies requirements, including current OSHA excavation and safety standards. Excavations less than 5 feet high may be cut vertical. The upper 5 feet of higher unshored slopes up to 10 feet deep may be cut 1:1 with the lower portion vertical.
- C. Because of the variable nature of the existing soil and relatively high ground water table, field modifications of temporary cut slopes may be required.
- D. Trim off unstable materials encountered on the slopes during the excavation even it this requires cutting the slope back at flatter inclinations.

3.05 COMPACTION

- A. Compact scarified surface soils and structural fill in uniformed lifts, no thicker than 8" in uncompacted thickness, conditioned to the appropriate moisture content as listed below.

<u>Fill</u>	<u>Compaction</u>	<u>Moisture Content</u>
Structural fills thicker than 5':	95%	3%-5% above optimum
All other fill:	90%	3%-5% above optimum

<u>Pavement</u>	<u>Compaction</u>	<u>Moisture Content</u>
Aggregate base rock and subbase:	95%	3%-5% above optimum
Upper 12" of soil below base rock:	90%	3%-5% above optimum

<u>Utility trenches</u>	<u>Compaction</u>	<u>Moisture Content</u>
Imported sand:	95%	at optimum
On-site soils:	90%	3%-5% above optimum

3.06. STRUCTURAL FILL and BACKFILL

□ Degree of compaction required is expressed as a percentage of the maximum density obtain by the test procedure presented in ASTM D1557 abbreviated as a percent of laboratory maximum density. Since ASTM D1557 applies only to soils that have 30 percent or less by weight of their particles retained on the ¾ inch sieve, express the degree of compaction.

- A. Scarify, water condition and recompact native soil. Remove tree roots and backfill.
- B. Place 6" minimum of on-site soil or approved non-expansive fill (NEF) evenly in layers in uncompacted thickness. Compact to a minimum of 90% relative compaction (ASTM D-1557, latest edition).
- C. Place 6" minimum of Class 2 aggregate base for pad grade. Compact as above.

- D. Adequately brace and/or shore all footings, walls, etc., against which backfill is to be placed to prevent displacement or damage while backfilling is being placed. Do not remove shores until permanent supports are in place and have attained their strength.

3.07 GRANULAR FILL

- A. Place base rocks fill on top of compacted and approved sub-grade under concrete slabs. Spread evenly to 6" minimum depth shown under concrete slabs.
- B. Place this fill just prior to placing concrete slab. Protect and maintain in a clean and debris free condition.
- C. At building slab, place moisture barrier over rock base course, lap joints 6" and seal with Stego Tape. Seal penetrations with Stego Tape.

3.08 FINISH GRADING

- A. Perform all cutting, filling, backfilling and grading necessary to bring entire area to elevations indicated.
- B. Grades uniformly smooth, compact the finish surface and free from irregular surface changes.
- C. Grade surfaces to drain water away from the building.
- D. Reasonably adjust grades and elevations during progress of work to accommodate the intent of drawings and specifications.

E. DRAINAGE

Provide for the collection and disposal of surface and surface water encountered during construction. Completely drain construction site during periods of construction to keep soil material sufficiently dry. Construct storm drainage features at the earliest stages of site development, and throughout construction grade the construction area to provide positive surface water runoff away from construction activity and provide temporary swales, ditches, and other drainage features and equipment as required to maintain dry soils.

3.09 DUST ALLEVIATION and CONTROL

- A. Provide pollution and dust abatement and control measures continuously during the course of the work.

3.10 CLEANING

- A. Remove from the site all rubbish, debris, etc., resulting from work in this Section.

SECTION 02660 - WATER SYSTEMS**1.00 - GENERAL**

1.01 WORK INCLUDED

- A. Trenching and other excavation.
- B. Ground water control.
- C. Pipe bedding.
- D. Installation of water lines and appurtenances.
- E. Backfill and compaction of backfill.
- F. Sterilization and testing.
- G. Dust alleviation and control.
- H. Cleanup and restoration of surface in improved areas.
- I. Supplying all labor, materials, equipment and apparatus not specifically mentioned herein or noted on the plans, but which are incidental and necessary to complete the work specified.

1.02 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the general designation only.
- B. American Society for Testing and Materials (ASTM) Publications:
 - ASTM A536
(1984; R 2014) Standard Specification for Ductile Iron Castings
 - ASTM D1785
(2012) Standard Specification for Poly (Vinyl Chloride) (PVC), Plastic Pipe, Schedules 40, 80, and 120
 - ASTM D2466
(2013) Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
 - ASTM D2467
(2013a) Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
 - ASTM D2564
(2012) Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems
 - ASTM F477
(2014) Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
- C. American Water Works Association (AWWA) Publications

AWWA C111/A21.11
(2012) Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings

AWWA C153/A21.53
(2011) Ductile-Iron Compact Fittings for Water Service

AWWA C500
(2009) Metal-Seated Gate Valves for Water Supply Service

AWWA C502
(2014) Dry-Barrel Fire Hydrants

AWWA C503
(2014) Wet-Barrel Fire Hydrants

AWWA C509
(2009) Resilient-Seated Gate Valves for Water Supply Service

AWWA C605
(2013) Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water

AWWA C651
(2014) Standard for Disinfecting Water Mains

AWWA C900
(2007; Errata 2008) Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4 In. Through 12 In. for Water Distribution

1.03 QUALITY ASSURANCE

- A. Water mains, services and appurtenances shall be subject to hydrostatic and leakage tests.

Prior to hydrostatic testing, obtain county approval of the proposed method for disposal of waste water from hydrostatic testing.

- B. Water mains, services, and appurtenances shall be sterilized prior to connection to existing systems.

Prior to disinfection, obtain county approval of proposed method for disposal of wastewater from disinfection procedures. Disinfect new water piping and existing water piping affected by contractors operations in accordance with AWWA C651.

- C. Submit manufacturer's data on the pipe material, fittings, valves and service material.
- D. The maximum allowable deflection (out of roundness) of PVC pipe under superimposed loads shall be 5%, or 75% of the manufacturers recommended maximum, whichever is smaller.
- E. The Engineer may require manufacturer's certificates showing conformance with this specification for any of the pipe materials, fittings, valves and appurtenances delivered to the job site.

1.04 JOB CONDITIONS

- A. Note and conform with conditions and requirements indicated and specified in construction documents.

2.00 - PRODUCTS

2.01 PIPE MATERIALS

- A. Water mains 12" in diameter or less shall be PVC pressure pipe conforming to the applicable requirements of AWWA Specification C900 for class 200 pipe having a dimension ratio (DR) of 14 and a cast iron pipe equivalent outside diameter.
- B. Maximum length of each section of pipe between elastomeric rings shall be twenty (20) feet.
- C. Each length of pipe shall have the words "DOMESTIC WATER" stenciled with 1-5/8" high lettering in permanent ink, at 2-foot spacing along its length.
- D. The Contractor may substitute pressure-sensitive tape in lieu of stenciling. Adhesive Backed Pipe Labeling Tape shall be PVC Plastic tape manufactured specifically for direct placement onto pipe, cable or conduit for warning and identification. Tape shall be a minimum of 2.2 mils, an adhesive strength of 26 psi, and with tensile strength of 32 lb. per inch of width. Tape shall be of the type provided in rolls, color coded for the utility involved with warning and identification imprinted in bold letters continuously and repeatedly over entire tape length. Code and letter coloring shall be permanent, unaffected by moisture or other substances contained in trench material.

2.02 PIPE COUPLINGS

- A. All couplings for use on PVC pipe for water lines shall be manufactured from the same materials and in compliance with the specifications set forth herein before for PVC pipe for water lines. Each coupling shall be equipped with two rubber rings, which fit into individual grooves formed in the inner wall of the coupling to eliminate blowouts or leaks.
- B. Rubber rings for use with PVC pipe couplings, fittings and appurtenances shall be manufactured from properly vulcanized rubber compounds to a uniform cross-section free from porosity, pits and blisters in conformance with the requirements of ASTM Designation F-477.

2.03 FITTINGS

- A. Fittings for use on PVC pressure pipe shall be ductile iron castings conforming to the applicable requirements of AWWA Standard C153 for two-hundred fifty (250) psi working pressure. Joints shall be rubber gasketed per AWWA C-111.
- B. Tapping sleeves shall be all stainless steel, with flat-faced flange to mate with standard tapping valves, with 3/4" NPT test plug, Mueller H-304, Smith-Blair 622, JCM 432, or equal.
- C. Fittings shall be elastomeric Seals (Gaskets) for Joining Plastic Pipe
- D. Joints for pipe and fittings shall be push-on joints or mechanical joints unless otherwise indicated.

2.04 VALVES AND VALVE BOXES

- A. Gate valves shall conform to the requirements of AWWA C509 for resilient-seated valves. Stems shall be fitted with a 2" x 2" square wrench nut and shall be manufactured to open counter-clockwise. Stem extensions shall be installed to bring the operating nut to within two (2) feet of finish grade where the depth from finished grade to operating nut exceeds four (4) feet. Gate valves shall be used for all valves ten (10) inches and smaller and shall be FUSION EPOXY lined and coated in conformance with the Specifications.
- B. AWWA C500, AWWA C509, AWWA C515. Or UL 262 Unless otherwise specified, valves conforming to: (1) AWWA C500 shall be non-rising stem type with double-disc gates and mechanical-joint ends or push-on joint ends as appropriate for the adjoining pipe, (2) AWWA C509 or AWWA C515 shall be non-rising stem type with mechanical-joint ends [or resilient-seated gate valves 3 to 12 inches in size], and (3) UL 262 shall be inside-screw type with operating nut, double-disc or split-wedge type gate, designed for a hydraulic working pressure of 200 psi and shall have mechanical-joint ends or push-on joint ends as appropriate for the pipe to which it is joined. Materials for UL 262 valves shall conform to the reference standards specified in AWWA C500. Valves shall open by counterclockwise rotation of the valve stem. Stuffing boxes shall have O-ring stem seals. Stuffing boxes shall be bolted and constructed so as to permit easy removal of parts for repair. In lieu of mechanical-joint ends and push-on joint ends, valves may have special ends for connection to sleeve-type mechanical coupling. Valve ends and gaskets for connection to sleeve-type mechanical coupling shall conform to the applicable requirements specified for the coupling. Where a post indicator is shown, the valve shall have an indicator post flange; indicator post flange for AWWA C500 valve shall conform to the applicable requirements of UL 262.
- C. Square wrench nut shall be brass and all other nuts, bolts, and washers throughout the valve and valve body shall be stainless steel, ASTM A-276, Type 316.
- D. Valves shall be provided with traffic valve boxes and cast iron traffic covers with "water" canted thereon, set in a concrete base as shown and dimensioned on the detail therefore on the plans.

2.05 WATER SERVICES

- A. Water service lines four (4) inches in diameter and larger shall be PVC pressure pipe and couplings conforming to the requirements of AWWA Standard C900 for Class 200 pipe and couplings as herein specified for PVC pressure water mains.
- B. Water service lines two (2) inches in diameter or less, shall be polyethylene Plastic Pipe Class 200, conforming to the requirements of ASTM Designation D2467 for the size indicated on the plans.
- C. Fittings, couplings and water service material shall be bronze and all nipples shall be brass of the size and type called for on the plans.
- D. Water meters and detector meters shall be purchased from and installed by the city, unless otherwise shown.
- E. Meter box shall be provided for each water meter as shown on the plans, and shall conform to the size shown on the City Standard Details.

2.06 LOCATING WIRE

- A. Locating wire for use with plastic pipe installations shall be stranded copper, eight (8) gauge type TW or THHN electrical wire with solid blue jacket.

- B. Connect locating wire to metallic fittings with brass wire split nuts.

2.07 CONCRETE FOR THRUST BLOCKING

- A. Reinforcement for concrete thrust blocking shall be deformed steel bars conforming to City standard and specifications.
- B. Concrete for thrust blocking shall be Portland cement concrete conforming to the applicable requirements of City standard and specifications.

2.08 PIPE BEDDING AND BACKFILL MATERIAL

Pipe bedding and backfill material shall conform to City specifications.

3.00 - EXECUTION

3.01 TRENCHING, BACKFILLING AND SHORING

- A. Shall conform to City Specifications.

3.02 PIPE INSTALLATION

- A. Installation: Pipe, valves, fittings and appurtenances shall be installed in accordance with the best practice, and in conformance with the applicable requirements of the AWWA Standards. Each length of PVC pipe shall be rotated so that the stenciled or taped words "DOMESTIC WATER" will be located on the top of the pipe.
- B. Handling: Pipe, valves, and fittings shall be carefully handled during hauling, unloading, and placing operations, so as to avoid breakage or damage. Strap-type slings shall be used for lifting and placing; no chains or hooks will be permitted. Broken or damaged pipe or appurtenances will be rejected by the Engineer and shall thereupon be removed from the work and replaced.
- C. Alignment: All pipe shall be accurately laid in conformity with the prescribed lines and grades as established by the Engineer. Each length shall be jointed to the preceding section as specified, and after said jointing has been completed, there shall be no movement of the pipe in subsequent operations.
- D. Pipe Deflections: The laying of pipe on curved alignment will be permitted up to one-half the deflection as recommended by the respective pipe manufacturer.
- E. Cleaning: Before each new length of pipe is placed, the interior of the preceding pipe shall be carefully cleaned of all dirt and debris. When laying pipe not in progress, all open pipe ends shall be closed with watertight plugs in a satisfactory manner.
- F. Bearing: Pipe in the trench shall have continuous uniform bearing along its bottom, except at bell holes. Blocking used to support the pipe during laying shall be placed at the end of the section and shall be removed before laying the next section. Before lowering pipe into the trench, the Contractor shall remove all stakes, debris, loose rock and other hard material from the bottom of the trench.
- G. Positioning: After the final positioning, the pipe shall be held in place in the trench with backfill material placed equally on both sides of the pipe at as many locations as are required to hold the pipe section in place. After joints are completed, the backfill material shall be redistributed and compacted as herein required.

- H. Closure: At the end of each day and when work is not in progress, the open ends of pipe installed in the line shall be closed with watertight plugs or caps.
- I. Thrust: Blocking: Concrete thrust blocks of the form and dimensions shown or noted on the plans shall be provided at all changes in horizontal or vertical alignment and at such other points as may be called for on the plans. Thrust blocks shall be installed in strict conformance with the details shown or noted on the plans.

3.03 CONNECTIONS TO EXISTING SYSTEMS

- A. Connections to existing systems shall not be made until the new mains have been satisfactorily sterilized and tested.

3.04 TESTING AND STERILIZATION

- A. The Contractor shall provide all necessary material and equipment, and shall perform all work required in connection with the testing and sterilization of the water system, as specified herein. Hydrostatic and leakage tests shall be made only after the trenches have been backfilled sufficiently to hold the pipe firmly in position. The Contractor shall provide all water necessary for filling, flushing, sterilization, and any required tests including all labor and equipment required.
1. Repairs and Re-tests: Any flaw disclosed by any of the above tests shall be repaired and satisfactorily re-tested.
 2. Hydrostatic Test: All water pipe shall be subjected to a hydrostatic test of 200 psi unless otherwise specified or directed. Each section being tested shall be slowly filled with water, care being taken to expel all air from the pipe by such means as are necessary. The pipes must be flushed before testing to remove any foreign material. Water shall be allowed to stand in the pipe for twenty-four (24) hours before test pressure is applied. The required pressure, as measured at the lowest elevation, shall be applied for not less than one (1) hour. Any leakage discovered in consequence of the pressure test shall be corrected and the test shall be repeated until satisfactory. Any excavation, defective pipe, fittings, valves, or joints shall be repaired or replaced at no additional cost to the Governed Agency.
 3. Leakage Tests: After the hydrostatic pressure test has been satisfactorily completed, each section of the line shall be subject to a leakage test, which is defined as the quantity of water to be supplied into the line necessary to maintain the specified test pressure after the pipe has been filled with water and the air expelled.
 - a. For domestic water and fire service lines the duration of each leakage test shall be not less than four (4) hours, unless otherwise specified, and during the test the pipe shall be continuously subject to hydrostatic pressure of 200 psi, as measured at the lowest elevation. The specified test pressure shall be satisfactorily applied by means of a pump connected to the pipe. The test pressure shall be maintained for the specified time and shall not be allowed to drop more than 5 psi during which all exposed pipe, couplings, fittings, valves and hydrants shall be examined carefully. No pipe installation will be accepted if the leakage for the section of line that is tested is more than the allowance stated below:

PIPE DIAMETER	LEAKAGE PER 100 JOINTS
(Inches)	(Gal./Hr.)
Less than	

4	0.76
6	1.14
8	1.52
10	1.92
12	2.30
14	2.67
16	3.06
18	3.44

- b. When test results indicate leakage beyond that allowed, Contractor shall conduct a survey of the line, and any leaks found shall be repaired, after which the leakage test shall be repeated until satisfactory conformance to this specification is demonstrated.
4. Sterilization: Prior to acceptance and before being placed in service, all new water lines shall be chlorinated in accordance with the requirements of AWWA Standard C651. The Contractor shall have the option of applying chlorine to the entire water content of the line, including services, fire hydrants and stubs, in sufficient quantity to produce a residual of at least ten

(10) ppm after twenty-four (24) hours retention; or of applying the chlorine to a portion of the water at a higher concentration which is passed through the line as a "slug", at a velocity which will result in a contact period of at least one (1) hour; all as stipulated in the above mentioned AWWA Standard.

- a. If the Contractor elects to employ the use of the "Tablet" for of chlorination by mounting tablets into the pipe sections as they are installed, he shall determine the minimum number of tablets per pipe length that will be allowed. In the event that adequate disinfection is not obtained using said minimum number of tablets, it shall be the Contractor's responsibility for re-chlorination until a satisfactory result is obtained.
- b. After chlorination has been satisfactorily completed, the lines shall be thoroughly flushed until the chlorine content in all parts of the system has been proven by test to be comparable to the chlorine content of the City Water System.
- c. It shall be the responsibility of the Contractor to law-fully dispose of the chlorinated water and flushing water, and avoid flooding or damage to adjacent properties or facilities.
- d. After flushing the chlorine from the water system, the Contractor shall engage the services of an approved Commercial testing laboratory, approved by the State of California Department of Public Health, to gather an approved number of representative water samples, the location and number of which shall be determined by the Engineer.
- e. No section of water systems will be allowed to be connected to the City's existing water system when any sample of water tests to 1.0, or more, of coliform bacteria colonies per 100 milliliter of sample, as tested by the Membrane Filtration Method. Should the laboratory report show that any sample taken was not acceptable, Contractor shall re-chlorinate and test the water again as herein before specified. This process shall be repeated until a satisfactory sterilization has been accomplished.

- f. Contractor shall direct the laboratory to send the original report of Bacteriological Examination to the Engineer.

3.05 CLEAN UP

Upon completion of the installation of water lines, and appurtenances, all debris and surplus materials resulting from the work shall be removed.

* * *

SECTION 02720 - STORM DRAINAGE**1.00 - GENERAL**

1.01 WORK INCLUDED

- A. Installation of storm drains and appurtenances.
- B. Dust alleviation and control.
- C. Cleanup and restoration of surface in improved areas.
- D. Supplying all labor, materials, equipment and apparatus not specifically mentioned herein or noted on the plans, but which are incidental and necessary to complete the work specified.

1.02 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the general designation only.
- B. American Society for Testing and Materials (ASTM) Publications:
 - ASTM A48
(2003; R 2012) Standard Specification for Gray Iron Castings
 - ASTM C76
(2015) Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
 - ASTM C443
(2011) Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
 - ASTM C478
(2015) Standard Specification for Precast Reinforced Concrete Manhole Sections
 - ASTM D1784
(2011) Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
 - ASTM D1785
(2012) Standard Specification for Poly (Vinyl Chloride) (PVC), Plastic Pipe, Schedules 40, 80, and 120
 - ASTM D2564
Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems
 - ASTM D2729
(2011) Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
 - ASTM D3034
(2014a) Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
 - ASTM F477
(2014) Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

1.03 QUALITY ASSURANCE

- A. Submit manufacturer's data on pipe, drainage structure and castings to be used.
- B. The Engineer may require manufacturer's or supplier's certificates showing conformance with this specification to be delivered with each shipment of material delivered to the job site.
- C. D-Load or class of pipe requirements shown or called for on the plans shall be the minimum acceptable.
- D. All pipes shall bear the manufacturer's label for the type, specification, and classification of the pipe.
- E. All storm drains shall be subject to passing a ball test.

1.04 JOB CONDITIONS

- A. Note and conform to conditions and requirements indicated and specified under Section 02202 of the Specifications.

2.00 - PRODUCTS

2.01 POLYVINYL CHLORIDE PIPE

- A. PVC pipe for minor storm drains less than twelve (12) inches in diameter shall conform to the requirements of ASTM 3034 or ASTM F477 and shall have a DR rating of 35. All pipe and fittings shall be made of PVC plastic having a minimum cell classification of 12454-B or 13364-B as defined in ASTM D-1784. Pipe barrel shall have the words "STORM DRAIN" marked along the longitudinal axis of the outside in 1-5/8" high block letters with permanent ink. The words shall be repeated at 2-foot spacing along the pipe length.
- B. The Contractor may substitute pressure-sensitive tape in lieu of stenciling. Adhesive-backed Pipe Labeling Tape shall be PVC Plastic tape manufactured specifically for direct placement onto pipe, cable or conduit for warning and identification. Tape shall be a minimum of 2.2 mils, an adhesive strength of 26 psi, and with tensile strength of 32 lb. per inch of width. Tape shall be of the type provided in rolls, color coded for the utility involved with warning and identification imprinted in bold letters continuously and repeatedly over entire tape length. Code and letter coloring shall be permanent, unaffected by moisture or other substances contained in trench material.
- C. Couplings and fittings for use with PVC non-pressure pipe shall be of the same materials and in compliance with the requirements specified for the pipe. Couplings and fittings shall be equipped with rubber rings which fit into individual grooves formed in the inner wall to the requirement of ASTM Designation F-477.

2.02 PVC UNDERDRAINS

- A. PVC underdrains shall consist of four (4) inch Schedule 40 perforated Poly Vinyl chloride (PVC) pipe conforming to the requirements of ASTM Designation D1785.
- B. Joints and fittings for PVC underdrains shall conform to the requirements of ASTM Designation D1785.
- C. Solvent cement for joining PVC underdrain pipe, couplings and fittings shall conform to the requirements of ASTM Designation D2564.

- D. Permeable material bedding and cover for subsurface drains shall be as specified in construction documents.
- E. Filter Fabric for underdrains shall conform to Construction document requirements.

2.03 STORM DRAIN MANHOLES

- A. Barrel and cone sections for storm drain manholes shall be precast reinforced concrete of the form and dimensions shown and detailed on the plans and shall conform to the requirements of ASTM Designation C478. Concrete used for manhole barrel and cone sections shall conform to the Governing agency requirements of these Specifications.
- B. Frames and covers for manholes shall be gray iron castings of the form and dimensions shown and detailed on the plans and shall conform to the requirements of ASTM Designation A48 for Class 30B castings. Frames and covers shall be match marked in sets which have been machined after fabrication to provide a firm and continuous seat. Each cover shall have cast into it the raised letters "STORM DRAIN". All castings shall be thoroughly cleaned and coated with commercial quality asphaltic varnish prior to delivery.
- C. Steps for manholes and other storm structures shall be polypropylene to the form and dimensions shown and detailed on the plans.
- D. Concrete for manhole bases shall conform to City standards and Specifications.
- E. Reinforcement for manhole bases shall be deformed steel bars conform to City Standard and specification. Size and shape of reinforcement shall conform to the details shown on the plans.
- F. Mortar for precast manhole section joints shall consist of one (1) part Portland Cement conforming to the requirements of City standard and specifications, with two (2) parts of sand by volume. Sand shall be well graded and of such size that all will pass a No. 8 sieve.
- G. Concrete for manhole frame anchor slabs shall conform to the City standard and specifications.

2.04 PIPE FOR STORM DRAINS

2.04.01 CONCRETE PIPE

Manufactured in accordance with and conforming to ASTM C76; Class III

2.04.02 DRAINAGE STRUCTURES

Pre-cast Reinforced Concrete Box manufactured in accordance with and conforming to ASTM C1433.

2.0 PIPE BEDDING AND COVER MATERIAL

- A. Pipe bedding and cover material shall conform to City standard and specifications.

3.00 - EXECUTION

3.01 TRENCHING, BACKFILLING AND SHORING

- A. Conform to City standard and specifications.

3.02 PIPE INSTALLATION

Installation: Storm drain pipe, underdrains and appurtenances shall be installed in accordance with the best practice, and in conformance with the plans and these Specifications.

- B. Handling: Pipe shall be carefully handled during hauling, unloading, and placing operations, so as to avoid breakage or damage. Strap-type slings shall be used for lifting and placing; no chains or hooks will be permitted. Broken or damaged pipe including chipped bells of spigots, will be rejected, and shall be removed from the work site.
- C. Alignment: All pipes shall be accurately laid in conformity with the prescribed lines and grades as established by the Engineer. Each length shall be joined to the preceding section as specified, and after said jointing has been completed, there shall be no movement of the pipe in subsequent operations.
- D. Pipe Deflections: The laying of pipe on curved alignment will be permitted only when necessary to conform to the alignment shown or called for on the plans. Joint deflections called for on the plans shall be permitted up to one half of the deflection recommended by the pipe manufacturer.
- E. Cleaning: Before each new length of pipe is placed, the interior of the preceding pipe shall be carefully cleaned of all dirt and debris. When laying pipe not in progress, all open pipe ends shall be closed with plugs in a satisfactory manner to the Engineer.
- F. Bearing: Pipe in the trench shall have continuous uniform bearing along its bottom, except all bell holes. Before lowering pipe into the trench, the Contractor shall remove all stakes, debris, loose rock and other hard material from the bottom of the trench.
- G. Positioning: After the final positioning, pipe shall be held in place in the trench with cover materials placed equally on both sides of the pipe at as many locations as required to hold the pipe section in place. Position plastic pipe with "STORM DRAIN" markings facing up. After joints are completed, the cover material shall be redistributed and compacted as herein required.
- H. Closure: At the end of each day and when work is not in progress, the open ends of pipe installed in the line shall be closed with plugs and openings for appurtenances shall be suitably covered.

3.03 CONNECTIONS

- A. Unless separately listed on the bid schedule, make all required connections to existing facilities and improvements at no additional cost, and compensation for such work shall be deemed as included in the price bid for pipe installation.
- B. All connections to manholes shall be constructed with concrete channels directed toward outlet pipe as shown and detailed on the plans.
- C. Break-out holes in manholes for connecting new pipe shall be grouted all around to prevent ground water infiltration. Pipes shall be cut off flush with the inside surface of the manhole. Use PVC manhole adapters in break-out holes in manholes for connecting new PVC pipe and grout all around to prevent ground water infiltration. Pipes shall be cut off flush with the inside surface of the manhole.
- D. A 2-foot nominal length of pipe shall be used when entering and leaving all manholes and structures.

3.04 STRUCTURES

- A. Structures and appurtenances shall be installed at the location and to the lines and dimensions shown on the plans and detail drawings.
- B. Structures shall be constructed and/or installed in conformance with the applicable requirements of Section 51 of the State Standard Specifications. Unless otherwise noted on the plans or detail drawings, all exposed surfaces of poured in place structures and appurtenances shall have a Class 1 surface finish.
- C. Frames for manholes and tops of catch basins, inlets and other structures in paved areas shall be accurately placed flush with and in the plane of the finish pavement. All manhole frames in paved area shall be secured by means of concrete anchor slabs as shown and detailed on the plans and detail drawings.
- D. All joints and pipe openings on manhole sections, risers, and grade adjustment rings shall be grouted smooth and flush with the interior of the structure in a workmanlike manner.

3.05 STORM DRAIN PLUGS & CLEANING

- A. Where called for on the plans or directed, plugs shall be placed in open ends of storm drains. Plugs shall consist of a brick and mortar wall not less than 8" in thickness constructed in such a manner as to ensure a watertight seal. Mortar for plugs shall conform to the requirements of paragraph 2.04F hereof.
- B. Storm drain pipe and structures shall be cleaned of all dirt, debris, and form work.
- C. Pipes shall be balled with an approved rubber ball to insure cleanliness prior to acceptance.

3.06 UNDERDRAINS

- A. Trenches for underdrains shall be excavated in location shown.
- B. Place filter fabric in the trench to protect the permeable material and pipe prior to backfilling.
- C. Pipe installed and the trench backfilled with permeable material according to the dimensions and details shown on the plans.
- D. Perforated pipe, fabric, and permeable material shall be installed in accordance with manufactural Standard Specifications.

SECTION 02730 - SANITARY SEWERS**1.00 - GENERAL**

1.01 WORK INCLUDED

- A. Trenching and other excavation.
- B. Ground water control.
- C. Pipe bedding.
- D. Installation of sanitary sewers and appurtenances.
- E. Backfill and compaction of backfill.
- F. Infiltration and leakage testing for gravity sewers.
- G. Hydrostatic and leakage testing.
- H. Dust alleviation and control.
- I. Cleanup and restoration of surface in improved areas.
- J. Supplying all labor, materials, equipment and apparatus not specifically mentioned herewith or noted on the plans, but which are incidental and necessary to complete the work specified.

1.02 APPLICABLE PUBLICATIONS

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

- B. American Society for Testing and Materials (ASTM) Publications:

ASTM D1784

(2011) Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds

ASTM D2564

Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems

ASTM D3034

(2014a) Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings

ASTM D3350

(2012) Polyethylene Plastics Pipe and Fittings Materials

ASTM F1417

(2011a) Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low Pressure Air

ASTM F477
(2014) Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

ASTM F794
(2003; R 2014) Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter

ASTM F477
(2014) Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

ASTM F949
(2010) Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings

C. American Water Works Association (AWWA) Publications:

AWWA C110/A21.10
(2012) Ductile-Iron and Gray-Iron Fittings for Water

AWWA C111/A21.11
(2012) Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings

AWWA C115/A21.15
(2011) Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges

AWWA C605
(2013) Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water

AWWA C900
(2007; Errata 2008) Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4 In. Through 12 In. for Water Distribution

AWWA M23
(2002; 2nd Ed) Manual: PVC Pipe - Design and Installation

1.03 QUALITY ASSURANCE

- A. Sanitary sewer gravity mains shall be subject to a ball test, infiltration and leakage tests. Sanitary sewer force mains shall be subject to air testing and hydrostatic and leakage tests.
- B. Class of pipe requirements shown or called for on the plans shall be the minimum acceptable.
- C. Submit manufacturer's data on the pipe material, fittings and service material.
- D. Construction practices for PVC pipe shall comply with Uni-Bell's "Handbook of PVC Pipe".
- E. The Engineer may require manufacturer's certificates showing conformance with this specification with any shipment of materials to the job site.
- F. Field Tests and Inspections: Perform field tests and provide labor, equipment, and incidentals required for testing, except that water and electric power needed for field tests will be furnished by contractor. Be able to produce evidence, when required, that each item of work has been constructed in accordance with the drawings and specifications.

- G. Leakage Tests: Test lines for leakage by either infiltration tests or exfiltration tests, or by low-pressure air tests.
- H. Prior to testing for leakage, backfill trench up to at least lower half of pipe. When necessary to prevent pipeline movement during testing, place additional backfill around pipe sufficient to prevent movement, but leaving joints uncovered to permit inspection. When leakage or pressure drop exceeds the allowable amount specified, make satisfactory correction and retest pipeline section in the same manner. Correct visible leaks regardless of leakage test results.

1.04 JOB CONDITIONS

- A. Note and conform to conditions and requirements indicated and specified in construction documents.
- B. Contractor shall conduct operations and schedule cleanup in a manner to cause the least possible obstruction and inconvenience to traffic, pedestrians and to adjacent property owners or tenants.

2.00 - PRODUCTS

2.01 PIPE MATERIALS

- A. All PVC pipe and fittings for sanitary sewers and laterals shall conform to the requirements of ASTM D-3034 with SDR rating of 26. All the pipe and fittings shall be made of PVC plastic having a minimum cell classification of 12454-B as defined in specification ASTM D-1784. The size of pipe shall be as designated on the plans and the size indicated shall be the internal clear diameter of the pipe. Individual pipe lengths shall not exceed twenty (20) feet in length. All pipes shall be stenciled with the words "SANITARY SEWER" in 1-5/8" high block lettering with permanent ink. The words shall be repeated at 2-foot spacing along the pipe length.
- B. The Contractor may substitute pressure-sensitive tape in lieu of stenciling. Adhesive-backed Pipe Labeling Tape shall be PVC Plastic tape manufactured specifically for direct placement onto pipe, cable or conduit for warning and identification. Tape shall be a minimum of 2.2 mils, an adhesive strength of 26 psi, and with tensile strength of 32 lb. per inch of width. Tape shall be of the type provided in rolls, color coded for the utility involved with warning and identification imprinted in bold letters continuously and repeatedly over entire tape length. Code and letter coloring shall be permanent, unaffected by moisture or other substances contained in trench material.
- C. Joints shall be with either a factory provided, rubber gasketed coupling, or integral bell; couplings or bells shall have a solid rubber ring conforming to ASTM F-477, factory assembled and locked into place to prevent displacement during installation.
- D. Wye branches at the cleanout and the cleanout riser shall be PVC conforming to ASTM D-3034, SDR 26.

2.02 SANITARY SEWER CLEANOUTS

- A. Wye branches and risers for sanitary sewer cleanouts shall conform to the City's Standard Details.

- B. Concrete boxes for cleanouts shall be Christy B-9 with B-9D lid, or equal; provide B9 - C traffic cover if located in vehicular areas.

2.03 PIPE BEDDING AND COVER MATERIAL

- A. Pipe bedding and cover material shall conform to City standard and specifications.

3.00 - EXECUTION

3.01 TRENCHING, BACKFILL AND SHORING

- A. Shall conform to City standard and specifications.

3.02 PIPE INSTALLATION

- A. Installation: Pipe and appurtenances shall be installed in accordance with the best practice, and in conformance with the applicable requirements of the manufacturer's handbooks. Pipe laying shall start at the low end of each section and proceed upgrade. All bell and spigot pipe shall be laid with the bell end upgrade. All pipes shall be laid on a bed prepared by handwork, dug true to line and grade, to furnish a true and firm bearing for the pipe throughout its entire length. Adjustment of pipes to the line and grade shall be made by scraping away or filling in and tamping material under the body of the pipe throughout its entire length and not by blocking or wedging. Unless otherwise indicated or directed by the Engineer, pipe shall be laid continuously through manhole locations and any connections therein made by means of appropriate fittings to provide a smooth and continuous channel. Bell holes shall be provided at the ends of each pipe length of sufficient size to permit making up the particular type of joint being used. Each length of pipe shall be rotated so that the stenciled or taped words "SANITARY SEWER" will be located on the top of the pipe.
- B. Handling: Pipe shall be carefully handled during hauling, unloading, and placing operations, so as to avoid breakage or damage. Strap-type slings shall be used for lifting and placing; no chains or hooks will be permitted. Broken or damaged pipe or appurtenances will be rejected, and shall thereupon be removed from the work and replaced.
- C. Alignment: All pipe shall be accurately laid in conformity with the prescribed lines and grades as established by the Engineer. Each length shall be jointed to the preceding section as specified, and after said jointing has been completed, there shall be no movement of the pipe in subsequent operations.
- D. Pipe Deflections: The laying of pipe on curved alignment by means of un-symmetrical closure of joints will be permitted only when necessary to conform to the alignment shown on the plans. Grade breaks indicated on the plans shall be accomplished by un-symmetrical closure of pipe and NOT by means of fittings. Joint deflections called for on the plans shall be permitted up to one-half of the deflections recommended by the pipe manufacturer.
- E. Cleaning: Before each new length of pipe is placed, the interior of the preceding pipe shall be carefully cleaned of all dirt and debris. When pipe laying is not in progress, all open pipe ends shall be satisfactorily closed with watertight plugs.
- F. Bearing: Pipe in the trench shall have continuous uniform bearing along its bottom, except at bell holes. Before lowering pipe into the trench, the Contractor shall remove all stakes, debris, loose rock and other hard material from the bottom of the trench.

- G. Positioning: After the final positioning, pipe shall be held in place in the trench with backfill material placed equally on both sides of the pipe at as many locations as required to hold the pipe section in place. After joints are completed, the backfill material shall be redistributed and compacted as herein required.
- H. Closure: At the end of each day and when work is not in progress, all open ends of pipe installed in the line shall be satisfactorily closed with watertight plugs.

3.03 CONNECTIONS

- A. Unless separately listed on the bid schedule, Contractor shall make all required connections to existing facilities and improvements at no additional cost, and compensation for such work shall be deemed as included in the price bid for pipe installation.
- B. All connections in manholes shall be constructed with concrete channels directed toward the outlet pipe as shown and detailed on the plans.
- C. Use PVC manhole adapters in break-out holes in manholes for connecting new PVC pipe and grout all around to prevent ground water infiltration. Pipes shall be cut off flush with the inside surface of the manhole.
- D. Use 2-foot nominal lengths of pipe when entering and leaving manholes and structures.

3.04 STRUCTURES

- A. Structures and appurtenances shall be installed at the location and to the lines and dimensions shown on the plans and detail drawings, and as established by the Engineer. Structures shall be installed in conformance with the applicable requirements of City standard and specifications. Precast structures shall be accurately assembled with full mortar bed joints.
- B. Frames for manholes in paved areas shall be accurately placed flush with and in the plane of the finish pavement. Tops of structures in unpaved areas shall be constructed to the grades shown or called for on the plans and established by the Engineer. Manhole frames in new roadway subgrade shall be brought to finish pavement plane and grade immediately after paving operations. All manhole frames in paved areas shall be secured by means of concrete frame anchor slabs as shown and detailed on the plans and detail drawings.

3.05 LATERALS

- A. Unless otherwise noted on the plans, all sanitary sewer laterals shall terminate in a cleanout constructed to the form and dimensions shown and detailed on the plans and detail drawings.

3.06 CLEANING SANITARY SEWERS

- A. Contractor shall flush and clean all sewer mains by means of pneumatic, sewer cleaning balls. The balls shall be of the appropriate size to fit the sewer pipe being cleaned. "Sewer Balling" operations shall be conducted by experienced personnel under the observation of the Engineer. The ball shall be introduced at the uppermost manhole and passed from manhole to manhole by means of a line with sufficient head of water to carry the ball along. The movement of the ball shall be controlled by a rope; care shall be exercised not to feed the ball too rapidly in order that all debris can be removed at each manhole.
- B. Each section of the sewer line shall be thoroughly cleaned before proceeding to the next section. Where sewer balls will not pass, flexible sewer rods with approved spears or

cutters may be used to clear the obstruction. Where obstructions cannot be cleared by sewer rodding, the obstructions shall be removed by excavation at the Contractor's expense. The Contractor shall remove all debris from sewer lines using approved methods.

- C. Installation cost shall include cost for water for sanitary sewer flushing and cleaning operations.

3.07 TESTING SANITARY SEWERS

- A. Sanitary sewer systems including laterals and sanitary force mains shall be tested for tightness after completion of all backfilling and prior to request for final inspection. Contractor shall notify the Engineer at least two (2) working days in advance of proposed testing dates. Tests of gravity sewers shall be made from end or manhole to manhole unless grades are flat enough to permit testing two or more sections at one time. Sections which fail to pass the tests shall be repaired or replaced, and the section retested until it falls within specified allowances.
- B. All water for sanitary sewer testing shall be provided and the tests performed by the Contractor in conformance with the following requirements:

1. Water Leakage Test:

- a. Preparation for Test: The sewer line to be tested shall be plugged at the downstream manhole. All openings in the upstream manhole shall be plugged except the downstream opening for the line to be tested. All branch sewers running from wye connections on the mains shall be plugged at their upper ends if the test head would cause them to overflow. The Test section shall then be filled with water and allowed to stand for at least thirty (30) minutes before test is started.
- b. Test Procedure: The water level in the upstream manhole or test tee shall be brought to a height approximately 4 feet above the crown of the open sewer at the upper end of the test section. The hydrostatic head in the test section shall be maintained so that no point in the section is the head less than four (4) feet or greater than 18 feet. In the case of a submerged section of line, the said head limitation shall be the difference between internal and external water levels. The test shall consist of measuring the loss of water during a one (1) hour period.
- c. Allowable Leakage: The allowable leakage in one (1) hour's time based on an average hydrostatic head of 4 feet for the entire test section, shall not exceed 0.4 gallons per inch of pipe diameter for each 500 feet of pipe.
- d. Manhole Leakage: Should an initial test show excessive leakage in a section of line, it is permissible to draw off the water and test the manhole that contained water. This test shall be made by plugging all openings in the manhole, filling same with water to the same elevation as used for the initial test, and checking the loss in a one-hour period. The leakage so determined may be deducted from the total leakage in the section of pipe initially tested. If, in the opinion of the Engineer, the manhole leakage thus determined is excessive, the Contractor shall waterproof the interior of the manhole by applying a coating of grout or an approved water-proofing material.

3.08 SANITARY SEWER PLUGS

- A. All ends of sanitary sewers provided for future connection shall be plugged with material of the same joint characteristics as specified for the sanitary sewer main or lateral.

3.09 CLEANUP

- A. Upon completion of sanitary sewer construction operations, all lines, manholes, and other structures shall be thoroughly cleaned of dirt, rubbish, debris and obstructions of any kind to the satisfaction of the Engineer, and the entire work site shall be cleaned of all waste, rubbish, and construction debris of any nature.

* * *

SECTION 02740 – ASPHALT PAVEMENT**1.00 - GENERAL**

1.01 DESCRIPTION

- A. Work Included:
 - 1. Spreading and compacting aggregate base material and asphalt concrete pavement.
 - 2. Trench patching and street paving/repair
 - 3. Patching of sections of existing parking lot paving, seal coat, and restriping
 - 4. All materials, equipment and apparatus not specifically mentioned herein or noted on drawings, but which are obviously necessary to complete the work specified.
- B. Related work specified elsewhere:
 - 1. Earthwork – Section 02300
 - 2. Permeable Interlocking Precast Concrete Unit Paving -Section 02743
 - 3. Pavement Markings - Section 02745
 - 4. Concrete Curbs and Gutters – Section 03300

1.02 QUALITY ASSURANCE

- A. Standard Specifications: State of California, Department of Transportation, Standard Specifications, July, 2015.
- B. Standards
 - 1. Spreading and compacting of aggregate base material: Conform to applicable provisions of Section 26, State Standard Specifications.
 - 2. Spreading and compacting of asphalt concrete: Conform to applicable provisions of Section 39, State Standard Specifications.
- C. Allowable Tolerances
 - 1. Finish surface of the aggregate base or aggregate subbase courses: Not vary more than 0.05 feet from grade established by Architect.
 - 2. Finish surface of asphalt concrete when measured with a 12-foot straight edge: Not vary more than 0.01 feet in the direction of rolling and 0.02 feet transversely below lower edge of the straightedge.
 - 3. Thickness of finished pavement section: Not less than the planned thickness at any point in any layer.

4. Percentage of compaction specified: Minimum acceptable. Percentage represents the ratio of the dry density of compacted material to maximum dry density of the material as determined by the procedure set forth in ASTM D-1557.

1.03 JOB CONDITIONS

- A. Aggregate base: Do not apply until subgrade approved.
- B. Prime or tack coat: Do not apply unless the ambient temperature is above 50°F and has not been below 35°F during the 12 hours immediately prior to application. Do not apply prime or tack coats when the surface to be coated is wet or contains an excess of moisture.
- C. Asphalt concrete pavement: Do not apply unless the ambient temperature is above 40°F and the base course has been approved.
- D. Dust alleviation and control measures: Provide continuously during course of construction.

1.04 WORK WITHIN CITY EASEMENT

- A. Obtain permit from City.
- B. Comply with all City requirements.

2.00 - PRODUCTS

2.01 AGGREGATE BASE

- A. Class 2 Aggregate base material: Free from vegetable matter and other deleterious substance. Conform to the grading and quality requirements.

2.02 ASPHALT CONCRETE PAVEMENT

- A. Aggregate for asphalt concrete pavement: Type B conforming to the requirements of Section 39-2.01 with the following special provisions:
 1. Grading of combined aggregates for new asphalt concrete pavement, 2" or more in thickness: 3/4" maximum size, medium grading.
 2. Grading of combined aggregate for asphalt concrete pavement, less than 2" in thickness: 1/2" maximum size, medium grading.
- B. Liquid asphalt for prime coat: Grade MC-70, conforming to requirements of Section 93-1.01 and 1.02.
- C. Asphaltic emulsion for tack coat (paint binder): Emulsified asphalt, Type SSIh, conforming to requirements of Section 94-1.01 through 1.05.

2.03 MISCELLANEOUS

- A. Header boards: Redwood, Construction Grade. Stakes of same material. Sizes as shown.
- B. Parking bumpers: Christy Bumper Block M20W6BB, 3' length, reinforced concrete with holes for steel bar anchorage.

3.00 – EXECUTION**3.01 PREPARATION AND EXCAVATION**

- A. Preparation: Cut existing asphalt pavement neat and square.
- B. Excavation: Excavate existing asphalt pavement and aggregate base where noted, to a depth to permit placement of new aggregate base and asphalt pavement or asphalt plug.

3.02 INSTALLATION

- A. Aggregate Base:
 1. Place, spread and compact in conformance with applicable requirements of Section 26-1.035, 1.04 and 1.05 to a min. thickness of 12”.
 2. Compact to a relative density, based on the moving average, of not less than 95% when tested in accordance with requirements of the Test Method No. Calif. 216.
- B. Asphalt Concrete:
 1. Proportion, mix, place, spread and compact asphalt concrete in conformance with applicable requirements of Section 39-3, 39-4 and 39-6 to a min. thickness of 4” at vehicle access at New Parking, all other locations 3”.
 2. Where asphalt pavement is placed against concrete gutter, construct finish surface of pavement 1/4” above abutting edge of gutter.
 3. Adjust existing manholes, lampholes, valve and monument covers, or other such structures in line of the work, adjust to grade with concrete collars or approved adjusting rings after completion of paving operations. Concrete collar, circular and covered with minimum of 3” of asphalt concrete to blend in with adjacent surfacing.
 4. Prior to applying prime or tack coat, clean surface to be paved. Apply prime coat to aggregate base course in conformance with Section 39-4.02. Apply prime coat at rate of 0.25 gallons per sq. yd., unless otherwise directed. After liquid asphalt has penetrated base course, absorb any excess standing on surface with coat of sand.
 5. Apply tack coat to all vertical surfaces of existing pavement, curbs, gutters, catch basins, manhole frames and construction joints. Apply in conformance with Section 39-4.02.

3.03 PARKING BUMPERS

- A. Installation: At each parking stall. Anchor to pavement with 2-1/2” round steel bars per bumper, 12” penetration into substrate.

3.04 CLEANUP

- A. Completion of paving and surfacing operations: Clean entire work site of waste, rubbish and construction debris of any nature relating to this work.
- B. Surplus materials: Remove from site.

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**SECTION 02743-
PERMEABLE INTERLOCKING PRECAST CONCRETE UNIT PAVING**

PART 1 – GENERAL SPECIFICATIONS

1.1 Section Includes

- A. Work consists of furnishing and construction of a Permeable Interlocking Concrete Pavement System in accordance with these specifications and in reasonably close conformity with the lines, grades, design, and dimensions shown on the plans.
- B. Installation work includes:
 - 1. Verifying Subgrade is to the lines, grades, infiltration rate, and density shown on the construction drawings;
 - 2. Furnishing and installing Geotextile and/or Membrane Liner (where required), Horizontal Drainage Piping (where required), Sub-base Course, Base Course, Bedding Course, Edge Restraint, Concrete Pavers and Permeable Joint Material to the lines and grades shown on the construction drawings.

1.2 Related Sections

A.	Section 02300	Earthwork- Geomembranes
B.	Section 02300	Aggregate Base Courses
C.	Section 02720	Pipe Underdrains
D.	Section 02740	Asphalt Concrete Paving
E.	Section 03300	Concrete Curbs and Gutters

1.03 References

- A. American Association of State Highway and Transportation Officials (AASHTO)
 - 1. GDPS-4-M Guide for Design of Pavement Structures
- B. American Society of Civil Engineers (ASCE)
 - 1. ASCE 58-10 Structural Design of Interlocking Concrete Pavement for Municipal Streets and Roadways
- C. American Society for Testing and Materials (ASTM)
 - 1. ASTM C-29 Bulk Density ("Unit Weight") and Voids in Aggregate
 - 2. ASTM C-94 Standard Specification for Ready Mixed Concrete
 - 3. ASTM C-131 Resistance to Degradation of Small-Sized Course Aggregate by Abrasion and Impact in the Los Angeles Machine
 - 4. ASTM C-136 Sieve Analysis of Fine and Course Grained Aggregates
 - 5. ASTM C-140 Sampling and Testing Concrete Masonry Units and Related Units
 - 6. ASTM C-936 Solid Concrete Interlocking Paving Units
 - 7. ASTM C-979 Pigments for Integrally Colored Concrete
 - 8. ASTM C-1645 Freeze-thaw and De-icing Salt Durability of Solid Interlocking Paving Units
 - 9. ASTM D-448 Standard Classification for Sizes of Aggregates for Road and Bridge Construction

10. ASTM D-698 Laboratory Compaction Characteristics of Soil Using Standard Effort
11. ASTM D-1557 Laboratory Compaction Characteristics of Soil Using Modified Effort
12. ASTM D-1883 CBR (California Bearing Ratio) of Laboratory Compacted Soils
13. ASTM D-2488 Description and Identification of Soils (Visual-Manual Procedure)
14. ASTM D-3034 Type PSM Poly Vinyl Chloride (PVC) Sewer Pipe and Fittings
15. ASTM D-3350 Polyethylene Plastic Pipe and Fittings Materials
16. ASTM D-4873 Identification, Storage and Handling of Geosynthetic Rolls and Samples
17. ASTM D-6928 Resistance of Course Aggregates to Degradation by Abrasion in the Micro-Deval Apparatus

- D. Interlocking Concrete Pavement Institute (ICPI)
1. Permeable Interlocking Concrete Pavement manual (latest edition)
 2. Permeable Design Pro software for hydrologic and structural design
 3. Tech Spec Technical Bulletins.

1.04 Submittals

- A. Contractor shall submit to the owner for approval, and retain for the balance of the project, a minimum of four full size samples of each Concrete Paver type/size/thickness/color/finish specified; the samples shall represent the range of shape, texture and color permitted for the respective type. Color(s) will be selected by Architect/Engineer/Landscape Architect/Owner from Manufacturer's standard colors.
- B. Prior to delivery of the associated material to the site, the Contractor shall submit the following product specific documentation for approval:
1. Aggregates
 - 1.) Sieve analysis per ASTM C-136
 - 2.) Durability of aggregates using Micro Deval Degradation using ASTM D-6928.
 - 3.) Percentage of angular and sub-angular particles per ASTM D-2488.
 - 4.) Minimum 3 lb sample of each material for independent testing.
 - 5.) Source test results for void ratio and bulk density of the Base and Sub-base aggregates per ASTM C-29.
 2. Concrete Pavers:
 - 1.) Test results from an independent testing laboratory for compliance to ASTM C-936 or other applicable requirements.
 - 2.) Warranty documentation
 - 3.) Close out Operations and Maintenance program
 - 4.) Material Safety Data Sheets
 3. Geosynthetics
 - 1.) One 18 inch x 18 inch panel of each geosynthetic (Geotextile or Membrane Liner) for inspection and testing. The sample panels shall be uniformly rolled and shall be wrapped in plastic to protect the material from moisture and damage during shipment. Samples shall be externally tagged for easy identification. External identification shall include: name of manufacturer; product type; product grade; lot number; and physical dimensions.
 - 2.) Material Safety Data Sheets
 4. Written Method Statement and Quality Control Plan that describes material staging and flow, paving direction and installation procedures, including representative reporting forms that ensure conformance to the project specifications.

1.05 Quality Assurance

- A. Contractor shall submit a list of five (5) previously constructed projects of similar size and magnitude prior to bid date to be qualified. Contact names and telephone numbers shall be listed for each project with date of completion.
- B. At a minimum, the Contractor's Site Foreman shall hold PICP Technician Certificate from the Interlocking Concrete Pavement Institute (ICPI) contractor certification program. The Site Foreman is expected to be onsite for the entire installation.
- C. Contractor shall conform to all local, state/provincial licensing and bonding requirements.
- D. Contractor will hold a mandatory pre-construction meeting with Design Engineer, Owner, and affected sub-trades accessing PICP work area to review method statement and quality control plan and communicate to all parties a work flow that is most desirable to meet the construction schedule as set forth by the General Contractor. Additional details of Pre-Construction meeting are outlined in Article 3.01.

1.06 Mock-Ups

- A. Install a 10 ft x 10 ft paver area following the installation practices described in Article 3.02 to 3.04.
- B. This area will be used to verify: surcharge of the Bedding Course; joint sizes; lines; laying pattern; color; and, texture of the job.
- C. To provide a proper representation of color blend, a minimum of 3 cubes for manual installation, and 6 cubes for mechanical installation, will be pulled from.
- D. This area shall be the standard from which the work will be judged.
- E. Subject to approval by the Owner, the mock-up may be retained as part of the finished work. If mock-up is not retained, remove and dispose of mock-up at the completion of the project.

1.07 Delivery, Storage And Handling

- A. Comply with Manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- B. Coordinate delivery and paving schedule to minimize interference with normal use of buildings adjacent to paving.
- C. Contractor shall check all materials upon delivery to assure that the proper materials have been received and are in good condition before signing off on the manufacturer's packing slip.
- D. Contractor shall protect all materials from damage or contamination due to jobsite conditions and in accordance with manufacturer's recommendations. Damaged or contaminated materials shall not be incorporated into the work.
- E. Deliver Concrete Pavers to the site in steel banded, plastic banded, or plastic wrapped cubes capable of transfer by fork lift or clamp lift. Unload and store Concrete Pavers at job site in such a manner that no damage occurs to the product.
- F. Handle and transport aggregates to avoid segregation, contamination and degradation. Keep different materials sufficiently separated as to prevent mixing. Do not dump or store one material on top of another unless it is part of the installation process. Cover material with waterproof covering to prevent exposure to rainfall or removal by wind – secure the covering in place.
- G. Geosynthetics shall be delivered, stored and handled in accordance with ASTM D-4873.

1.08 Environmental Conditions

- A. Do not install during heavy rain, freezing conditions or snowfall.
- B. Do not install on frozen soil subgrade or aggregates.
- C. Do not install frozen aggregates.

1.09 Maintenance Materials

- A. Provide 10 square feet additional paver material for use by Owner for maintenance and repair as attic stock.
- B. Pavers to be from the same production run as installed materials.
- C. Store paver materials in Owner designated location.

PART 2 – PRODUCTS

2.1 Definitions

- A. Base Course – within the context of this specification, a washed open graded free draining aggregate material (#57 Stone) of a designed thickness that provides both structural support over the Sub-base and water storage capacity (within the voids). It also serves as a choking material between the Bedding Course and Sub-base.
- B. Bedding Course – within the context of this specification, a two-inch thick layer of washed open graded free draining aggregate material (#8 Stone) loosely screeded smooth for bedding of the Concrete Pavers.
- C. Concrete Pavers – within the context of this specification, solid individual paving units manufacturing from concrete that are either specifically designed for use in permeable applications (include joints and voids) or are laid in a pattern that creates large enough openings to provide infiltration. Concrete Pavers are shipped in clusters called bundles or cubes, which consist of several layers of pavers strapped or wrapped together.
 - a. Voids – larger openings between the individual pavers that provide for infiltration.
 - b. Joints – smaller openings between the individual pavers that provide vertical and horizontal interlock between units.
- D. Edge Restraint – within this specification, a cast in place concrete curb, building or other stationary object that prevents the lateral movement of the Bedding Course and Concrete Pavers so they do not spread and loose interlock. Other Edge Restraints options include plastic, steel or aluminum edging, cut stone, precast concrete and submerged concrete edge complete with mortared pavers.
- E. Geotextile – Woven or non-woven fabrics made from plastic fibers used primarily for separation between Sub-base and Subgrade.
- F. Horizontal Drainage Piping – series of horizontal pipes within the sub-base that discharge to a catchbasin, ditch or other receiving body beyond the extent of the paved area. Piping is typically elevated in a Partial Exfiltration System, and at the bottom of the Sub-base in a No Exfiltration System.
- G. Laying Face – the working edge of the pavement where the laying of pavers is occurring.
- H. Mechanical Installation - The use of specialized machines to lift whole layers of pavers from the bundles and place them on the prepared bedding course. These specialized machines are designed specifically for this application.
- I. Membrane Liner – impermeable liner placed at the bottom and sides of a No Exfiltration System, used to prevent the exfiltration/discharge of water other than through the

Horizontal Drainage Piping. Usually includes a geotextile on top (possibly bottom) for protection.

- J. Permeable Joint Material – a washed open graded free draining aggregate material (typically #8, #89 or #9 Stone) used to fill the spaces (joints and voids) between Concrete Pavers to create interlock and still maintain infiltration.
- K. Permeable Interlocking Concrete Pavement System – a system of paving consisting of Concrete Pavers placed in an interlocking pattern with the joints and voids filled with Permeable Joint Material. The minimum rate of infiltration of the Concrete Pavers and Permeable Jointing Material is 10 inches per hour, or the design storm, whichever is greater. The Bedding Course, Base Course and Sub-base Courses provide structural support over the Subgrade and stores, exfiltrates (into the Subgrade) and/or drains the infiltrating water.
- L. Sub-base Course – within the context of this specification, an open graded free draining aggregate material (#2 Stone) of a designed thickness that provides both structural support over the Subgrade and water storage capacity (within the voids).
- M. Subgrade – the soil upon which the pavement structure and shoulders are constructed.

2.2 Concrete Pavers

- A. Supplied by:
Belgard Location: (Head office for the given state)

CA

Sierra Building Products

10714 Poplar Avenue, Fontana, CA 92337

866-749-3038 909-355-6444 Fax

SBI Materials

10540 Old Redwood Highway

Windsor, CA 95492

(707) 431-1617

mwells@sbimaterials.com

- B. The Concrete Paver products required include:
PRODUCT #1 -Aquaroc
- C. Concrete Pavers shall conform to the following requirements set forth in ASTM C-936:
Measured length or width of test specimens shall not differ by more than +/- 0.063 in, while measured thickness shall not differ by more than +/- 0.125 in.
 1. Average compressive strength of 8,000 psi (55 MPa) with no individual unit under 7,200 psi (50 MPa) when tested in accordance with ASTM C-140.
 2. Average absorption of 5% with no unit greater than 7% when tested in accordance with ASTM C-140.
 3. Where freeze-thaw testing is required, the average mass loss of all specimens tested shall not be greater than (A) 225 g/m² when subject to 28 freeze thaw cycles, or (b) 500 g/m² when subject to 49 freeze thaw cycles. Testing shall be conducted using a 3% saline solution in according to ASTM C-1645.
- D. Efflorescence shall not be a cause for rejection.
- E. Pigment in Concrete Pavers shall conform to ASTM C-979.

2.3 Bedding Course

- A. Clean, non-plastic aggregate, free from deleterious or foreign matter, manufactured from crushed rock.
- B. Micro Deval Degradation of less than 8% as per ASTM D-6938.
- C. Percent of angular and sub-angular particles greater than 90%. Do not use rounded river gravel.
- D. LA Abrasion <40 as per ASTM C-131, minimum CBR of 80% as per ASTM D-1883.
- E. Gradation to conform to Table 1 as tested in accordance to ASTM C-136. All aggregates shall have equal to or less than 2% passing the No. 200 (0.075 mm) sieve.

Table 1
Grading Requirements for Bedding Course (ASTM No. 8 Stone per ASTM D-448)

Sieve Size	Percent Passing
1/2 in. (12.5 mm)	100
3/8 in. (9.5 mm)	85 to 100
No. 4 (4.75 mm)	10 to 30
No. 8 (2.36 mm)	0 to 10
No. 16 (1.18 mm)	0 to 5

2.04 Permeable Joint Material

- A. Where joints are greater than or equal to ¼ inch, use ASTM No. 8 Stone as specified for the Bedding Course.
- B. Where joints are less than ¼ inch, use pre-bagged Permeable Joint Material as supplied by Belgard.

2.4 Base and Sub-base

- A. Clean, non-plastic aggregate, free from deleterious or foreign matter, manufactured from crushed rock.
- B. Micro Deval Degradation of less than 8% as per ASTM D-6938.
- C. Percent of angular and sub-angular particles greater than 90%. Do not use rounded river gravel.
- D. LA Abrasion <40 as per ASTM C-131, minimum CBR of 80% as per ASTM D-1883.
- E. Gradation of Base Course to conform to Table 2 as tested in accordance to ASTM C-136. Gradation of Sub-base Course to conform to Table 3 as tested in accordance to ASTM C-136. All aggregates shall have equal to or less than 2% passing the No. 200 (0.075 mm) sieve.

Table 2
Grading Requirements for Base Course (ASTM No. 57 Stone per ASTM D-448)

Sieve Size	Percent Passing
1-½ in. (37.5 mm)	100
1 in. (25 mm)	95 to 100
1/2 in. (12.5 mm)	25 to 60
3/8 in. (9.5 mm)	0 to 10
No. 4 (4.75 mm)	0 to 5

Table 3
Grading Requirements for Sub-base Course (ASTM No. 2 Stone per ASTM D-448)

Sieve Size	Percent Passing
3 in. (75 mm)	100
2- ½ in. (63 mm)	90 to 100
2 in. (50 mm)	35 to 70
1-½ in. (37.5 mm)	0 to 15
¾ in. (19 mm)	0 to 5

2.06 Edge Restraints

- A. Edge restraints shall be cast in place concrete curbs constructed at a minimum to the dimensions of the details shown on the drawings.

2.07 Geosynthetics

- A. Where required, Geotextile materials shall be selected by the Soils Engineer based on the intended use.

2.08 Horizontal Drainage Piping

- A. The Horizontal Drainage Piping shall be perforated or slotted PVC pipe manufactured in accordance with ASTM D-3034, or corrugated HDPE pipe manufactured in accordance with ASTM D-3350.

PART 3 – EXECUTION

3.01 Inspection

- A. Prior to commencement of any work, the Contractor shall conduct a pre-construction meeting with the Owner, Design Engineer and affected sub-trades. The pre-construction meeting should, at a minimum, verify:
- The location of the Mock Up, and whether it will be part of the final construction or need to be removed.
 - The site layout conforms to the Site Plan. In particular, the location and elevation of discharge points (if any) of the Horizontal Drainage Pipes.
 - The excavation work conforms to the specified lines and elevations. Subgrade shall be trimmed to within 0 and ½ in of the specified grades. The surface of the prepared Subgrade shall not deviate by more than 3/8 in from the bottom edge of a 10-foot straight edge laid in any direction.
 - The condition of the subgrade, in particular that the surface infiltration (where desired) has not been adversely impacted by the excavation work. Where compaction is desired, that the compaction densities have been met.
 - Locations of curbs, grade beams, utility structures, light standards, tree wells or any other protrusions as applicable to the project.
 - The details of the site's 'Erosion and Sediment Control Plan'.
 - Panel Installation Drawings for the Geosynthetics, in particular the location of any protrusions through the Membrane Liner where boots are required.
- B. Although the Owner may provide soil testing and quality assurance inspection during earthwork and Subgrade preparation, the Owner's quality assurance program does not relieve the Contractor of responsibility for quality control and system performance. Contractor shall obtain any quality control testing or inspection not provided by the Owner

that is necessary to satisfy the Contractor with the condition of the Subgrade prior to commencement of the work. This may include:

- a. Proof rolling of the subgrade to determine presence of soft spots or localized pockets of objectionable materials.
 - b. Infiltration testing to verify the subgrade has not been adversely impacted.
 - c. Compaction testing.
- C. Where deficiencies or inconsistencies are identified, the Contractor shall notify the Design Engineer in writing. The Contractor will not proceed with the work until the Design Engineer has verified that the deficiencies or inconsistencies have been addressed.
- D. Beginning of Installation means acceptance of Subgrade.

3.02 Installation Base Course

- A. Keep area where pavement is to be constructed free from sediment during the entire job. Any materials contaminated with sediment shall be removed and replaced with clean material.
- B. Install Membrane Liner in accordance with the manufacturer's recommendations. The Membrane Liner is applied to the bottom and sides of the excavation. Allow for enough Membrane Liner to exceed the final elevation of the surface. After completion of the surface, the excess liner should be cut flush with the finished grade,
- C. Install Geotextiles as required in accordance with the specifications and drawings. The Geotextile is applied to the bottom and sides of the excavation with overlapping joints a minimum of 12 inches. Overlaps to follow down slope. Allow for enough geotextile to exceed the final elevation of the surface. After completion of the surface, the excess geotextile should be cut flush with the finished grade,
- D. Install the Sub-base Course and Base Course at the thicknesses, compaction rates, surface tolerances, and elevations outlined in the specifications.
 - 1. Place and spread the first layer of Sub-base without displacing or damaging the geosynthetics (if used). To prevent damage, tracked vehicles must not be used to spread the initial Sub-base layer.
 - 2. The aggregate should be spread and compacted in uniform layers not exceeding 6 inch loose thickness. Compaction is performed using either a 10 T (10 ton) vibratory roller or a minimum 13,500 lbf centrifugal force reversible vibratory plate compactor. For each lift, make at least two passes in the vibratory mode and at least two passes in the static mode – continue compaction until there is visible movement in the materials.
 - 3. At the specified elevation(s), install the Horizontal Drain Pipes in accordance with the manufacturer's recommendations. Ensure the Pipes are properly sloped to provide proper drainage to the outlets Pipes shall be surrounded by a minimum of 4 inches of Base Course material to prevent damage from the Sub-base material. Care must be taken not to damage Horizontal Drain Pipes during subsequent aggregate installation.
 - 4. Final surface tolerance should be plus or minus 1 inch over a 10 foot straight edge laid in any direction.
 - 5. Attention will be paid to providing proper compaction near curbs, grade beams, concrete collars around utility structures, lights standards, tree wells, building edges and other protrusions as applicable to the project. In areas not accessible

- to large compaction equipment, compact to specified density with mechanical tampers (jumping jacks).
- E. Before commencing the placing of the Bedding Course, the base shall be inspected by the Owner's representative.

3.03 Installation Edge Restraints

- A. Adequate edge restraint shall be provided along the perimeter of all paving as specified. The face of the edge restraint, where it abuts pavers, shall be vertical.
- B. All concrete edge restraints shall be constructed to dimensions and level specified and shall be supported on a compacted Base not less than 6 inch thick.
- C. Concrete used for the construction of edge restraints shall be air-entrained and have a compressive strength as specified. All concrete shall be in accordance with ASTM C94 requirements.

3.04 Installation Bedding Course, Concrete Pavers and Permeable Joint Material

- A. Spread the Bedding Course evenly over the Base Course and screed to a nominal 2 in. thickness. Do not use the bedding material to fill depressions in the Base Course surface.
- B. The Contractor shall screed the Bedding Course using either an approved mechanical spreader (e.g.: an asphalt paver) or by the use of screed rails and boards.
- C. Moisten and lightly compact the Bedding Course using a Plate Compactor. Surface tolerances shall be 3/8 inch over a 10-foot straight edge.
- D. Loosely screed the bedding course.
- E. Ensure that Concrete Pavers are free of foreign material before installation. Concrete Pavers shall be inspected for color distribution and all chipped, damaged or discolored Concrete Pavers shall be replaced. Initiation of Concrete Paver placement shall be deemed to represent acceptance of the pavers.
- F. Lay the Concrete Pavers in the pattern(s) as shown on the drawings. Maintain straight pattern lines.
- G. Paving units shall be installed from a minimum of 3 bundles for hand installations, 6 bundles for mechanical installations, simultaneously to ensure color blending.
- H. Joints between the individual Concrete Pavers shall be maintained according to the spacer bars.
- I. Fill gaps at the edges of the paved area with cut pavers or edge units. Do not install cut pavers smaller than one-third of a whole paver along edges subject to vehicular traffic – trim two pavers to fit.
- J. Cut pavers using a masonry saw. Upon completion of cutting, the area must be swept clean of all debris to facilitate inspection and to ensure the Concrete Pavers are not damaged during compaction.
- K. Using a low amplitude plate compactor capable of at least 5,000 lbs. (22 kN) compaction at a frequency of 75 hz –100 hz, compact and seat the Concrete Pavers into the Bedding Course.
- L. The pavers shall be compacted to achieve consolidation of the Bedding Course and brought to level and profile by not less than three passes. Initial compaction should proceed as closely as possible following the installation of the paving units and prior to the acceptance of any traffic or application of Permeable Joint Material.
- M. Any units that are structurally damaged during compaction shall be immediately removed and replaced.

- N. Apply a dressing of Permeable Joint Material to the surface and sweep into the joints and voids. Fill joints and voids, then sweep off excess material before vibrating the material down into the joints using a plate compactor. This will require at least two or three passes with the compactor.
- O. Do not compact within 6 feet of the unrestrained edges of the paving units.
- P. All work to within 3 ft (1 m) of the laying face must be left fully compacted at the end of each day. Cover the laying face with plastic sheets overnight if not closed with cut and compacted pavers.
- Q. Sweep off excess aggregate when the job is complete.

3.05 Quality Assurance/Quality Control

- A. Quality Assurance - The Owner may engage inspection and testing services, including independent laboratories, to provide quality assurance and testing services during construction. This does not relieve the Contractor from securing the necessary construction quality control testing.
- B. Quality assurance should include as a minimum verification with the Design Engineer that the Contractor's quality control plan and testing are adequate. Quality assurance shall also include observation of construction for general compliance with design drawings and project specifications.
- C. Quality Control – The Contractor shall engage inspection and testing services to perform the minimum quality control testing described in the design plans and specifications. Only qualified and experienced technicians and engineers shall perform testing and inspection services.
- D. Quality control testing shall include backfill testing to verify soil types and compaction, and verification that the system is being constructed in accordance with the design plans and project specifications.

3.06 As-built Construction Tolerances

- A. Final inspection shall be conducted to verify conformance to the drawings after removal of excess aggregate. All pavements shall be finished to lines and levels to ensure positive drainage at all drainage outlets and channels.
- B. The final surface elevations shall not deviate more than +/- 3/8 inch under a 10 ft long straight edge.
- C. Lippage shall be no greater than 1/8 inch difference in height between adjacent pavers.
- D. Bond lines for the pavers shall be +/- 1/2 inch over a 50 foot string line.

3.07 Protection and Maintenance

- A. At the completion of the work, the Manufacturer shall provide the Owner with a "PICP System Maintenance Checklist" and sample "Long Term Performance and Maintenance Agreement".
- B. Once the work is complete, the Owner shall be responsible for protecting the work from sediment deposition and damage due to subsequent construction activity on the site.
- C. The Contractor shall return to the site after 6 months from the completion of the work and conduct an inspection of the PICP System with the Owner, Manufacturer and General

Contractor in accordance with the "PICP System Maintenance Checklist". The contractor shall provide the following remedial work, as required, as part of the original bid and with no additional compensation: fill paver joints with stones; replace broken or cracked pavers; re-level settled pavers to specified elevations; and, re-align pavers to straighten bond lines. The Owner shall be responsible for removal of debris either on the surface or within the joints, as required for the Contractor to properly conduct the necessary remedial work.

END OF SECTION

SECTION 02745 - PAVEMENT MARKINGS**1.00 - GENERAL**

1.01 DESCRIPTION

- A. Work included:
 - 1. Cleaning of area before application of markings.
 - 2. Application of stripes and pavement markings.
 - 3. Signage for accessibility parking.
- B. Related work specified elsewhere:
 - 1. Asphalt Pavement - Section 02740.

1.02 QUALITY ASSURANCE

- A. Standards: State of California, Department of Transportation, Standard Specifications, July 2015.
- B. City of Redwood City: Comply with City standards and details where applicable.

1.03 JOB CONDITIONS

- A. Pavement: Thoroughly cure before application of striping or marking thereon. Do not apply striping or marking until asphalt surface has been approved by Architect.

2.00 PRODUCTS

2.01 PAVEMENT MARKINGS

- A. Paint: The paint shall be homogeneous easily stirred to smooth consistency, and shall show no hard settlement or other objectionable characteristics during a stage period of 6 months. Paint for roads, parking areas, and streets shall conform to FS TT-P-1952, color as specified by city standard. Pavement marking paints shall comply with applicable state and local laws enacted to ensure compliance with federal clean air standards. Paint materials shall conform to the restrictions of the local Air Pollution Board.

2.02 SIGNAGE

- A. Metal signs: Metal plate attached to Schedule 40 galvanized steel pipe supports set in concrete per California Building Code Accessibility.

3.00 EXECUTION

3.01 PAVEMENT MARKINGS

- A. Application: Apply in conformance with manufacturer's recommended instructions and CALTRAS Standard Specifications.

3.02 SIGNAGE

- A. Parking stalls: Install metal Standard accessibility signs on pipe supports at stalls as shown. At designated van stalls, provide "Van Accessible" sign attached below Standard sign.
 - B. Site Entrance: Warning signage regarding unauthorized use of disabled parking spaces posted conspicuously at each entrance to off-street parking areas.
 - C. Accessibility symbol: Paint standard symbol on pavement surface at designated stalls.
 - D. Painted signs and stripping: Paint names and strips as noted.
 - E. Painted curbs: Paint red as noted.
- 3.03 CLEANUP
- A. Completion of pavement markings and signs: Clean work site of all waste, rubbish and construction debris of this Section.

* * * * *

SECTION 02810 – NON-POTABLE IRRIGATION SYSTEM

1.00 GENERAL

1.01 DESCRIPTION

- A. Install an automatic, electrically operated irrigation system including all elements relating directly to irrigation system from the point of connection in most distant sprinkler head and includes furnishing of all labor, tools, materials, etc., necessary for the installation as specified and shown. All piping and sprinkler components shall comply to the State of California for use of recycled water. All valves and valve boxes shall be labeled in accordance with these requirements.
- B. Before proceeding with work, carefully check and verify all dimensions and report any variations to Contractor and Landscape Architect.
- C. System shall efficiently and evenly irrigate all areas and be complete in every aspect, and be left ready for operation.
- D. Included in the work, furnish and install:
 - 1. Main supply line connection
 - 2. Mainline- purple pipe
 - 3. Branch lines (laterals) purple pipe
 - 4. Backflow preventer assembly (protect existing)
 - 5. Gate valves
 - 6. Low voltage power distribution system
 - 7. Remote control valves in boxes labeled reclaimed water
 - 8. Automatic irrigation controller, weather sensor, pedestal & electrical hook-up
 - 9. Sprinkler heads
 - 10. Quick coupling valves
 - 11. Flushing lines
 - 12. Testing mains
 - 13. Balancing system
 - 14. Miscellaneous valves, fittings and appurtenances system in operating condition as a completed unit to the satisfaction of Landscape Architect.

1.02 RULES AND REGULATIONS

- A. All work and materials shall be in full accordance with the latest rules and regulations of the California Building Code, Plumbing; and other applicable State or local laws or regulations. Nothing in these drawings or specifications is to be construed to permit work not conforming to these codes. Code ASTM pipe and fittings for recycled water for installation of non-potable water pipe and ancillary components.
- B. When the specifications call for materials of better quality or larger size than required by the Rules and Regulations, provisions of specifications shall take precedence.
- C. Contractor shall furnish without an extra charge any material and labor when required by the compliance with these rules and regulations, even though the work was not mentioned in these specifications or shown on drawings.
- D. Any existing buildings, equipment, piping, pipe covering, sewer, sidewalks, landscaping, etc., damaged during the course of this work, replace or repair in a manner satisfactory to Architect and at Contractor's expense and before final payment is made. Contractor shall

be responsible for damage caused by leaks in piping systems being installed or having been installed. Repair all damage so caused in a manner satisfactory to Architect.

1.03 DRAWINGS

Drawings show the general arrangement of all work. Any work indicated on drawings but not specifically mentioned in specifications, or vice versa shall be furnished and installed. As it is not within the scope of the drawings to show all necessary offsets, obstructions or structural conditions, it shall be the responsibility of the Contractor to install his work in such a manner that it will conform to the structure.

1.04 VISITING THE PREMISES

Before submitting bid, visit premises and become familiar with all existing conditions pertaining to the execution of the work. No request for additional payment due to Contractor's failure to allow for working conditions will be valid.

1.05 COOPERATION WITH OTHER TRADES

Arrange and coordinate the work with the work of other trades to the extent that the installation is accomplished without undue delay. Call to the attention of Contractor and Architect any conflict between this work and that of other trades. No additional cost will be permitted to accomplish the above.

1.06 EXISTING SITE UTILITIES and IRRIGATION SYSTEM

- A. Verify location of existing utilities in areas where excavation is performed. Use caution during excavation to prevent interruption or severance of existing utilities. Do not break into any pipe, conduit, or concrete encasement except as shown. When such obstructions prevent the installation of this work, notify Contractor and Architect. Reroute existing main line as noted. Location of utilities other than those shown which may exist within the site are unknown. Location of utilities shown is approximate.
- B. Protect existing irrigation valves of planting areas to remain such that these areas will continue to receive irrigation during construction. If the existing system is damaged by Contractor, the Contractor shall be responsible for immediate repair of such damage. After such repair, remove all heads of the repaired system so that the lines can be cleared of all dirt and foreign matter.

1.07 PROTECTION

Provide for the safety and good condition of all materials and equipment until final acceptance. Protect all equipment and material from damage and provide adequate and proper storage facilities during the progress of work. Replace all damaged and defective material.

1.08 SUBSTITUTION

Certain numbers in the Drawings and in Specifications are taken from manufacture's catalogs. Equipment equal in quality and utility will be accepted, provided that a request for approval comes from the Contractor, in writing, with complete information or catalogue data to show the equality of the material or article to that specified. Make all requests for substitution within 5 days after award of contract.

1.09 STANDARDS, TEST AND INSPECTIONS

- A. Qualifications of worker: Provide at least one person who shall be present at all times during execution of this portion of the work and who shall be thoroughly familiar with the type of materials being installed and the manufacturer's recommendations as to method of installation and who shall direct all work performed.
- B. Closing in uninspected work: Do not allow or cause any work to be covered or closed until it has been inspected, tested and approved.

1.10 GUARANTEE

- A. Guarantee full coverage with no excessive over spray onto walks, paved areas, etc.
- B. It is the responsibility of the Contractor to fill and repair all depressions and replace all necessary planting due to settlement of irrigation trenches for one year following completion and acceptance of the job.
- C. Provide a written guarantee covering all materials, equipment and workmanship furnished to be free of defects of workmanship and materials and shall agree to replace at his expense, at any time within one year after installation is accepted, any and all defective parts that may be found.
- D. Submit written guarantee on company letterhead addressed to Owner through the General Contractor for transmittal to the Architect and Owner.

2.00 PRODUCTS

2.01 MATERIALS – SPRINKLER SYSTEM

- A. Valves and fittings: Connections compatible with type of pipe joints selected by Contractor.
- B. Plastic pipe: Polyvinyl/chloride (PVC), Schedule 40, new, continuously and permanently marked with manufacturer's name, kind of pipe, material, size, NSF approval, and schedule or class.
 - 1. Downstream lines under concrete or asphalt: plastic – Schedule 40- PVC (Polyvinyl Chloride)
 - 2. Purple PVC Pipe for reclaimed water. AWWA C900-07
- C. Main lines: IPS, PVC 1120-1220 Schedule 40, NSF Polyvinyl Chloride, solvent weld ASTM D-1785-67A.
- D. Lateral lines: IPS, PVC 1120-1220 class 200 NSF polyvinyl, solvent weld purple pipe.
- E. Fittings Control Valves: Schedule 40 I.P.S. Threaded adapters may be used in place of nipples where connecting pipe to valves. Use male adapters only.
 - 1. Pipe fittings of same material as pipe where applicable and recommended by pipe manufacturer for the particular type of pipe to which they are to be connected. Conform to requirements of one of the following specifications and as detailed on drawings:
 - a. Purple pipe fittings per AWWA.
 - b. PVC Schedule 40 fittings ASTM #2466 for Non-potable water

- c. PVC Schedule 80 Nipples non- potable threaded both ends.
- F. Solvent: Use only type of plastic pipe solvent complying with ASTM D-2564-66T and recommended by manufacturer of plastic pipe.
- G. Primer: Weld-on P-70
- H. Gate Valve: As specified on Drawings.
- I. Backflow Preventer: Install new backflow device for irrigation labeled for non-potable water. Install per detail on drawings.
- J. Controller: As specified on Drawings.
- K. Automatic non-potable control valves: As specified on Drawings.
- L. Sprinkler heads: As specified on Drawings with non-potable markings.
- M. Quick coupling valves: Type and make as shown with purple non-potable rubber covers. Provide 4 matching keys for quick coupling valves. Quick couplers and two hose swivels shall be furnished by Contractor to Owner and appropriate for specified quick coupling valves.
- N. Remote control valve box and low-voltage pull box: Ametek or Carson, 12" rectangle with lid; one valve per box. No earth fill permitted inside box. Valve number routed on lid lids to be marked as non-potable water and be purple in color.

2.02 ELECTRICAL EQUIPMENT AND WIRING FITTINGS

- A. Wiring to Power Supply: Controller connected to 117 VAC electrical service furnished to the controller location. Connection in metallic conduit.
- B. Underground Conductor: To serve automatic control valves, No 14 UF-AWG direct burial wire. Insulated 4/64 inches, U.L. approved type U.F. and able to withstand a crush test of 5,000 psi. Common or neutral conductors, white. Other control wires to automatic control valves, red.
- C. Sleeves for Control Wires: Under all walks and paving as indicated.

2.03 MISCELLANEOUS EQUIPMENT

- A. Provide all equipment called for on Drawings, new, first quality of their respective kinds and subject to approval of Architect.
- B. Operating and service keys and wrenches: Provide to Owner, at completion of the Maintenance Period, 2 each of all operating and servicing keys and wrenching required for maintenance and operation of all heads and valves. Include all wrenches necessary for complete disassembly of all heads and valves.

3.00 EXECUTION

3.01 LAYOUT

- A. Install specified pipe, valves, fittings, wiring, switches, controls, and appurtenances at approximate locations indicated on plans. Main lines and lateral lines layout on drawings is diagrammatic. Locate main line and lateral lines in landscape areas wherever possible.

- B. Lay out work as accurately as possible in accordance with diagrammatic drawings.
- C. Where site conditions do not permit location of piping, valves and heads where shown, notify Landscape Architect and determine relocating in joint conference.
- D. Run pipe lines and automatic control wiring in common trenches wherever practical.
- E. Do not install a line directly over another line in the same trenches.

3.02 HANDLING AND STORAGE

- A. Protect work and materials from damage during construction and storage.
- B. Store PVC pipe in a neat and orderly manner, fully supported and protected from sunlight.

3.03 EXCAVATING AND TRENCHES

- A. Excavate trenches with vertical sides, uniform bottom, free of deleterious material and wide enough for pipe to lay side by side, fully supported on bottom. Maintain 3" clearance between pipes.
 - 1. No lines shall be installed parallel to directly over another line.
 - 2. When lines must cross, the angle shall be 45° to 90°, and a minimum of 3" vertical clearance shall be maintained.
- B. Hydraulic driving methods shall not be used under paved surfaces.
- C. Where it is necessary to excavate adjacent to existing trees, use all possible care to avoid injury to trees roots. Excavation in areas where 2" and larger occur do by hand. All roots 2" and larger in diameter, except directly in the path of pipe or conduit, shall be tunneled under and heavily wrapped with burlap, to prevent scarring or excessive or excessive drying. Where a ditching machine is run close to trees having roots smaller than two inches in diameter, the wall of the trench adjacent to the tree shall be hand trimmed, making clean cuts through. Roots 1" and larger in diameter shall be painted with 2 coats of Tree Seal, close. Trenches adjacent to trees within 24 hours; where this is not possible, side of trench adjacent to tree shall be kept shaded with burlap or canvas.
- D. Restore surfaces, existing underground installations, etc., damaged or out as a result of excavation, to original conditions in a manner approved by Architect.
- E. Where other utilities interfere with irrigation trenching and pipe work, adjust the trench depth as instructed by Architect.
- F. Embed a # 8 bare copper tracer wire in trench and over all main lines.
- G. Encase any pipe passing under pavement in an oversize PVC pipe.

3.04 ASSEMBLING PIPE LINES

- A. Installation:

1. Pipe snaked from side to side of trench bottom a minimum of 6" for every 15 ft. in length.
2. Immediately prior to backfilling, pipe tempered by running cold water through it for a minimum of 15 minutes. All adjustable sprinkler heads turned to "OFF" position and all risers capped, except that one riser be left open at end of each run of 50 feet or more in length. Waste water diverted to prevent ponding. Tempering may be combined with flushing.
3. Galvanized piping and fitting upstream of valve to receive sufficient amount of pipe dope before joining.
4. Before being placed in position, pipe and fitting cleaned carefully. Maintain in a clean condition, and open ends of pipe closed temporarily at end of each day. Defective pipe will be rejected. Provide proper facilities for lowering sections of pipe into trenches such that neither the pipe nor the trench will be damaged or disturbed.
5. During installation, the interior of pipes, fittings, and accessories kept clean at all times and all openings in piping runs closed at end of each days work and as necessary to prevent the entry of foreign matter.

3.05 SOLVENT WELD JOINTS

- A. Assemble above ground where possible.
- B. Cut square, ream and thoroughly clean.
- C. Make joint using specified primer and cement, continuously wiping off excess.
- D. Allow 60 minutes of set-up time before handling and 24 hours curing before applying water pressure.

3.06 THREADED CONNECTION

- A. Plastic to steel connection: Use male adapters. Work steel connections first. A non-hardening pipe dope, Permatex # 2 used on all threaded plastic to steel joints, and light wrench pressure is all that should be used.
- B. Where threaded plastic nipples are required: Use only IPS Schedule 40 pipe.

3.07 INSTALLATION OF AUTOMATIC CONTROLLER AND VALVES

- A. Automatic controller: Securely installed where shown on Drawings. Furnish and install metallic conduit of a size to accommodate properly the number of 24 volt wires required to pass through it from the controller unit to 18" below grade. Furnish and install junction boxes as required to allow pulling of wires to controller.
- B. Controller installation: Level, neat, sturdy and to satisfaction of Architect.
- C. Label: All zones on chart inside controller door as to area locations with plastic label tape.
- D. Remote control valves: Install where shown and group together where practical. Place no closer than 12" to walk edges, buildings and walls.

- E. Incorporate existing valves of existing planting areas to remain to new automatic controller.

3.08 INSTALLATION OF CONDUCTOR IN TRENCHES

- A. Where 2 or more cables are laid parallel in the same trench. Taped together not less than 25 feet. Splices limited to areas under the valve boxes.
- B. Splices: Made with "Pentite" or "Snaptite" by Rain Bird. Neatly coil 2 ft. of cable slack at each R.C.V. solenoid connection within access boxes. Not less than 1 ft. of cable slack left on each side of splices. Slack cable placed in trench in a series of "S" curves.

3.09 INSTALLATION OF SPRINKLER HEADS

- A. Installation shown in detail.
- B. Install plumb with finish grade.
- C. Thoroughly flush lines before installing heads.
- D. Adjust sprinkler heads for proper distribution.

3.10 QUICK COUPLING VALVES

- A. Install as shown in detail.
- B. Thoroughly flush lines before installing quick coupling valves.

3.11 BACKFILLING

- A. Backfill only after piping has been inspected and approved.
- B. Use extreme care while backfilling. Any materials or equipment damaged or destroyed while backfilling, repair or replace by the Contractor at no cost to Owner.
- C. Backfill material: Earth excavated from trenches, free from rocks, concrete chunks, and other foreign or coarse materials. Carefully select backfill that is to be placed next to plastic pipe to avoid any sharp objects which may damage the pipe.
- D. Backfill: To a point 6" above top of pipes with sand or loose, silty soil free of rocks or hard lumps. Water and compact before further filling. Fill remainder of trench in 6" layers wetting each layer with water and compacting with tampers.
- E. Compaction: By mechanical method to at least 90% except for the last 12" under paved areas which shall be compacted to 95%. In all planting areas, backfill compacted to 85%.
- F. Finishing: Dress areas to finished grade and remove excess soil, rocks or debris remaining after backfill is completed.
- G. Settlement: If occurs along trenches, adjust grades as necessary in turf, ground cover, and paving areas to the proper level or permanent grade.

3.12 FLUSHING

- A. After flushing, submit pipe to leakage test. Test on pressure lines, complete prior to backfilling. Place soil on trenches, between fittings to insure the stability of the line under

pressure. In all cases, fittings and couplings must be open to visual inspection for the full period of test. No testing be done until the last solvent welded joint has had 24 hours to set and cure.

- B. Control valves: Closed, slowly fill sprinkler system main with water to line pressure.
- C. Air: Before testing expel all air from pipes.
- D. Duration for each test: 4 hours and during test, system subject to line pressure.
- E. Leakage: Should any section of pipe laid disclose leakage, locate and repair defective pipe or joint and retest.
- F. Sprinkler: Test to ascertain that they function according to manufacturer's data. If they do not function according to such data, replace. Adjustable sprinklers shall permit no flow when closed and under pressure.
- G. Service cocks: Adjusted so that sprinklers which they control do not throw water on buildings or into unwanted areas when under maximum operating pressure and during times of normal prevailing winds.
- H. Adjustable sprinklers: Adjust by turning the hydraulically most distant most distant sprinkler from control valve to its wide open position. With the service cock wide open, open the control valve so that the sprinkler head produces a spray approximately 12" high. Adjust all other sprinkler heads on the section for equal height sprays, changing the control valve setting as required to maintain this condition. Next, open the control valve for normal operation and observe the spray. Adjust service cocks and individual sprinklers as required to keep the spray within the areas desired and to prevent over spray onto walks, roadways, and buildings.
- I. Adjustments: If it is determined that adjustments in irrigation equipment will provide proper and more adequate coverage, make such adjustments prior to planting. Adjustments may also include changes in nozzle sizes and degrees of arc as required.
- J. Lowering raised sprinkler head: by accomplishing within 10 days after notification by Architect.

3.13 CLEAN-UP

- A. Clean and balancing: Clean, adjust and balance all systems. Demonstrate the entire system to Architect, proving that all heads are properly adjusted for radius and are of coverage, that all remote control valves are properly balanced, and that the installed system is workable, clean and efficient.

3.14 RECORD DRAWINGS

- A. Drawings: Provide and keep up-to-date a complete record set of prints which shall show every change from original contract drawings. Show exact depth below grade and plan location of all piping. Prints for this purpose may be obtained from Architect at a cost. Keep a set of prints on job site, and use only as a record set. This shall not be construed as authorization for Contractor to make changes in layout without definite instructions in each case.
- B. These records are part of the work. Deliver to Architect in a good and acceptable condition prior to final acceptance of the work. Drawings shall completely show installed

irrigation systems to scale. Valve measured from 3 fixed points and recorded on Drawing. A legend shall include all equipment installed.

- C. Maintenance personnel: After the system has been completed, inspected and approved, instruct Owner's maintenance personnel on operation and maintenance of irrigation system.

3.16 AUTOMATIC CONTROLLER KEY

- A. Deliver 1 key for each automatic controller that is installed to Owner.
- B. Instruct Owner on the operation of the automatic controller.

SECTION 02910 – LANDSCAPING

1.00 GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Furnish and install trees, shrubs, ground covers, sod turf, vines, topsoil and mulch.
 - 2. Soil preparation and amendments, staking, pruning, mulching and other work necessary for proper and complete installation.
- B. Related Work Specified Elsewhere:
 - 1. Irrigation System - Section 02810

1.02 STANDARD, TESTS AND INSPECTIONS

- A. Provide at least one person who shall be present at all times during execution of this work and who shall be thoroughly familiar with the type of materials being installed and the best methods for their installation and who shall direct all landscape planting work.
- B. Plants: Grown in nurseries which have been inspected by the State or by the County Horticulture Inspector and have complied with all regulations thereof; this requirement does not prohibit the use of plant materials grown outside of State provided such plant material and shipments meet all the requirements of the State Department of Agriculture.
- C. Disease and Insects: Plants and planting materials shall meet or exceed the specification of Federal, State and Local laws regarding inspection for plant disease and insect control. Inspection certificates shall accompany shipments.
- D. Quality Standards: Quality and size conform with current edition of "Horticulture Standards" for the number one grade nursery stock as adopted by American Association of Nurserymen.
- E. Name Standards: All plants shall be true to name and one of each bundle or lot shall be tagged with the name and size of the plants in accordance with the standards of practice of the American Association of Nurserymen. In all cases, botanical names shall take precedence over common names.
- F. Preliminary Inspections: Assemble all plant materials in one location at the site for acceptance by Landscape Architect. Plant materials rejected shall be immediately separated out from other stock and removed from site. All plant material shall be tagged with botanical name. No plant materials shall be planted unless approved by Landscape Architect.
 - 1. Prior to requesting preliminary inspection and approval, thoroughly weed and rake all planting areas, complete all plant basins, plumb all tree stakes and snug all tie wires, and put the site into a neat and orderly condition.
 - 2. When all planting and the preparation for preliminary inspection is complete, request the Architect to make a preliminary inspection and approval. This

approval shall establish the beginning of the maintenance period. No partial approvals will be given.

1.03 SOILS TESTS

- A. Soil test by Waypoint Analytical report # 16-092-0105 Contractor to obtain report and base all cost on the recommendations contained within the report.

1.04 GUARANTEE AND REPLACEMENT

- A. Guarantee that all trees planted shall be in good, health and flourishing condition of active growth at the end of growing year from the date of Final Acceptance as define herein.
- B. Any delay in the completion of any part of the work in the planting operations which extends the planting into more than one planting season shall extend the guarantee period correspondingly.
- C. Replace, without cost to Owner, as soon as weather conditions permit, all dead plants and all plants not in a vigorous, thriving, healthy, and growing condition as determined by Architect. Make replacements of the same kind and sizes as originally specified, and plant as described on drawings and in specifications. Plant smaller than specified will not be accepted. If the same size is unavailable, plant a larger size.
- D. Contractor will not be held liable for plants lost during the guarantee period as a result of vandalism, storms, accidents, or improper care that results from neglect on the part of Owner. Architect will be the final arbiter in these decisions.
- E. Prepare plants free of dead branches and dead branch tips, and have foliage of normal density, size and color.
- F. Replacements shall continue to be made until each plant has successfully established itself for the required guarantee period.

2.00 PRODUCTS

2.01 FERTILIZERS

- A. Per soils report
- B. 21 gram slow release plant tablets

2.02 TOPSOIL

- A. Topsoil-Imported: For all planting areas and shall be a fertile, friable, natural material, without admixture of subsoil material. It shall be live soil and contain a normal amount of decomposed organic matter and free from heavy alkaline soil, coarse sand, stones, lumps, tools, rocks or other foreign matter. Topsoil to be placed as shown on the drawings to a 12" depth. The soil shall be an amended sandy loam as supplied by Rice Trucking Half Moon Bay CA. 650-726-0100. Remove rocky, gravelly soils as noted in soils report & replace with topsoil. Scarify sub-soil prior to soil placement.

- B. Sample: Before any topsoil is placed, submit to Architect a 2-pound sample typical of the topsoil to be used, for inspection and approval. Placement of topsoil may begin upon approval of sample.
- C. Placement: Place at a minimum depth of 6" in all planting areas, or to a depth that obtains finish grade as shown.

2.03 SOIL AMENDMENT – ORGANIC

- A. Soil amendment: Foster Farms 1-1-1 "Organic Farms" Landscape Amendment and shall have a salinity level not exceeding 6.5.

2.04 PLANTING BACKFILL MIX

Mix: per details on drawings

2.05 STAKING AND GUYING MATERIALS

- A. Stakes: Lodgepole pine, 3" diameter x 10', or as detailed.
- B. Ties: per details

2.06 MULCH MATERIAL

- A. Mulch: recycled organic Arbor Mulch from Lyngso Materials

2.07 HEADERS

- A. 6" w x 8"d concrete band as indicated on plans w/ one # 3 rebar

2.08 PLANT MATERIALS

- A. Plants: Nursery grown, first class, fresh, vigorous, well-established and normal representatives of their species or varieties, and have average or normal well-developed branch system together with vigorous root systems. Free from insect pest, eggs and larvae, plant diseases, disfiguring knob and sun scald, injuries, abrasions of the bark and other objectionable disfigurements. Thin, weak plants will not be accepted. All plants equal or exceed the sizes specified in the plants List, which are the minimum.
- B. Plants: Of species, variety, size, and conditions, as specified, or as shown. Under no condition will there be any substitution of plants or sizes for those listed on accompanying plans, except with the written consent of Architect.
- C. Quantities: As indicated on drawings. Quantities shown on drawings are only approximate. Verify actual number needed, furnish and install all plants as needed.
- D. Pruning: Do not prune plants prior to delivery except upon approval of Architect.
- E. Container stock: Been grown in the container in which delivered for at least 6 months, but not over 2 years. Samples must be shown to prove no root-bound condition.

- F. Container plants: Cracked or broken balls of earth when taken from the container shall not be planted. Canned stock removed carefully from cans after containers have been cut on two sides with tin snips or other approved cutter. Boxed stock shall have all sides and bottom removed before backfilling.
- G. Wire or Rope: No plant shall be bound with wire or rope at any time so as to damage the bark or break branches.
- H. Substitution: Landscape Architect reserves the right to make substitutions and deletions in planting scheme when he deems necessary as the work progresses on site. Such substitutions, additions and deletions shall be accompanied by an equitable adjustment of the Contract Sum when necessary. All plant material acquired through additions or substitutions shall be subject to all conditions and guarantees as herein specified.
- I. Inspection and Approval: All plants subject to inspection and approval by Architect at the place of growth or upon delivery for quality, size and variety. Such approval shall not impair the right of Architect to reject plants during progress of work for size and condition of rootball, latent defects or injuries. Remove reejected plants from the site.
- J. Plant Protection: Adequately protect from sun, wind and water.

2.09 LAWN SOD

- A. Sod: Drought tolerant, RTF tall fescue, by Park Ave sod

2.10 OTHER MATERIALS

- A. All other materials not specifically described, but required for a complete and proper installation of landscaping: New, first quality of their respective kinds, and subject to approval of Architect.

3.00 EXECUTION

3.01 GENERAL

- A. Prior to all work in this Section, carefully inspect the installed work of other trades and verify that all such work is complete to the point where planting installation may properly commence. Verify that planting can be completed in accordance with the original design. In the event of discrepancy, immediately notify Architect and proceed as directed.

3.02 PLACING OF TOPSOIL

- A. Subgrade in areas to receive topsoil: Scarify thoroughly to 12" minimum depth, immediately prior to topsoil placement. Subgrade scarification approved by Architect.
- B. Place topsoil: To within 2" of finished grade.

3.03 FINE GRADING

- A. Sticks, roots, rubbish and stones: Remove over 1-1/2" size.
- B. Fertilizer: per soils report

- C. Foster Farms "Organic Farms" 1-1-1 landscape soil amendment: Spread at rate of 3 cu. yds per 1,000 sq. ft.
- D. Rototill: To incorporate soil amendment and fertilizer in the surface 6" profile. Make repeated passes with rotary hoe cultivator until the surface 6" consist of a thorough blend.
- E. Soaking: Thoroughly soak soil to allow for settling before finish grading.
- F. Finish Grade: Rake surface and bring all areas to a smooth, even grade with all ridges and depressions removed. Regrade all areas not acceptable to Architect. Mandatory planting areas at a smooth minimum grade of 2% for drainage. Regrade any area with insufficient drainage at no extra cost. Finished grade including 1" of mulch, 3/4" below adjacent paving or curbs.

3.04 PLANTING TREES AND SHRUBS

A. General:

1. Establish a temporary nursery for all plants that have been inspected but cannot be planted immediately upon arrival at site. Provide adequate protection from sun and wind and keep moist and well watered at all times.
2. Assemble all plant material together in a central location on the site so that all may be inspected at one time.
3. Mark all proposed tree and shrub locations on site by placing plants in location shown. Make adjustments required by Architect and secure Architect's approval of locations before planting.
4. Do not take plants from temporary nursery until tree pits or holes for plants have been properly excavated, prepared and ready to receive plant material.

B. Excavation

1. Excavate holes circular in outline, with vertical sides and flat bottom to conform with planting detail. Take care to prevent cave-in of sides. Holes shall be one half deeper than the container or root ball and one half the width on each side. Scarify bottom and sides of the holes prior to placing plant to eliminate an interface.
2. Remove all lime treated subsoil, especially in existing parking lots, in the bottom of or under the planting hole and dispose of as directed, taking care that this soil not to be re-used for any planting.
3. Fill holes with water. If water has not percolated so that no water remains after 30 minutes, provide drain holes filled with soil mix sufficient to insure percolation of all water within 30 minutes. Auger bore drain holes penetrating the engineered fill a minimum of foot into original undistributed soil. Angle of borings to be as close to vertical as possible. Scarify sides of drain holes. Backfill drain holes with planting mix.

- C. Planting Operations
1. After pits are dug, break sides to open wall of pit for root penetration. Loosen bottom of pit to a depth of 3" and mix with an equal amount of topsoil. Construct a foot-tamped mound in bottom of pit as indicated on drawings, to bring grade to such an elevation so that the root crown of the root ball, after final settlement, will be stabilized at 1" above the surrounding finished grade. Backfill planting mix around root ball and soak thoroughly, taking care not with too much water to the point where the planting mix ingredients are separated. Water the backfill until saturated to the full depth.
 2. Backfill all plant holes with loose soil in a finely divided condition, free from rocks, clods, and lumpy material. After planting holes have been drilled, mix the removed soil with one part soil amendment to 2 parts topsoil. Backfill about one-third with this mixture. To insure the life of the plant, it is important that the actual planting operation proceed without delay to avoid undue evaporation and drying out of roots while exposed to air and sun. Handle plants so that roots and tops are adequately protected at all times.
 3. Water plants in place during and after backfilling and fertilizing.
 4. Pour Ortho "Upstart" over the surface of plant basin at double the manufacturer's directions at end of each day planting. Water immediately.
- 3.05 FERTILIZING
- A. Apply fertilizer at following rate:
1. One gallon can: single 21 gram plant tab
 2. 5 gallon can: 2- 21 gram plant tabs
 3. 15 gallon can and larger: 4- 21 gram plant tabs
- 3.06 MULCHING
- A. Trees and shrub basins: Mulch with a 2" depth of specified mulch.
- 3.07 STAKING
- A. Stake all trees prior to backfilling tree planting pits. Place stakes alongside root ball and at least 2 feet below finished grade. Erect stakes completely plumb and firmly anchored.
- 3.08 GROUNDCOVER PLANTING
- A. Soil preparation as per 3.00 – EXECUTION of planting specifications.
 - B. Install groundcover plants in evenly spaced rows with staggered spacing at intervals shown on drawings.
 - C. Take care not to cut damage roots or tops. Planting hole sizes are determined by the root system of each individual plant and large enough so roots will not be confine.

- D. Water immediately after planting and in sufficient quantity to saturate the soil around and below the plants to a depth of 8".
- E. Trees and shrubs occurring in ground cover areas, plant before final preparation of those areas.
- F. Plants shall not be allowed to dry out before or while being planted (pertains also to trees and shrubs). Keep exposed roots moist by means of wet sawdust, peat moss, or burlap at all times during planting operations and do not allow exposure to the air except while being placed in the ground. Wilted plants, whether in place or not, will not be accepted and shall be replaced at Contractor's expense.
- G. Spread 1" of Vita-bark "Mini-Mulch" over all groundcover areas after planting keeping top of mulch 3/4" min. below paved areas.

3.09 SODDED LAWN PLANTING

- A. Installation: Install lawn sod by sodding method. Finish grade lawn to proper elevation, moisten and prepare with fertilizer prior to sodding. Surface raked, watered, rolled and leveled. Install sod evenly and 1/2" below adjacent surfaces. Water with spray to completely saturate.
- B. Fertilization: Just prior to laying of sod, evenly broadcast 10 lbs. per 1000 sq. ft of pre-planting fertilizer over entire lawn area.
- C. Guarantee: Guarantee lawn will be 100% covered with turf at final inspection conducted at end contract maintenance period.

3.10 CLEAN-UP

- A. Clean the entire area included in the limit of work as indicated on drawings before preliminary inspection. Remove all cans, rocks, debris and other foreign materials resulting from the work from the site. Wash all paved areas.
- B. Maintain this condition of cleanliness throughout the maintenance period to satisfaction of Architect.

3.11 PRELIMINARY INSPECTION

- A. Upon completion of all planting and all clean-up work, the Contractor shall request a preliminary inspection. Completion of all corrective work and inspection and approval of it shall establish the beginning of the maintenance period.

3.12 MAINTENANCE PERIOD

- A. Maintenance period begins upon completion of all work and continues for 90 days.
- B. Maintenance period shall consist of caring for plants, beds and turf areas as follows:
 1. Protect all areas against damage, including erosion and trespass, and provide all necessary safeguards. Maintain and keep in good condition all temporary barriers erected to prevent trespass.
 2. Keep all walks and paved areas clean. Keep site free from debris resulting from landscape work and maintenance.

3. Repair all damages planted areas and replace plants immediately upon discovery of damage or loss.
4. Maintain turf during entire maintenance period. Cut as frequently as growth of grass requires. Cut to a height of 2" unless otherwise directed.

Trim edges of turf at paving and header boards at time of second cutting and at each cutting there after.

Resod areas which fail to adequately grow as soon as evident or as directed.

Repair any hollow, settled or eroded areas by filling, rolling, top dressing, resodding or as directed.

Fertilize all planting areas with 16-6-8 commercial fertilizer at rate of 6 lbs. per 1000 sq.ft. prior to end of 30 days after planting and at 30 day intervals thereafter. Water thoroughly after applying fertilizer. Perform all necessary operations to establish a uniform, thick and vigorous stand of turf.
5. Check all barriers and temporary fencing daily during the work week and repair or replace immediately as needed.
6. Maintain adequate moisture in soil to ensure vigorous growth.
7. Keep contract areas free from weeds by cultivating, hoeing or hand pulling. Use of chemical weed killer will not relieve the Contractor of the responsibility for keeping areas free from weeds over 1" in height at all times.
8. Fertilize each tree with Ortho "Upstart" at the end of 30 days following manufacturer's directions. Spread the fertilizer evenly over surface of plant basin and cultivate into mulch of soil. Thoroughly water after applying fertilizer.
9. Make a final weeding of all plant areas immediately prior to final inspection. Prune newly planted trees as directed by Architect. Remove all dead branches.

3.13 FINAL INSPECTION AND ACCEPTANCE

- A. Prior to requesting final inspection and acceptance, thoroughly weed and rake all planting areas, repair all plant basins, replumb all tree stakes and snug all tie wires, and put the site into a neat and orderly condition.
- B. Submit written notice to Architect through the Contractor requesting final inspection and acceptance, not less than 10 days before the anticipated date.
- C. Final inspection for acceptance shall be made at the conclusion of the 60 day planting maintenance period, provided that on such date all project improvements and corrective work has been completed. If all project improvements and corrective work are not completed the planting maintenance shall continue at no additional cost to the Owner until all work has been completed. This condition shall be waived by the Owner under such circumstances wherein the Owner has granted an extension of time to permit the completion set forth in the agreement.

SECTION 02830 – WOOD FENCES AND GATES**1.00 - GENERAL**

1.01 DESCRIPTION

- A. Section Includes:
 - 1. Requirements regarding wood fencing and gates
 - 2. Gate Hardware Group M. See section 08700.
- B. Related Sections:
 - 1. Finish Hardware – Section 08700,
 - 2. Painting -Section 09900, for surface preparation and the application of paint systems on wood fence, gate and framing components, if included.

1.02 REFERENCES

- A. Structural steel, bars, flats and shapes: ASTM A 36.
- B. Zinc coatings (hot-dipped galvanized): ASTM A 123.
- C. Steel structural tubing, rounds and shapes: ASTM A 500, Grade B.
- D. Electric-resistance-welded carbon and alloy steel mechanical tubing: ASTM A 513.

1.03 PERFORMANCE REQUIREMENTS

- A. Completed gates shall be capable of supporting a 600-lb. load (applied at midspan) without permanent deformation.

1.04 SUBMITTALS

- A. General: Comply with Division 1 Section “Submittal Procedures”.
- B. Product Data: For each type of product indicated.
- C. Shop Drawings: Show fabrication and installation details for wood gates.
 - 1. Include plans, elevations, sections, and details of wood gates, fabrications and their connections. Show anchorage and accessory items.
 - 2. Provide templates for anchors and bolts specified for installation under other Sections.
 - 3. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Deliver materials to job site in good condition and properly protect against damage to finished surfaces.

- B. Storage: Store materials in a clean dry location and in such a way as to avoid damage from dust, chemicals and moisture in the air by covering with protective material.
- C. Handling: Handle materials on site to protect finishes.

2.0 – PRODUCTS

2.01 GENERAL

- A. All wood materials shall be treated wood, or wood of a natural resistance to decay. Materials shall be free from loose knots, cracks, and other imperfections.
- B. Cast-in-place Concrete: Class 3000 minimum, Section 03300.

2.02 WOOD BOARDS OR SLATS

- A. Wood boards or slats: Clear, redwood 1x6,
- B. Top and bottom rails: redwood 2x4
- C. Bottom skirt board: 2x12 PTDF

2.03 POSTS

- A. Fence and Man Gate posts: 4x4 PTDF
- B. Man Gate posts: 6x6 PTDF
- C. Buried post ends should be treated with an approved wood preservative product.

2.04 GATES

- A. Provide additional horizontal, vertical, and diagonal members to ensure proper gate operation and for attachment of wood, hardware and accessories. Consult manufacturer as necessary.
- B. Accessibility: Gate stops, latches and locks shall be accessible from either side of gate.
- C. Types: Man Gates and Truck Gates
 - 1. Man Gates
 - a. Openings shall be a minimum of 3 feet wide.
 - 2. Truck Gates
 - a. Openings shall be a minimum of 12 feet wide.
- C. Gate designs shall be approved by OWNER prior to installation.

2.05 GATE HARDWARE

- A. Gate hardware including, but not limited to, latches, hinges, stops and bolts shall be stainless steel, powder coated black, or galvanized.
- B. Hinges and Pins shall be heavy duty and sized as per manufacturer's recommendations.
- C. For truck gates (double-leaf), a drop rod or stop shall be installed on one leaf, include at least one guide and shall extend into concrete base or similarly solid base.

3.00 EXECUTION

3.01 PREPARATION

- A. Field conditions: Verify field conditions, grade changes or surface irregularities.
- B. Discrepancies: Advise Architect of discrepancies between approved shop drawings and field conditions prior to proceeding with the work.

3.02 INSTALLATION

- A. Fence posts: Set plumb and true. Footings of size shown. Caps as indicated.
- B. Gates: Install plumb and level, of sizes and styles as shown. Install gate stops as required. Field attach padlock provisions or strikes to assurance alignment. Install exit devices at single and double gates as noted. Lubricate hinges, wheels and other hardware after installation.
- C. Field welds and abrasions to factory coating: Clean, reprime and touch up with paint or coating of same quality and finish as used by manufacturer.

3.03 CLEANING

- A. Site: Clean site of excess materials.
- B. Concrete splatter: Clean from exposed posts.

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SECTION 03100 – CONCRETE FORMWORK**PART 1 - GENERAL****1.1 DESCRIPTION**

- A. Work Includes: Provision of formwork for cast-in-place concrete and installation of embedded items.
- B. Related Sections:
 - 1. Section 03200 - Concrete Reinforcement.
 - 2. Section 03300 - Cast-In-Place Concrete.

1.2 REFERENCES

- A. Requirements of GENERAL CONDITIONS and DIVISION NO. 1 apply to all Work in this Section.
- B. Published specification, standards, tests, or recommended methods of trade, industry, or governmental organizations apply to Work of this Section where cited by abbreviations noted below (latest editions apply).
 - 1. California Code of Regulations. Title 24, 2013 edition, also known as California Building Code (CBC).
 - 2. American Society for Testing and Materials (ASTM).
 - 3. Federal Specifications (FS).
 - 4. American Concrete Institute's "Recommended Practice for Concrete Formwork," (ACI 347).
 - 5. United States Voluntary Product Standard for Construction and Industrial Plywood (PSI-83).
 - 6. American Plywood Association's "Guide to Plywood Grades" (APA).
 - 7. West Coast Lumber Inspection Bureau's "Standard Grading Rules No. 16" (WCLIB).

1.3 QUALITY ASSURANCE

- A. Design Criteria: Formwork shall conform to ACI 347 and CBC Section 1906A.
 - 1. Formwork:
 - a. Shall prevent leakage or washing out of cement mortar.
 - b. Shall resist spread, shifting, and settling.
 - c. Shall reproduce accurately required lines, grades, and surfaces within tolerances specified.
 - 2. Safety: The Contractor shall be responsible for adequate strength and safety of all formwork including falsework and shoring.

- B. Allowable Tolerances: Formwork shall produce concrete within tolerance limits recommended in ACI 347, unless otherwise noted.

1.4 SUBMITTALS

- A. Samples: Only as requested by the Architect.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use.

1.6 JOB CONDITIONS

- A. Sequencing Schedule:
1. Ensure timely delivery of embedded items. Be responsible for cutting and patching necessitated by failure to place embedded items.
 2. Plan erection and removal to permit proper sequence of concrete placing without damage to concrete.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Forming Materials:
1. Panel or board forms at the Contractor's option.
 - a. Panel Forms: Minimum 5/8-inch thick exterior grade plywood with sealed edges, PS 1 grade Plyform Class I and II B-B Exterior or HDO Exterior.
 - b. Board Forms: Shiplap or tongue and groove lined with PS 1 grade Plyform Class I and II Exterior 1/2-inch or HDO Exterior 1/2-inch or 3/16-inch thick fiberboard conforming to FS LLL-B-810a(1), type I.
 2. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on Drawings.
 - a. Use Plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood", Class I, Exterior Grade or better, with each piece bearing legible inspection trademark. Panels to receive specified form sealer to ensure uniform finish of exposed surfaces.
 - b. Designated "Architectural Concrete" Surfaces: Use overlaid plywood complying with U.S. Product Standard PS-1 "A-C or B-B High Density Overlaid Concrete Form", Class 1.
 3. Chamfer Strips: Burke Concrete Accessories' PVC type CSF 1/2-inch, all exposed corners.
- B. Wood Framing: WCLIB standard grade or better Douglas Fir.

- C. Form Ties and Spreaders: Metal type acting as spreaders, leaving no metal within one inch of concrete face and no fractures, spalls, depressions or other surface disfigurements greater than 3/4-inch in diameter.
- D. Expansion Joint Filler:
 - 1. Fiber Type: Premolded asphalt-impregnated fiber, ASTM D1751, 1/4-inch thick unless otherwise noted. Same as W. R. Meadows, Inc.'s "Sealtight Fiber Expansion Joint"; Grace Construction Materials "Serviced Fiber Expansion Joint Filler, Code 1390"; National Expansion Joint Co.'s "Fiber Joint Filler No. 12"; Burke Concrete Accessories, Inc.'s "Burke Fiber Expansion Joint"; or equal product substituted per Section 01000.
- E. Form Sealer: Same as Grace Construction Material's "Formfilm"; or equal product substituted per Section 016000.
- F. Release Agent: Must not stain or otherwise adversely affect architectural concrete surfaces. Same as The Nox-Crete Co.'s "Nox-Crete Form Coating"; Industrial Synthetics Corp.'s "Synthex;" or equal product substituted per Section 016000.

2.2 SOURCE QUALITY CONTROL

- A. Plywood shall bear APA grade-trademark.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas where formwork will be constructed and verify that:
 - 1. Excavations are sufficient to permit placement, inspection and removal of forms.
 - 2. Excavations for earth forms have been neatly and accurately cut.
 - 3. Conditions are otherwise proper for formwork construction.
- B. Do not start work until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Obtain necessary information for coordination of formwork with items to be embedded in concrete and other related work.

3.3 CONSTRUCTION

- A. General:
 - 1. Design, erect, support, brace and maintain formwork to support vertical and lateral, static, and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation and position. Maintain formwork construction tolerances complying with ACI 347.
 - 2. Construct forms to sizes, shapes, lines and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb Work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in Work. Use selected materials to obtain

required finishes. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.

3. Frame openings where indicated on Architectural, Structural, Mechanical, Plumbing and Electrical drawings.

B. Earth Forms:

1. Construct wood edge strips at top sides of excavations.
2. Provide forms for footings wherever concrete cannot be placed against solid earth excavation.
3. Remove loose dirt and debris prior to concrete pours.
4. Foundation concrete may be placed directly into neat excavations provided the foundation trench walls are stable as determined by the Structural Engineer. In such case, minimum formwork shown on the drawings is mandatory to insure clean excavations immediately prior to and during the placing of concrete.

C. Walls and Other Formed Elements:

1. Erect outside forms for exposed exterior walls first and obtain the Architect's approval before reinforcement is placed. Obtain Architect's approval of the reinforcement before interior form is erected.
2. Carefully align inside and outside forms before tightening ties.
3. Plywood Forms: Insure vertical joints are plumb and horizontal joints are level; arrange joints and ties in geometrical pattern as approved by the Architect.
4. Form inside corners at exposed conditions with mitered boards or plywood so that no concrete is placed against form ends.
5. After erection, seal all cracks, holes, slits, gaps, and apertures in forms so that they will withstand the pressure and will remain completely watertight.
6. Provide a means to seal the bottom of forms at construction joints such as foam tape or other gasket devices.
7. Apply a coating of release agent prior to the erection of formwork. Follow approved manufacturer's recommendations.

D. Slab Forms:

1. Establish levels and set screeds.
2. Depress slabs where required to receive special floor finishes.

E. Cleanouts and Openings: Provide on interior face of wall forms as required for effective removal of loose dirt, debris and waste material, for inspection of reinforcing and for introduction of vibrators where the Architect deems necessary.

F. Expansion Joints:

1. Provide in exterior concrete paving on grade at maximum 24-feet on center or as noted and at intersections with vertical surfaces, curbs, manholes or other penetrations through paving.

2. Use fiber type expansion joint fillers typically and depress 1/4-inch unless otherwise noted.
3. Use cork type expansion joint fillers at conditions with non-bituminous waterproofing, liquid waterproofing or sealant systems.

G. Construction Joints:

1. Provide where shown on the drawings as directed by the Engineer.
2. Provide key indentations at all joints.
3. Provide pour strips on inside face of forms at horizontal joints, but remove strips and thoroughly clean out reglets before placing subsequent portions of wall.
4. Prevent formations of shoulders and ledges.
5. Provide means for drawing forms into firm contact with concrete before placing additional concrete over previous pours where shrinking and warping has separated concrete from forms.

H. Embedded Items:

1. Properly locate, unless locating is specified elsewhere, and place inserts and embedded items required by other trades prior to casting concrete.

I. Shoring:

1. Adequately brace and maintain shoring to safely support vertical, lateral, and asymmetrical loads until completed structure has attained design strength.
2. Distribute shoring loads over area where shoring is erected and protect against undermining or settlement.
3. Provide means for making vertical adjustments to compensate for settlement either before or during placing of concrete.
4. Reshoring will be permitted. Shores and reshores shall be designed by a Civil Engineer registered in the State of California and installed under his/her direction. This Civil Engineer shall be employed by the Contractor.

3.4 REMOVAL

- A. Secure the Architect's approval for time and sequence of form removal.
- B. Form Removal: Forms shall be removed without damage to the concrete, and in no case shall they be removed prior to the concrete member attaining the specified strength.

<u>MEMBER</u>	<u>STRENGTH</u>	<u>MINIMUM TIME*</u>
Vertical surfaces of walls, columns	0.60 f'c	7 days

*Estimated curing time required to obtain desired strength. Results of the 7-day test cylinder break shall be presented to the Architect to demonstrate compliance with above specified strength requirements prior to form removal. If a 7-day test cylinder break demonstrates strength that is less than that specified, the Contractor may elect to take additional cylinders at the time of next pour to demonstrate strength requirements. The Contractor shall bear the cost of taking and testing the additional samples.

C. Forms:

1. Remove forms carefully to avoid damaging corners and edges of exposed concrete.
2. Reuse:
 - a. The Architect will approve reuse of forms provided they are straight, clean, free from nails, dirt, hardened concrete, or other injurious matter and edges and surfaces are in good condition.
 - b. Clean and repair any damage caused by placing, removal, or storage. Reuse of formwork with repairs or patches which would result in adverse effects to architectural concrete finish will not be permitted.
 - c. Store formwork in manner to prevent damage or distortion.
 - d. Reseal as required to achieve concrete of specified quality.

END OF SECTION

SECTION 03200 - CONCRETE REINFORCEMENT**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section includes reinforcing bars, welded wire fabric, and reinforcement accessories.
- B. Related Sections:
 - 1. Section 03100 - Formwork.
 - 2. Section 03300 - Cast-In-Place Concrete.

1.2 REFERENCES

- A. Requirements of the GENERAL CONDITIONS and DIVISION NO. 1 apply to all Work in this Section.
- B. Published specifications, standards, tests, or recommended methods of trade, industry, or governmental organizations apply to Work of this Section where cited by abbreviations noted below (latest editions apply).
 - 1. California Code of Regulations. Latest version of the California Building Code (CBC) (2013).
 - 2. American Society for Testing and Materials (ASTM).
 - a. ASTM A706/A706M – Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
 - 3. American Concrete Institute:
 - a. ACI 315 - "Manual of Standard Practice for Detailing Reinforced Concrete Structures".
 - b. ACI 318 - "Building Code Requirements for Structural Concrete".
 - 4. Concrete Reinforcing Steel Institute (CRSI):
 - a. CRSI - "Manual of Standard Practice."
 - b. CRSI - "Recommended Practice for Placing Reinforcing Bars."
 - 5. American Welding Society:
 - a. AWS A5.1 - "Mild Steel Covered Arc-Welding Electrodes".
 - b. AWS D1.4 – Structural Welding Code – Reinforcing Steel.

1.3 QUALITY ASSURANCE

- A. Welders' Qualifications: Welders shall be qualified in accordance with AWS D1.4.
- B. Reinforcing steel shall not be permitted to rust where there is danger of staining exposed surfaces of adjacent concrete. The Contractor shall replace rust-stained concrete at his expense.

- C. Allowable Tolerances: Reinforcing steel shall be placed within tolerances permitted by CBC, Section 1907A.5 unless otherwise approved by the Architect.
- D. The Owner's Testing Agency will provide tests in accordance with CBC Section 1916A.2.
 - 1. Collect mill test reports for reinforcement.
 - 2. Take samples from bundles at fabricators.
 - a. When bundles are identified by heat number and accompanied by mill analysis, two specimens shall be taken from each ten (10) tons, or fraction thereof, of each size and grade.
 - b. When reinforcement is not positively identified by heat numbers or when random sampling is intended, two specimens shall be taken from each 2-1/2 tons, or fraction thereof, of each size and grade.
 - 3. Test for tensile and bending strengths.
 - 4. Provide inspection of welding, including prior fit-up, welding equipment, weld quality and welder certification in accordance with AWS D1.4 and UBC Standard No.19-1. Chemical analysis sufficient to determine carbon equivalent and minimum preheat temperature shall be performed when reinforcement does not conform to low-alloy steel requirements of CBC Section 1903A.4. Steel shall comply with ASTM A706, Grade 60.

1.4 SUBMITTALS

- A. Section 01330 – Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Show bending and placing details, size and location of reinforcing steel. Include diagrammatic wall elevations at 1/4-inch equals one foot scale to clearly show position and erection marks of bars including marginal bars around openings with dowels, splices, etc.
- C. Certified mill test reports (tensile and bending) for each heat or melt of steel prior to delivery of material to the job site. Where reinforcing is to be welded, mill test reports shall verify the weldability of the steel.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Section 01600 – Product Requirements.
- B. Deliver reinforcement and accessories to site not more than 48-hours before placement.
- C. Store in manner to prevent excessive rusting and fouling with grease, dirt, or other bond-weakening coatings.
- D. Take precautions to maintain identification after bundles are broken.

1.6 COORDINATION

- A. Section 01300 – Administrative Requirements: Coordination and project conditions.
- B. Coordinate with placement of formwork, formed openings, and other Work.

PART 2 - PRODUCTS

2.1 REINFORCEMENT

- A. Bars: New billet steel, ASTM A615 Grade 60, or ASTM A706 Grade 60 at welded reinforcement.
- B. Tie Wires and Spirals: ASTM A82.
- C. Welded Wire Fabric: ASTM A185.

2.2 ACCESSORY MATERIALS

- A. Welding Electrodes: Mild steel covered arc-welding types conforming to AWS A5.1.
- B. Bar Supports: As required for assembling and supporting reinforcement in place.
 - 1. Typical: CRSI Class B pre-galvanized.
 - 2. Interior and Exterior Soffits and Other Exposed Conditions: CRSI Class C plastic-protected; or class E stainless steel wire, Type 430, and containing not less than 16-percent chromium.
- C. Threaded coupler: Lenton Standard coupler by ERICO or equal product substituted by request. Coupler shall develop 125-percent of specified yield strength reinforcement.

2.3 FABRICATION

- A. Shop-fabricate to comply with drawings.
- B. Conform with the requirements of ACI 315 where specific details are not shown or where drawings and specifications are not more demanding.

PART 3 - EXECUTION

3.1 PLACEMENT

- A. General:
 - 1. Place bars as noted.
 - 2. All reinforcement shall be continuous. See drawings for lap splice schedule. Stagger splices where possible. Contact lap splices shall be securely wired together to maintain alignment. At shotcrete limit splices as much as possible use non-contact lap splice when required.
 - 3. Ensure placement will permit concrete protection in conformance with CRSI or to extent shown.
 - 4. Support and fasten bars securely with spacers, chairs or ties to permit their being walked upon without displacement or movement both before and during placement of concrete. Wire-tie bar intersections.
 - 5. Do not bend bars around openings or sleeves. Wherever conduits, piping, inserts, sleeves, etc. interfere with placing of reinforcement, obtain the Architect's approval of placing before concreting.
 - 6. Do not field bend bars unless expressly noted in the Contract Documents.
- B. Reinforcement for Shotcrete Applications:

1. Place reinforcement in accordance with CBC Section 1907A.5.
- C. Welding:
1. Employ shielded metal-arc method and conform to AWS D1.4.
 2. Ensure equipment supplies proper current and voltage and is adjustable to suit arrangement and thickness of items welded.
- D. Prior to placing concrete, verify reinforcement has been bent, positioned, and secured in accordance with drawings; ensure removal of oil, grease, dirt, or other bond-weakening coatings; replace severely rust-pitted reinforcing bars.
- E. Quality Assurance:
1. The Project Inspector will inspect placement of reinforcement and notify Structural Engineer of any discrepancies in placement.
 2. The Owner's Testing Agency will inspect shop and field welding of reinforcing bars in accordance with CBC Section 1903A.

END OF SECTION

SECTION 03300 - CAST-IN-PLACE CONCRETE**PART 1- GENERAL****1.1 DESCRIPTION**

- A. Section Includes: Provision of cast-in-place concrete, shotcrete and granular fill under slabs-on-grade.
- B. Related Sections:
 - 1. Section 03100 - Formwork.
 - 2. Section 03200 - Concrete Reinforcement.
 - 3. Section 05500 - Metal Fabrications.
 - 4. Section 02300 - Sub-Slab Vapor Barrier.
- C. Products Installed But Not Supplied Under This Section:
 - 1. Sub-Slab Vapor Barrier. Refer to Section 02300.

1.2 REFERENCES

- A. Published specifications, standards, tests, or recommended methods of trade, industry, or governmental organizations apply to Work of this Section where cited by abbreviations noted below (latest editions apply).
 - 1. California Code of Regulations. Latest Edition of the California Building Code (CBC) (2013).
 - 2. American Society for Testing and Materials (ASTM).
 - 3. American Concrete Institute:
 - a. ACI 301 – Specifications for Structural Concrete.
 - b. ACI 304 - Recommended Practice for Measuring, Mixing and Placing Concrete.
 - c. ACI 305 - Hot Weather Concreting.
 - d. ACI 306.1 - Standard Specification for Cold Weather Concreting.
 - e. ACI 318 - Building Code Requirements for Structural Concrete.
 - 4. State of California, Business and Transportation Agency Division of Highways' "Materials Manual," (CMM).

1.3 QUALITY ASSURANCE

- A. The Contractor's Testing Laboratory Qualifications: The Contractor's Testing Laboratory shall be under direction of a Civil Engineer registered in the State of California, shall have operated successfully for four years prior to this work, and shall conform to requirements of ASTM E329.
- B. Requirements of ACI 301 shall govern work, materials and equipment related to this Section; specifications herein set minimum results required, and references to procedures are intended to establish minimal guides.

- C. The Contractor shall be responsible for quality of concrete in place and shall bear burden of proof that concrete meets minimum requirements.
- D. Placing of concrete by means of pumping will be an acceptable method of placement providing that the Contractor can demonstrate that:
 - 1. Specified concrete strengths will be met.
 - 2. Equipment has a record of satisfactory performance under similar conditions and using a similar mix.
 - 2. Trial batches have been made.
- E. Conform to ACI 305 when concreting during hot weather.
- F. Conform to ACI 306.1 when concreting during cold weather.

1.4 SUBMITTALS

- A. Section 00006, Contract Part 2, Section 2.6 Submittals: Submittal procedures.
- B. The Contractor's Testing Laboratory's certificate of compliance.
- C. The Contractor shall submit:
 - 1. Certified copies of mix designs for each concrete class specified including compressive strength test reports.
 - 2. Certification that materials meet requirements specified.
 - 3. Samples only as requested by the Architect.
 - 4. Certification from vendor that samples originate from and are representative of each lot proposed for use.
- D. The Owner's Testing Agency will submit reports on tests and inspections performed to the Owner, the Architect, the Contractor, and the Division of the State Architect.
- E. Shop Drawings: Show construction joint locations and details.
- F. Schedule of placing for the Architect's review before starting Work.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Ensure storage facilities are weather tight and dry.
- B. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use.
- C. Store bulk cement in bins capable of preventing exposure to moisture.
- D. Use sacked cement in chronological order of delivery. Store each shipment so that it may be readily distinguishable from other shipments.

1.6 COORDINATION

- A. Section 00006 - Administrative Requirements: Coordination and project conditions.

- B. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.

PART 2- PRODUCTS

2.1 CONCRETE CLASSES

CLASS	STRENGTH	AGGREGATE	WEIGHT	SLUMP
A	4000 psi	3/4 Inch	145 pcf	4 Inches

See specific requirements for Floor slab concrete noted in this specification. Floor slab will be polished and requires a special mix design.

- A. Class: Identifies location and use as specified in the Structural Drawings.
- B. Strength: Compressive strength in psi after 28-days when tested in accordance with ASTM C39. All concrete shall develop compression strength specified in 28-days. To meet above requirements, mix shall be designed such that average compressive strength will exceed specified 28-day strength by an amount as specified by ACI 318.
- C. Aggregate: Maximum size in inches. Use recycled aggregate where possible. Except light weight concrete and slab concrete.
- D. Weight: Pounds per cubic foot, air dry.
- D. Slump: In inches when tested in accordance with ASTM C143.

SHOTCRETE

CLASS	STRENGTH	AGGREGATE	WEIGHT	SLUMP
A	4000 psi	3/8 Inch	145 pcf	2 Inches

2.2 MATERIALS

- A. General Requirements:
- Cement and aggregates shall have proven history of successful use with one another. Sources of cement and aggregate shall remain unchanged throughout work unless the Architect approves request for change made at least 10-days prior to anticipated date of casting.
 - Ready-mixed concrete shall meet requirements of ASTM C94.
 - Deviations in properties of materials tested by the Owner's Testing Agency shall be cause for their rejection pending additional test results and redesign of mix by the Contractor's Testing Laboratory.
 - No frozen aggregates will be permitted.
- B. Cements:
- For Class A, B, and C Concrete: ASTM C150, Type II. Use one brand of cement throughout project unless otherwise acceptable to Architect. Use Type 1 cement for light weight concrete and floor slab concrete.

2. Maximum water/cement ratio of 0.50. Use 0.45 for light weight concrete and floor slab concrete.
- C. Fly Ash: ASTM C618, Type F; minimum 20% replacement of portland cement. No Fly Ash shall be used for light weight concrete and floor slab concrete.
- D. Aggregates:
1. Coarse: ASTM C33. Coarse aggregate shall consist of a clean, hard, fine grained, sound crushed rock, or washed gravel or a combination of both. It shall be free from oil, organic matter or other deleterious substances and shall not contain more than two percent by weight of shale or cherty material. "Cleanness value shall not be less than 75 when tested per MM Test Method, 227 and conforming to CBC Section 1903A.4.2.
 2. Fines: ASTM C33. Sand equivalent shall be not less than 75 when tested as per ASTM D2419.
 3. For Class C Concrete: ASTM C330; expanded shale type uniformly graded from 3/4-inch to No. 200 Mesh. Cleanliness value and sand equivalent not less than 75. Same as Aggregate Division of Basalt Rock Co., Inc's "Basalite"; Port Costa Clay Products Co.'s "PC-7"; or equal product substituted upon request.
 4. Provide aggregates from a single source for exposed concrete. For light weight concrete and floor slab concrete; during batching, the incoming material consistency should be monitored and controlled.
- E. Water: Clean and potable, free from impurities detrimental to concrete.
- F. Water-Reducing Admixture: ASTM C494, Type A, that do not contain non-lignini sulfonate. Same as Grace Construction Materials' "WRDA" with hycol; Master Builders "Pozzolith" 322N; or equal product substituted per Section 01000. Limit admixture for light weight concrete and floor slab concrete.
- G. Air Entraining Admixture: ASTM C260, certified by manufacturer to be compatible with other products. Same as W.R. Grace's "Daravair", Master Builders' "Micro-Air", Sika Corp.'s "Sika Aer", or equal product substituted per Section 01000. No Air Entrained add mixture for light weight concrete and floor slab concrete.
- H. Other Admixtures: Only as approved by the Architect.
- I. Non-Shrink Grout: Premixed high strength grout requiring only addition of water at the site. Same as Master Builder's "Masterflow 928 Grout"; Burke's "Non-Ferrous, Non-Shrink Grout", or equal product substituted per Section 01000.
- J. Curing Materials:
1. Curing Compound: ASTM C309. Water loss – not more than 0.55 kg/m² in 72 hours; Light Reflectance – not less than 60%. Same as Grace Construction Materials' "Horn Clear Seal"; Grimes Co.'s "Sealcrete"; Master Builders' "Masterseal W", or equal product substituted per Section 01000. See section 03320 for requirements. Curing compound shall be compatible with concrete polishing requirements.
- K. Concrete Sealer: See section 03320 for sealer requirements.
- L. Insulation Board: Extruded close cell polystyrene foam, channeled for drainage, with a minimum compressive strength of 60 psi at 0.1-inch deformation when tested in accordance with ASTM D1621-73, and meeting requirements of FS-HH-I-524b, Type II,

Class B. Same as The Dow Chemical Co.'s "Styroform PD Brand" or equal product substituted per Section 01000.

- M. Epoxy Adhesive: Two component material suitable for anchoring rebar into dry or damp concrete. Same as Simpson "SET XP Adhesive", Hilti's "HIT C-100" or equal product substituted per Section 01000.
- N. Vapor Barrier: As specified in Section 02300 – Sub Slab Vapor Barrier.
- O. Granular Fill Under Slab-on-Grade: Clean and free from excessive dirt, no less than 95 percent passing #4 sieve and not more than 25 percent passing #200 sieve. Geotechnical Engineer shall approve material.

2.3 MIXES

A. General Requirements:

1. The Contractor shall perform tests or assemble the necessary data indicating conformance with specifications.
2. For each mix submit data showing that proposed mix will attain the required strength in accordance with requirements of CBC Section 1905A.3, Method "B".
3. The Contractor shall instruct Laboratory to base mix design on use of materials tested and approved by the Owner's Testing Agency.
4. Mix design shall include compression strength test reports per CBC Section 1905A.6.
5. Mix shall be designed, tested, and adjusted if necessary in ample time before first concrete is scheduled to be placed. Laboratory data and strength test results for revised mix design shall be submitted to Architect prior to using in project.
6. Insure mix designs will produce concrete to strengths specified and of uniform density without segregation.
7. If mix yield exceeds 1-cubic yard, modify mix design to no more than one cubic yard without changing cement content.
8. The Contractor's mix designs shall be subject to review by the Architect and by the Owner's Testing Agency.
9. Introduction of calcium chloride will not be permitted.
10. Unspecified admixtures will not be permitted unless the Architect reviews, the Contractor modifies mix designs as necessary, and modifications are accepted by the Owner's Testing Agency.

B. Patching Mortar: Mix in proportions by volume of one part cement to two parts fine sand.

C. Non-Shrink Grout: Follow approved manufacturer's printed instructions and recommendations.

2.4 MIXING

A. Batching Plant Conditions:

1. Ensure equipment and plant will afford accurate weighing, minimize segregation and will efficiently handle all materials to satisfaction of the Architect and the Owner's Testing Agency.

2. Replace at no additional expense equipment the Architect and the Owner's Testing Agency deem inadequate or unsuitable.
3. Use approved moisture meter capable of determining moisture content of sand.

B. General Requirements:

1. Thoroughly clean concrete equipment before use for architectural concrete mixes to avoid contamination.
2. Mix cement, fine and coarse aggregates, admixtures and water to exact proportions of mix designs. Method of mixing shall comply with CBC Section 1905.8 or ACI318, Section 5.8.
3. Measure fine and coarse aggregates separately according to approved method which provides accurate control and easy checking.
4. Adjust grading to improve workability; do not add water unless otherwise directed.
5. Maintain proportions, values, or factors of approved mixes throughout work.
6. Mix concrete in transit mixers five minutes immediately prior to discharge in addition to mixing as called for by ACI 304 and ASTM C94.

- C. Admixtures: Use automatic metering dispenser to introduce admixture into mix. Dispenser shall be recommended and calibrated by admixture manufacturer.

2.5 SOURCE QUALITY CONTROL

A. The Owner's Testing Agency will:

1. Review mix designs, certificates of compliance, and samples of materials the Contractor proposes to use.
2. Test and inspect materials, as necessary, in accordance with ACI 318 and CBC Sections 1903, and 1905 for compliance with requirements.
3. Take samples as required from the Contractor's designated sources.
4. Take one grab sample for each 100 tons of Portland cement except that, when used in bulk loading ready-mix plants where separate bins for pre-tested cement are not available, take grab samples for each shipment of cement placed in bin with not less than one sample being taken for each day's pour and subsequently test such samples if required by the Architect or Engineer.
5. Test both coarse and fine aggregate by use of solution of sodium or magnesium sulfate, or both whenever in the judgement of the Architect such tests are necessary to determine quality of material. Perform such tests in accordance with ASTM C88. Loss shall not exceed 6-percent of either fine or coarse aggregate. Aggregate failing to comply with this requirement may be used in the Work provided it contains less than 2- percent of shale and other deleterious particles and shows a loss in soundness test of not more than 10-percent when tested in the sodium sulphate solution. Test aggregates as required by CBC Section 1903 and ACI 318.
6. Test for sand equivalent of fine aggregate in accordance with California Test 217.

7. Test for cleanness value of coarse aggregate in accordance with California Test 227.
 8. Inspect plant prior to any work to verify following:
 - a. Plant is equipped with approved metering devices for determining moisture content of fine aggregate.
 - b. Other plant quality controls are adequate.
 9. Continuously inspect quality and quantity of materials used in transit mixed concrete, in batched aggregates and ready-mixed concrete at mixing plant or other location per ACI 318 where other materials are measured.
- B. Waiver of Batch Plant Inspection:
1. Continuous batch plant inspection may be waived in accordance with if the plant complies with ASTM C94 and has been certified by an agency acceptable to the engineer to comply with the requirements of the National Ready Mix Concrete Association.
 2. When batch plant inspection is waived, the following requirements shall apply:
 - a. Testing Agency shall check the first batching at the start of work and furnish mix proportions to the licensed Weighmaster.
 - b. Licensed Weighmaster shall identify material quantities and certify each load by a ticket.
 - c. Project Inspector shall collect truck mix tickets with load identification and maintain a daily record of placement. Trucks without a load ticket identifying the mix shall be rejected. Copies of daily placement record shall be submitted to Architect.
 - d. At the end of the project, the Weighmaster shall submit an affidavit to Architect certifying that all concrete supplied conforms to proportions established by mix designs.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 00006 – Administrative Requirements: Coordination and project conditions.
- B. Examine units of work to be cast and verify that:
 1. Construction of formwork is complete.
 2. Required reinforcement, inserts, and embedded items are in place.
 3. Form ties at construction joints are tight.
 4. Concrete-receiving places are free of debris.
 5. Dampen subgrade for slabs-on-grade. Do not saturate. See soils report for additional requirements.
 6. Depths of depressed slab conditions are correct for delayed finish noted and for its proper bonding to concrete.

7. Conveying equipment is clean and properly operating.
 8. The Architect has reviewed formwork and reinforcing steel and that preparations have been checked with the Project Inspector.
 9. Vapor barrier has been installed according to ASTM E1643.
- C. Do not begin casting before unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Ensure availability of sufficient labor, equipment and materials to place concrete correctly in accordance with scheduled casting.
- B. Protect finished surfaces adjacent to concrete-receiving places.
- C. Clean transportation and handling equipment at frequent intervals and flush thoroughly with water before each day's run. Do not discharge wash water into concrete form.
- D. Construction Joints: Clean and roughen all construction joint contact surfaces by removing all surface laitance and exposing sound mortar. Sandblasting and bush-hammering are acceptable methods.

3.3 PLACING

- A. The Inspector of Record, Architect, Structural Engineer, Testing Laboratory shall be notified at least 48 hours before placing concrete.
- B. Place concrete in accordance with CBC Section 1905.
- C. Place concrete in cycles as a continuous operation to permit proper and thorough integration and to complete scheduled placement. Place no concrete where sun, wind, heat, or facilities prevent proper finishing and curing.
- D. Convey concrete as rapidly and directly as practicable to preserve quality and to prevent separation from rehandling and flowing; do not deposit concrete initially set. Cast concrete within ninety (90) minutes after adding water unless otherwise noted. Retempering of concrete which has partially set will not be permitted.
- E. Take precautions to avoid damage to under-slab moisture barrier and displacement of reinforcement and formwork.
- F. Deposit concrete vertically in its final position. Avoid free falls in excess of six feet where reinforcement will cause segregation and in typical conditions unless the Architect approves otherwise.
- G. Keep forms and reinforcement clean above pour line by removing clinging concrete with wire brush before casting next lift. Also remove leakage through forms.
- H. Interruption in casting longer than 60-minutes shall be cause for discontinuing casting for remainder of day. In this event, cut back concrete and provide construction joints as the Architect directs; clean forms and reinforcement as necessary to receive concrete at a later time.
- I. Hot Weather Concreting: Conform to ACI 305 and following requirements when mean daily temperature rises above 75 degrees Fahrenheit.

1. An upper temperature limit of concrete mixes shall be established by the Contractor for each class of concrete. Concrete temperature during placing shall not be so high as to cause difficulty from loss of slump, flash set, or cold joints, and shall not exceed 90°F. Other project climatic conditions detrimental to concrete quality such as relative humidity, wind velocity, and solar radiation shall also be considered.
2. Trial batches of concrete for each mix design shall be made at the limiting mix temperature selected. In lieu of trial batches, compression strength test reports (20 minimum) at the limiting temperature for each proposed mix shall be submitted to the Owner's testing laboratory for review.
3. Practices to maintain concrete below maximum limiting temperature shall be in accordance with ACI 305. Concrete ingredients may be cooled before mixing, or flake ice or well-crushed ice of a size that will melt completely during mixing may be substituted for part of the mixing water.
4. Practices to avoid the potential problems of hot weather concreting shall be employed by the Contractor in accordance with ACI 305.
5. When the temperature of the reinforcing steel or steel deck forms is greater than 120°F, reinforcing and forms shall be sprayed with water just prior to placing the concrete.

J. Cold Weather Concreting:

1. No placement of concrete will be allowed at temperatures below 20 degrees Fahrenheit or if mean daily temperature for curing period is anticipated to be below 20 degrees Fahrenheit.
2. No concrete placement will be allowed on frozen subgrade.
3. Conform to ACI 306 and following requirements when mean daily temperature falls below 40 degrees Fahrenheit.
 - a. Reinforcement, forms or ground to receive concrete shall be completely free from frost.
 - b. Concrete at time of placement for footings shall have temperature no lower than 50 degrees Fahrenheit, for all other concrete this minimum temperature at time of placement shall be 60 degrees Fahrenheit. Maximum temperature shall be 90 degrees Fahrenheit.
 - c. Concrete shall be maintained at temperature no lower than 50 degrees Fahrenheit for minimum 7-day period after placement by means of blanket insulation, heaters, or other methods as approved by the Architect.
 - d. Use of calcium chloride or admixtures containing calcium chloride as accelerators will not be permitted.
 - e. The Contractor shall keep a record of concrete surface temperature for first 7-days after each pour. This record shall be open to inspection by the Architect.

K. Consolidating:

1. Use vibrators for thorough consolidation of concrete.

2. Provide vibrators for each location during simultaneous placing to ensure timely consolidation around reinforcement, embedded items and into corners of forms; ensure availability of spare vibrators in case of failures. Vibrate through full depth of freshly placed concrete.
 3. Do not place vibrators against reinforcement, attach to forms, or use to spread concrete.
 4. Exposed Concrete: Vibrate with rubber type heads and, in addition, spade along forms with flat strap or plate.
- L. Construction Joints:
1. Verify location and conformance with typical details; provide only where designated or approved by the Architect. Comply with CBC Section 1906.
 2. All horizontal and vertical construction joints to be thoroughly sandblasted to clean and roughen entire surface to minimum 1/4-inch relief exposing clean coarse aggregate solidly embedded in mortar matrix.
 3. Just prior to depositing concrete, the surface of the construction joint shall be thoroughly wetted.
- M. Contraction (Control) Joints in Slabs-on-Grade:
1. Construct contraction joints in slabs-on-ground to form panels of patterns indicated on Shop Drawings. Use saw cuts 1/8" x 1/4 slab depth, unless otherwise indicated.
 2. Time saw cutting to allow sufficient curing of concrete to prevent ravelled or broken edges.
 3. Contraction joints in unexposed floor slabs may be formed by saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregate.
 4. If joint pattern not shown, provide joints not exceeding 15' in either direction and located to conform to bay spacing wherever possible (at column centerlines, half bays, third-bays).
- N. Walls and Other Formed Elements:
1. Space points of deposit to eliminate need for lateral flow. Placing procedures of concrete in forms permitting escape of mortar, or flow of concrete itself, will not be permitted.
 2. Level top surface upon stopping work.
 3. Take special care to fill each part of the forms by depositing concrete directly as near final position as possible, and to force concrete under and around reinforcement, embedded items, without displacement.
 4. After concrete has taken its initial set, care shall be exercised to avoid jarring forms or placing any strain on ends of projecting reinforcement.
 5. Where backfill is placed against a wall, it shall be adequately shored until it has attained design strength.

3.4 CURING

- A. General Requirements:
1. Take curing measures immediately after casting and for measures other than application of curing compound, extend for seven days. The Architect may recommend longer periods based upon prevailing temperature, wind and relative humidity. Comply with CBC Section 1905.11.
 2. Avoid alternate wetting and drying and fluctuations of concrete temperature.
 3. Protect fresh concrete from direct rays of sun, rain, freezing, drying winds, soiling, and damage.
 4. Do not permit curing method to affect adversely finishes or treatments applied to finish concrete.
- B. Curing Method, Typical: Obtain the Architect's approval of alternate measures.
1. Keep forms and concrete surfaces moist during period forms are required to remain in place.
 2. Apply curing compound per manufacturers' recommendations.

3.5 CLEANING, PATCHING AND DEFECTIVE WORK

- A. Where concrete is under strength, out of line, level or plumb, or shows objectionable cracks, honeycombing, rock pockets, voids, spalling, exposed reinforcement, signs of freezing or is otherwise defective, and, in the Architect's judgement, these defects impair proper strength or appearance of the work, the Architect will require its removal and replacement at the Contractor's expense.
- B. Immediately after stripping and before concrete is thoroughly dry, patch minor defects, form-tie holes, honeycombed areas, etc., with patching mortar. Patch shall match finish of adjacent surface unless otherwise noted. Remove ledges and bulges.
- C. Compact mortar into place and neatly file defective surfaces to produce level, true planes. After initial set, dress surfaces of patches mechanically or manually to obtain same texture as surrounding surfaces.
- D. Rock Pockets:
1. Cut out to full solid surface and form key.
 2. Thoroughly wet before casting mortar.
 3. Where the Architect deems rock pocket too large for satisfactory mortar patching as described, cut out defective section to solid surface, key and pack solid with concrete to produce firm bond and match adjacent surface.
- E. Cleaning
1. Insure removal of bituminous materials, form release agents, bond breakers, curing compounds if permitted and other materials employed in work of concreting which would otherwise prevent proper application of sealants, liquid waterproofing, and other delayed finishes and treatments.
 2. Where cleaning is required, take care not to damage surrounding surfaces or leave residue from cleaning agents.

3.6 PROTECTION

- A. Protect concrete from injurious action of the elements and defacement of any nature during construction operations.
- B. Protect exposed corners of concrete from traffic or use which will damage them in any way.
- C. Make provisions to keep all exposed concrete free from laitance caused by spillage or leaking forms or other contaminants. Do not allow laitances to penetrate, stain, or harden on surfaces which have been textured.

3.7 FIELD QUALITY CONTROL

- A. Section 00006, Contract Part 2 General Provisions –Inspection and Testing of Work
- B. The Owner's Testing Agency will:
 - 1. Perform testing in accordance with ACI 318 and CBC Section 1903 and 1905.
 - 2. Review concrete mix designs.
 - 3. Inspect concrete and grout placement continuously.
 - 4. Test concrete to control slumps according to ASTM C143.
 - 5. Continuously monitor concrete temperature as it arrives on the site.
 - 6. Test concrete for required compressive strength in accordance with CBC Section 1905.6:
 - a. Make and cure three specimen cylinders according to ASTM C31 for each 50 cubic yards, or fraction thereof, of each class poured at site each day.
 - b. Retain one cylinder for 7-day test and two for the 28-day test.
 - c. Number each cylinder 1A, 1B, 1C, 2A, 2B, 2C, etc; date each set; and keep accurate record of pour each set represents.
 - d. Transport specimen cylinders from job to laboratory after cylinders have cured for 24-hours on site. Cylinders shall be covered and kept at air temperatures between 60 and 80 degrees Fahrenheit.
 - e. Test specimen cylinders at age 7-days and age 28-days for specified strength according to ASTM C39.
 - f. Base strength value on average of two cylinders taken for 28-day test.
 - 7. Test and inspect materials, as necessary, in accordance with ACI 318, MM Test Method 227 (Coarse Aggregates) and MM Test Method 217 (Fine Aggregates), for compliance with requirements specified in this section.
- C. The Contractor shall:
 - 1. Submit ticket for each batch of concrete delivered to job site. Ticket shall bear the following information:
 - a. Design mix number.

- b. Signature or initials of ready mix representative.
 - c. Time of batching.
 - d. Weight of cement, aggregates, water and admixtures in each batch with maximum aggregate size.
 - e. Total volume of concrete in each batch.
 - f. Notation to indicate equipment was checked for contaminants prior to batching.
2. Pay the Owner's Testing Agency for taking core specimens of hardened structure and testing specimen according to ASTM C88 and C42 when laboratory tests of specimen cylinders show compressive strengths below specified minimum.

3.8 FINISH OF FORMED SURFACES

- A. Rough Form Finish: For formed concrete surfaces not exposed-to-view in the finish Work or by other construction. Concrete surface shall have texture imparted by form facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.
- B. Smooth Form Finish: For formed concrete surfaces exposed-to-view, or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, painting or other similar system. This is as-cast concrete surface obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch defective areas with fins or other projections completely removed and smoothed.
- C. Related Unformed Surfaces: At tops of walls, horizontal offsets and similar unformed surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.9 SLAB FINISHES

- A. See specification section 03320 for slabs to be polished.
- B. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed-to-view, and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or other thin film finish coating system.
 - 1. After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and with surface leveled to tolerances of F_F20. Grind smooth surface defects which would telegraph through applied floor covering system.
 - 2. Floors to receive traffic topping shall have steel trowel finish.
- B. Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps and ramps, and elsewhere as indicated.
 - 1. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

- a. Provide medium broom finish on portland cement concrete paving surfaces less than 5 percent slope.
 - b. Provide heavy broom finish on portland cement concrete paving surfaces greater than 5 percent slope.
- C. Scratch Finish: Apply scratch finish to monolithic slab surfaces that are to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo, and other bonded applied cementitious finish flooring material, and as otherwise indicated.
1. After placing slabs, plane surface to tolerances for floor flatness (F_F) of 15. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set, with stiff brushes, brooms or rakes.
- D. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified, and slab surfaces which are to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo, and as otherwise indicated.
1. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Check and level surface plane to tolerances of $F_F=18$. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.

3.10 CLEAN UP

- A. Perform Work under this Section to keep affected portions of building site neat, clean, and orderly. Remove, immediately upon completion of Work under this Section, surplus materials, rubbish, and equipment associated with or used in performance. Be aware that failure to perform clean-up operations within 24 hours of notice by Architect will be considered adequate grounds for having work done by others at no added expense to the Owner.

END OF SECTION

SECTION 04200 - CONCRETE MASONRY**1.00 - GENERAL**

1.01 DESCRIPTION OF WORK:

- A. Furnish and install all concrete masonry units, mortar, grout and reinforcing steel as shown and specified.
- B. Related work described elsewhere:
 - 1. Reinforcing steel: Section 03200.
 - 2. Cast-in-Place Concrete: Section 03300.
- C. Coordinate placement of inserts, hangers, etc. furnished by other trades for electrical, plumbing, mechanical and other work.

1.02 QUALITY ASSURANCE:

- A. Except where otherwise specified, comply with the following standards by National Concrete Masonry Association (NCMA) and the American Concrete Institute (ACI):
 - 1. NCMA TR 72A "Specification for Concrete Masonry Construction".
 - 2. NCMA TR 87 "Cold Weather Masonry Construction".
 - 3. ACI 530 "Specification for Concrete Masonry Construction".
- B. Comply with the referenced ASTM standards for materials.
- C. Tests and Inspections: Testing and inspections shall be in accordance with the specifications, and as noted in this Section. Testing laboratory shall be selected by the owner with the approval of the Architect. Owner will pay the cost for all tests. If additional tests are required because of faulty materials or workmanship, cost of these tests will be paid by the Owner and charged to the Contractor.
- D. Finishes:
 - 1. Reinforcing steel shall not be permitted to rust where there is danger of staining exposed surfaces of adjacent concrete.
 - 2. Contractor shall replace rust-stained concrete and/or masonry at his expense.
- E. Comply with California Building Code (CBC), 2013 edition, **Chapter 19**.
- F. Special inspection:
 - 1. The Owner shall employ a qualified masonry inspector to perform continuous masonry inspection.

2. The masonry inspector shall be at the site during all masonry construction and perform the following duties:
 - a. Before masonry work commences, meet with the Contractor and the Architect in a joint meeting to establish the requirements for surveillance and quality control of the masonry work.
 - b. Check brand and type of cement, lime (if used) and source of sand.
 - c. Inspect the foundation or slab to ascertain that it is clean and ready to receive units.
 - d. Check reinforcing steel dowels for straightness, proper alignment, spacing, size and length.
 - e. Observe manner in which units are laid up to ensure that joints are full of mortar and kept tight during work. Inspect cells to assure that fins will not interfere with grouting or foaming. Instruct masons to keep cells clean of mortar droppings and inspect to determine compliance.
 - f. Observe placing of grout continuously.
 - g. Perform or supervise performance of required sampling and field testing as specified.
 - h. Keep complete record of inspection of work. Report daily to the Owner's representative the progress of the masonry inspection.

G. Prism Test: The Owner's Testing Agency will perform prism testing in accordance with [Section 2105.3.2](#).

H. Mortar and grout tests: Comply with [Section 2105.3.4.2](#).

1.03 SUBMITTALS:

- A. Submit two (2) copies of manufacturer's certification that masonry units meet the requirements of this Section.
- B. Grout mix design: Submit proportions for mortar and grout.
- C. Mock-Up: Construct a sample wall panel on the project site, at a location designated by the Architect, to serve as a representative sample of the minimum acceptable level of materials, color range, and workmanship to be provided in the work of the project. The mock-up shall have one surface of at least 16 square feet, and approximately 4 x 4 feet in configuration, and shall turn a 90° corner. The mock-up, after acceptance by the Architect, shall serve to demonstrate the bond pattern, type and width of joints to be used, and the range of color of masonry units to be expected in the work of the project. The mock-up shall be retained until directed by the Architect, and shall then be removed in total from the project site.

1.04 DELIVERY, STORAGE AND HANDLING:

- A. Handle, store and protect masonry units in a manner to avoid chipping, breakage or contact with the soil or contaminating materials and exposure to the elements. Deliver concrete masonry units to the job site in air-dry condition as defined herein.
- B. Keep anchors, ties and joint reinforcement free of rust.
- C. Deliver cement and lime in unbroken bags, barrels or other approved containers, plainly marked and labeled with the manufacturers' name and brands. Store cementitious materials in dry, weather-tight tarpaulins. Store and handle cement in a manner that will prevent the inclusion of foreign materials and damage by water or dampness.

1.05 JOB CONDITIONS:

- A. Prior to commencing work, the Contractor shall examine the Contract Documents, and note all conditions that may affect the work of this Section. All such conditions found shall be transmitted to the Architect, in writing, for clarification or modification. Do not proceed with the work of this Section until direction has been given by the Architect on all such conditions.

2.00 - PRODUCTS

2.01 CONCRETE MASONRY UNITS:

- A. Masonry units shall be aired cured not less than 28 days when delivered to the project site, and shall conform to the following requirements. Speed blocks will not be acceptable for use on this Project.
 - 1. Hollow, light weight open end type concrete block size conforming to ASTM C90, Grade N, Type I, Maximum linear shrinkage 0.06% from saturated to oven dry condition. (Calstone Company). $f'm=1900$ psi.
 - a. Sizes (nominal): 12"x8"x16" and 8"x8"x16" and 8"x4"x16" walls, 16"x8"x16" and 24"x8"x16" and 24"x8"x24" columns, 2"x8"x16" veneer (WxHxL).
 - b. Texture: Split Face at exposed sides, unless otherwise noted.
 - 2. Shrinkage of blocks shall not exceed .045 percent when tested per ASTM C426.
 - 3. At the time of delivery to the job site, blocks shall not exceed a value in weight of contained water in excess of 35% of full saturated water content total for the unit tested. Units shall be shipped and stored with protection to prevent increase in water content from rain or other sources.

2.02 CEMENT:

- A. Cement shall be Type II Portland cement, conforming to ASTM C150. Plastic cement shall have less than 12% of the total volume in approved types of plasticizing agents and

shall conform to all of the requirements of C150, except in respect to the limitations on insoluble residue, air entrainment and additions subsequent to calcination.

2.03 AGGREGATE:

- A. Aggregate shall be clean, sharp and well graded and free from injurious amounts of dust, lumps, shale, alkali, surface coatings and organic matter. Sand for mortar shall conform to ASTM C144. Sand for grout: clean, natural sand conforming to ASTM C33. Pea gravel for grout shall conform to ASTM C404, size number 8.

2.04 ADMIXTURES:

- A. Admixture: Sika Grout Aid Type II Admixture as manufactured by Sika Chemical Corporation. Use of other admixtures not permitted.
- B. Mortar Color: Pure mineral pigment, lime-proof, color as selected by the Architect from the manufacturer's standard colors.
- C. Additives and admixtures to mortar or grout shall not be used unless approved by Architect.
- D. For high lift grouting, the grout should contain an admixture of the type that reduces early water loss to the masonry units and produces an expansive action in the plastic grout sufficient to offset initial shrinkage and promote bonding of the grout to all interior surfaces of the masonry units. Obtain the approval of the Architect or Structural Engineer for use of the admixture.

2.05 WATER:

- A. Water shall be free from deleterious quantities of acids, alkalis, and organic materials.

2.06 REINFORCING STEEL:

- A. See section 03200.
- B. Anchor ties and centering devices: Centering clips shall be formed from not lighter than 9-gage wire. Clips shall be of a design that will prevent displacement of the reinforcing bars during the course of construction.

2.07 LIME:

- A. Hydrated lime shall conform to CBC Standard 21-13 and ASTM C270, Type S.
- B. Quicklime shall conform to CBC Standard 21-12 and ASTM C5. Quicklime shall be slaked and then screened through a 16 mesh sieve. After slaking, screening, and before using, it shall be stored and protected for not less than 10 days. The resulting product shall weigh not less than 83 pounds per cubic foot.

2.08 MIXING:

- A. Mortar: Mortar shall be freshly prepared and uniformly mixed in the ratio of 1 part Portland cement, 1/4 part minimum to 1/2 part maximum lime putty or hydrated lime, damp loose sand not less than 2-1/4 and not more than 3 times the sum of the volumes of the cement and lime used, and shall conform to ASTM C270, Type S. Mortar shall attain a minimum compressive strength of 1500 psi at 28 days.
- B. Grout: Grout for pouring or pumping shall be of fluid consistency as recommended by the Concrete Masonry Association of California and Nevada, and mixed in the ratio, by volumes, of 1 part Portland cement, 1/10 part hydrated lime, 2-1/4 parts minimum and 3 parts maximum dry loose sand, 2 parts coarse aggregate where the grout space is 3 inches or more in its least dimension. Grout shall attain minimum compressive strength of 2000 psi at 28-day. Provide mix designs reviewed by a registered testing laboratory under the direct supervision of a registered Civil Engineer. Add Sika Corp. Sika Grout Aid Type II admixture in accordance with the manufacturer's directions when its use is approved.
- C. Mixing: Mortar or grout shall be mixed by placing 1/2 of the water and sand in the operating mixer, and then adding the cement and then the remaining amount of water and sand. Lime shall be the last material added to the mixer. The full batch shall then be mechanically mixed for not less than 5 minutes. Hand mixing may only be used upon approval of the Architect.
 - 1. Mortar may be re-tempered with water as required to maintain high plasticity. Re-tempering on mortar boards shall be done only by adding water within a basin formed with the mortar and the mortar re-worked into the water. Any mortar which is unused after 1-1/2 hours from the initial mixing time shall not be used.
 - 2. Pre-mixed grout materials are to be mixed in accordance with the manufacturer's printed instructions.
 - 3. Mix in batch mechanical mixer of at least one-sack capacity permitting accurate control of water quantity.

3.00 - EXECUTION

3.01 INSPECTION:

- A. Examine the foundation work on which the masonry work will be placed, for true alignment, within 1 inch tolerance vertically or horizontally, and notify the Contractor in writing, with copy to the Architect, of all conditions detrimental to the timely completion of the work.
- B. Do not proceed with the work of this Section until all unsatisfactory conditions have been corrected in a manner acceptable to the manufacturer of the materials.

3.02 PREPARATION:

- A. Clean laitance, dust, dirt, oil, organic material or other foreign materials from concrete surface upon which reinforced masonry is to be placed. Use sandblasting, if necessary, to remove laitance from pores and to expose the aggregates. Projecting dowels shall be free from loose scale, dirt, concrete, or other bond-inhibiting substances and properly located. Protect surrounding work to prevent damage from masonry work.

3.03 GENERAL INSTALLATION:

- A. Masonry units shall be sound, dry, clean, and free from cracks or chips. No fractional parts of units shall be used where whole units can be used. Wetting of the units shall not be permitted except when hot, dry weather exists, causing the units to be warm to the touch, and then the surface only may be wetted with a light fog spray.
- B. All masonry shall be laid true, level, plumb, and neatly.
- C. Proper masonry unit shapes shall be used at sills, lintels, bond beams, etc., with a minimum of cutting. Units shall be cut to fit all plumbing ducts, electrical work, structural work, and all similar items passing through the wall, and all voids between the units and the item passing through it shall be neatly patched with mortar.
- D. All cutting of masonry units shall be made by means of power operated equipment designed for cutting of masonry, in a neat and true fashion.
- E. Provide all required clean-out openings, for grouting operations.
- F. Prevent grout or mortar stains from occurring on faces of walls or partitions that will be exposed to view after completion of construction.
- G. Do not allow mortar or grout spatters to remain on masonry surface; clean such spatters from wall or partition faces as they may occur.
- H. Keep block work damp, but not saturated, for a minimum of 4 days.
- I. Adjust each unit to its final position while mortar is still soft and plastic. Remove and relay in fresh mortar for any unit that is disturbed after mortar has stiffened. Keep chases and spaces to be grouted free from mortar and other debris. Units used in exposed masonry surfaces shall be free from chipped edges or other imperfections detracting from the appearance of the finished work.
- J. Do not lay up one tier of wall more than 16 inches ahead of other tier.
- K. Do not attach construction supports to walls, except where permitted by Architect.
- L. Install anchors, bolts, and other embedded items accurately as work progresses.
- M. Step back unfinished work for joining with new work. Do not use toothing. Remove loose mortar and thoroughly clean the exposed joints before laying new work.

- N. Lay units in running bond pattern unless otherwise noted.

3.04 BONDING:

- A. The top surface of the concrete foundation shall be clean and with laitance removed and aggregate exposed before the masonry work commences.
- B. The units shall be laid in a stack bond pattern to match existing.
- C. Intersecting walls and partitions shall be bonded by the use of steel ties at 24 inches on center maximum spacing. Corners shall have a standard masonry bond by overlapping units and grouting solid. Columns, beams and similar structural members shall be anchored to the wall with anchor bolts or their equivalent.
- D. Anchors shall be fully and solidly grouted in place. Embedment shall not be less than 2/3 of the wall thickness, unless otherwise shown.

3.05 JOINTS:

- A. The starting joint on foundations shall be laid with mortar coverage for the width of the face shells on the bed joint. The area where grout occurs shall be kept free from mortar so that the grout will contact the foundation.
- B. Mortar joints shall be 3/8 inch wide, unless otherwise shown, straight, clean, and uniform in thickness.
- C. All exposed joints shall be tooled with a round bar to produce a dense, slightly concave surface, well bonded to the block at the edges. Tooling shall be done when the mortar is partially set but still sufficiently plastic to bond. All tooling shall be done with a tool that compacts the mortar, pressing the excess mortar out of the joint, rather than dragging it out.
- D. Walls scheduled to receive a plaster, or other applied finish such as a waterproofing membrane, shall be struck flush.
- E. Joints that are not tight at the time of tooling shall be raked out, pointed and then tooled. Vertical head joints shall be shoved tightly so that the mortar bonds well to both units. Joints shall be solidly filled from the face of the block at least the depth of the face shell. Horizontal bed joints shall be full.
- F. If it is necessary to move a unit after it has been once set in place, the unit shall be removed from the wall, cleaned and set in fresh mortar.
- G. Control joints shall be of the configuration shown, and shall be located as indicated on the Drawings.

3.06 REINFORCING:

- A. Reinforcing dowels extending from the concrete foundation and not lining up with the masonry unit cell, shall be bent not more than 1 horizontal to 6 vertical to bring it into alignment.
- B. Dowels shall be grouted into a core in vertical alignment, even though it is in an adjacent cell to the vertical wall reinforcing.
- C. Reinforcing bars shall be straight except for bends or hooks indicated on the Drawings. Bars shall be lapped a minimum of 48 bar diameters at splices. Vertical bars shall be held on top and bottom and at intervals not exceeding 192 diameters.
- D. Vertical reinforcing steel shall have a minimum clearance of 1/2 inch from the face of the masonry. Horizontal bars shall be laid on the webs of the units in continuous masonry courses, of bond beam units, and shall be solidly grouted in place.
- E. Wire reinforcement shall be completely embedded in mortar or grout. Joints with wire reinforcement shall be at least twice the thickness of the wire. Wire reinforcement shall be lapped at least 6 inches at splices and shall contain at least one cross wire of each piece of reinforcement in the lapped distance.

3.07 LOW LIFT GROUTING:

- A. General:
 - 1. Use low lift grouting unless Contractor requests to use high lift grouting and Architect approves the request.
 - 2. Place grout 3 to 5 days after masonry has been erected and mortar has set.
 - 3. Grout voids between wythes and cells of concrete block.
 - 4. Ensure grout flows into voids and completely surrounds reinforcing steel.
 - 5. All reinforcing steel shall be in place, and all cells to be grouted shall be cleaned of all debris prior to grouting.
 - 6. Vertical cells to receive grout shall have vertical alignment to maintain a continuous unobstructed cell area not less than 2 x 3 inches. Grout shall be placed within 30 minutes of mixing. All cells containing reinforcement shall be fully grouted.
 - 7. Stop grout pours approximately 1 inch below top of top masonry unit to form a key for subsequent placement of materials, except at top course. Bring grout flush with top of block.
 - 8. All grout shall be puddled or vibrated into place. Grouting of beams or lintels over openings, shall be done in a single, continuous operation.
 - 9. Where necessary to stop longitudinal run, provide suitable dam to retain grout in place.
 - 10. Do not wet down grout spaces prior to grouting.

- B. Low-lift grouting:
1. Lay units to 5 feet height. Pour grout to a maximum height of 5 feet, stopping $\frac{1}{2}$ inch below top of unit or over horizontal steel which shall be fully embedded in grout.
 2. Delay 3 to 5 minutes allowing the excess of water to be absorbed by the masonry units, then consolidate by vibrating.
 3. Lay up and grout next 5 feet of wall.
- C. Place grout using hand bucket, concrete hopper, or grout pump. Place grout so as to completely fill the grout spaces without segregation of the aggregates. Where grouting is discontinued for more than one hour, stop the grout $1\frac{1}{2}$ inches below the top of a course to form a key at pour joints.
- D. Brace wall against wind or other forces during construction. Allow sufficient time between lifts to preclude cracking of face shells should occur during construction, tear down and rebuild the wall at no additional cost to Owner.

3.08 POINTING AND CLEANING:

- A. After mortar joints have attained their initial set but prior to hardening, completely remove mortar and grout daubs or splashings from exposed masonry surfaces. Before completion of the work, rake out all defects in joints in exposed masonry surfaces, fill with mortar and tool to match existing joints.
- B. Immediately after grout work is completed, remove scum and stains that have percolated through the masonry using a high-pressure stream of water or a non-acidic solution. Do not use metal tools or metal brushes for cleaning.
- C. Dry brush exposed concrete masonry unit surfaces at the end of work each day and after any required pointing. Use stiff fiber-bristled brushes only.

3.09 HOT WEATHER INSTALLATION:

- A. Masonry erected when the ambient temperature is more than 99° F in the shade and the relative humidity is less than 50 percent shall be protected from direct exposure to wind and sun for 48 hours after installation.

3.10 COLD WEATHER INSTALLATION:

- A. No masonry shall be laid when the temperature of the outside air is below 40° F unless approved methods are used during the construction to prevent damage to the masonry. Such methods shall include protection of the masonry for a period of at least 48 hours where Type I or II Portland cement is used in the mortar and grout.

- B. Keep masonry units completely covered and free from frost, ice and snow at all times and maintain a minimum temperature of 40°F when laid. If ice or snow has inadvertently formed on a masonry bed, it shall be thawed by application of heat carefully applied until top surface of the masonry is dry to the touch.
- C. When air temperatures fall below 40 ° F, maintain temperature of mortar and grout between 40 and 120 ° F by heating mixing water and/or sand. Temperature of mixing water or of water and sand introduced to cement shall not exceed 140 ° F.
- D. Comply with CBC Section 2104.3.

3.11 TOLERANCES:

- A. Variation from unit to adjacent unit: 1/32 inch maximum.
- B. Variation from plane of wall: ¼ inch in 10 feet and ½ inch in 20 feet or more.
- C. Variation from Plumb: ¼ inch per story. (non-cumulative)
- D. Variation from level coursing: 1/8 inch in 3 feet, ¼ inch in 10 feet, ½ inch maximum.
- E. Variation of joint thickness: 1/8 inch in 3 feet.
- F. Maximum variation from cross sectional thickness of walls: ¼ inch.

3.12 PROTECTION AND CLEANING:

- A. Protect adjacent walls and other finished surfaces from mortar stains, lime burn, block scratches and other damage.
- B. Prevent block from getting stained or covered with mortar. Clean work daily. Protect previously completed work by installing vinyl sheets over completed work. Wash down walls with clean water and stiff brushes at the completion of grouting and at the end of each work day. Job must be free of mortar, lime stains, acid stains, etc.
- C. Point holes or defective mortar joints in exposed masonry. Cut out defective joints and re-point.
- D. Site: On completion of the work, remove from the site all equipment, excess material, and debris. Clean up mortar droppings and leave premises clean insofar as masonry work is concerned.

* * * * *

SECTION 05100 - STRUCTURAL STEEL**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
1. Fabrication and erection of structural steel work, including schedules, notes, and details showing size and location of members, typical connections, and types of steel required.
 2. Structural steel is that work defined in American Institute of Steel Construction (AISC) "Code of Standard Practice" and as otherwise shown on drawings.
- B. Related Sections:
1. Section 03300 – Cast-in-Place Concrete: Anchor bolt installation in concrete.
 2. Section 05500 – Metal Fabrications: Steel fabrications affecting structural steel work.

1.2 REFERENCES

- A. ASTM International:
1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
 2. ASTM A992 Standard Specification for High-Strength Steel
 3. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 4. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 5. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
 6. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
 7. ASTM A449 - Standard Specification for Quenched and Tempered Steel Bolts and Studs.
 8. ASTM A490 - Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength.
 9. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 10. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
- B. American Welding Society:
1. AWS D1.1 - Structural Welding Code - Steel.
- C. Research Council on Structural Connections:
1. RCSC - Specification for Structural Joints Using ASTM A325 or A490 Bolts.
- D. SSPC: The Society for Protective Coatings:
1. SSPC - Steel Structures Painting Manual.

1.3 SUBMITTALS

- A. Section 01330 – Submittal Procedures: Requirements for Submittals.
- B. Product data or manufacturer's specifications and installation instructions for following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).

1. Structural steel (each type), including certified copies of mill reports covering chemical and physical properties.
 2. High-strength bolts (each type), including nuts and washers. a. Include Direct Tension Indicators if used.
 3. Structural steel primer paint.
 4. Shrinkage-resistant grout.
- C. Shop drawings prepared under supervision of a California licensed Professional Engineer and reviewed by the Structural Engineer of record, including complete details and schedules for fabrication and assembly of structural steel members, procedures, and diagrams.
1. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS symbols and show size, length, and type of each weld.
 2. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed as work of other sections.
- D. Test reports conducted as part of Contractor's Quality Control program on shop- and field-bolted and welded connections. Include data on type(s) of tests conducted and test results.
- E. Certified copies of each survey conducted by a California licensed Land Surveyor, showing elevations and locations of base plates and anchor bolts to receive structural steel and final elevations and locations for major members. Indicate discrepancies between actual installation and approved bid documents.

1.4 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of following, except as otherwise indicated:
1. American Institute of Steel Construction (AISC) "Code of Standard Practice for Steel Buildings and Bridges".
 - a. Paragraph 4.2.1 of the above code is hereby modified by deletion of the following sentence:
 - 1.) "This approval constitutes the owner's acceptance of all responsibility for the design adequacy of any detail configuration of connections developed by the fabricator as a part of his preparation of these shop drawings".
 2. AISC "Specifications for Structural Steel Buildings," including "Commentary".
 3. "Specifications for Structural Joints using ASTM A325 or ASTM A490 Bolts" approved by the Research Council on Structural Connections.
 4. American Welding Society (AWS) D1.1 "Structural Welding Code - Steel".
 5. ASTM A6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use".
 6. California Building Code, latest edition.
- B. Qualifications for Welding Work: Qualify welding procedures and welding operators in accordance with AWS "Qualification" requirements.
1. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests.
 2. If recertification of welders is required, retesting will be Contractor's responsibility.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site at such intervals to ensure uninterrupted progress of work.
- B. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not to delay work.

- C. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration. If bolts and nuts become dry or rusty, clean and re-lubricate before use.
 - 1. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General
 - 1. Metal Surfaces: For fabrication of work that will be exposed to view, use only materials that are smooth and free of surface blemishes including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating, and applying surface finishes.
 - 2. Provide steel with 25 percent minimum recycled steel content.
- B. General
 - 1. Bars and Plates: ASTM A36.
 - 2. Structural Steel Shapes: ASTM A992 Grade 50 Steel, unless otherwise noted in plans.
- C. Cold-Formed Steel Tubing: ASTM A500, Grade B.
- D. Steel Pipe: ASTM A53, Type E or S, Grade B; or ASTM A501.
 - 1. Finish: Black, except where indicated to be galvanized.
- E. Steel Castings: ASTM A27, Grade 65-35, medium-strength carbon steel.
- F. Headed Stud-Type Shear Connectors: ASTM A108, Grade 1015 or 1020, cold-finished carbon steel with dimensions complying with AISC Specifications.
- G. Anchor Bolts: ASTM A307, unless otherwise noted on drawings and details.
- H. Unfinished Threaded Fasteners: ASTM A307, Grade A, regular low-carbon steel bolts and nuts.
 - 1. Provide hexagonal heads and nuts for all connections.
- I. High-Strength Threaded Fasteners: Heavy hexagon structural bolts, heavy hexagon nuts, and hardened washers, as follows:
 - 1. Quenched and tempered medium-carbon steel bolts, nuts, and washers, complying with ASTM A325.
 - a. Where indicated as galvanized, provide units that are zinc coated, either mechanically deposited complying with ASTM B695, Class 50, or hot-dip galvanized complying with ASTM A153.
- J. Direct Tension Indicators: ASTM F959, type as required.
 - 1. Use on all ASTM A325 bolts on connections that are slip critical.
- K. Electrodes for Welding: E-70XX Electrodes.
- L. Structural Steel Primer Paint: Fabricator's standard rust-inhibiting primer on all steel that will not be coated with fireproofing or embedded in concrete, and primer shall be compatible with finish paints to be used in facility.

- M. Cement Grout: Portland cement (ASTM C150, Type I or Type III) and clean, uniformly graded, natural sand (ASTM C404, Size No. 2). Mix at a ratio of 1.0 part cement to 3.0 parts sand, by volume, with minimum water required for placement and hydration.
- N. Nonmetallic Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, non staining product containing selected silica sands, Portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with CE-CRD-C621.
1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. 100 Non-Shrink Grout (Non-Metallic); Conspec, Inc.
 - b. Supreme Grout; Cormix, Inc.
 - c. Sure Grip Grout; Dayton Superior.
 - d. Euco N.S.; Euclid Chemical Co.
 - e. Crystex; L & M Construction Chemicals, Inc,
 - f. Masterflow 713; Master Builders.
 - g. Sealtight 588 Grout; W. R. Meadows.
 - h. Propak; Protex Industries, Inc.
 - i. Set Non-Shrink; Set Products, Inc.
 - j. Five Star Grout; U.S. Grout Corp.

2.2 FABRICATION

- A. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings. Provide camber in structural members where required by structural design.
1. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence that will expedite erection and minimize field handling of materials.
 2. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.
- B. Connections: Weld or bolt shop connections, as indicated.
- C. Bolt field connections, except where welded connections or other connections are indicated.
1. Provide high-strength threaded fasteners for principal bolted connections.
 2. Provide unfinished threaded fasteners for only bolted connections of secondary framing members to primary members (including purlins, girts, and other framing members taking only nominal stresses) and for temporary bracing to facilitate erection; and only where noted on drawings.
- D. High-Strength Bolted Construction: Install high-strength threaded fasteners in accordance with AISC "Specifications for Structural Joints using ASTM A325 Bolts".
- E. Welded Construction: Comply with AWS D 1. 1 Code for procedures, appearance and quality of welds, and methods used in correcting welding work.
- F. Assemble and weld built-up sections by methods that will produce true alignment of axes without warp.
- G. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Weld shear connectors in field, spaced as required, to beams and girders in composite construction. Use automatic end welding of headed stud shear connectors in accordance with manufacturer's printed instructions.

- H. Steel Wall Framing: Select members that are true and straight for fabrication of steel wall framing. Straighten as required to provide uniform, square, and true members in completed wall framing.
- I. Build up welded door frames attached to structural steel framing. Weld exposed joints continuously and grind smooth. Plug-weld steel bar stops to frames, except where shown removable. Secure removable stops to frames with countersunk, cross-recessed head machine screws, uniformly spaced not more than 10 inches o.c., unless otherwise indicated.
- J. Holes for Other Work: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members, as shown on final shop drawings.
- K. Provide threaded nuts welded to framing and other specialty items as indicated to receive other work.
- L. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.

2.3 SHOP PAINTING

- A. General: Shop-paint structural steel, except those members or portions of members to be embedded in concrete or mortar. Paint embedded steel that is partially exposed on exposed portions and initial 2 inches of embedded areas only.
 - 1. Do not paint surfaces to be welded or high-strength bolted with friction-type connections.
 - 2. Do not paint surfaces scheduled to receive sprayed-on fireproofing.
 - 3. Apply 2 coats of paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.
- B. Surface Preparation: After inspection and before shipping, clean steelwork to be painted. Remove loose rust, loose mill scale, and spatter, slag, or flux deposits. Clean steel in accordance with Steel Structures Painting Council (SSPC) as follows:
 - 1. P-1 "Solvent Cleaning".
 - 2. P-3 "Tower-Tool Cleaning".
 - 3. P-6 "Commercial Blast Cleaning".
- C. Painting: Immediately after surface preparation, apply structural steel primer paint in accordance with manufacturer's instructions and at a rate to Provide dry film thickness of not less than 1.5 mils. Use painting methods that result in full coverage of joints, comers, edges, and exposed surfaces.
- D. Painting: Provide a one-coat, shop-applied paint system complying with Steel Structures Painting Council (SSPC) Paint System Guide No. 7.00.

2.4 SOURCE QUALITY CONTROL

- A. General: Materials and fabrication procedures are subject to inspection and tests in mill, shop, and field, conducted by a qualified inspection agency. Such inspections and tests will not relieve Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.
 - 1. Promptly remove and replace materials or fabricated components that do not comply.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 013000 - Administrative Requirements: Coordination and project conditions.

3.2 ERECTION

- A. Surveys: Employ a licensed land surveyor for accurate erection of structural steel. Check elevations of concrete and masonry bearing surfaces, and locations of anchor bolts and similar devices, before erection work proceeds, and report discrepancies to the Engineer and Record. Do not proceed with erection until corrections have been made or until compensating adjustments to structural steel work have been agreed upon with the Structural Engineer.
- B. Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds.
- C. Temporary Planking: Provide temporary planking and working platforms as necessary to effectively complete work.
- D. Setting Bases and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of base and bearing plates.
 - 1. Set loose and attached base plates and bearing plates for structural members on wedges or other adjusting devices.
 - 2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.
 - 3. Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.
 - 4. For proprietary grout materials, comply with manufacturer's instructions.
- E. Field Assembly: Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming part of complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces that will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
- F. Level and plumb individual members of structure within specified AISC tolerances.
- G. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.
- H. Splice members only where indicated and accepted on shop drawings.
- I. Erection Bolts: On exposed welded construction, remove erection bolts, fill holes with plug welds, and grind smooth at exposed surfaces.
 - 1. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
 - 2. Do not enlarge unfair holes in members by burning or by using drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit next size larger bolts.

- J. Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in primary structural framing. Cutting will be permitted only on members that are not under stress, as acceptable to the Structural Engineer. Finish gas-cut sections equal to a sheared appearance when permitted.
- K. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.
 - 1. Apply by brush or spray to provide minimum dry film thickness of 1.5 mils.
- L. Touch-Up Painting: Cleaning and touch-up painting of field welds, bolted connections, and abraded areas of shop paint on structural steel is included in Division 9 under painting work.

3.3 ERECTION TOLERANCES

- A. Section 014000 – Quality Requirements: Tolerances.

3.4 QUALITY CONTROL/QUALITY ASSURANCE

- A. Section 014000 – Quality Requirements: Testing and Inspection Services.
- B. The Owner will engage an independent Quality Assurance testing and inspection agency to periodically inspect fabrication and erecting high-strength bolted connections and welded connections and to perform tests and prepare test reports. Owner's Testing Agency need duplicate tests and inspections performed by the Contractor's Quality Control on at least a 20 percent basis to randomly verify monitoring and quality at construction.
- C. Testing agency shall conduct and interpret tests, state in each report whether test specimens comply with requirements, and specifically state any deviations therefrom.
- D. Contractor shall provide access for testing agencies to places where structural steel work is being fabricated or produced so that required inspection and testing can be accomplished.
- E. Testing agencies shall inspect structural steel at plant before shipment.
- F. Correct deficiencies in structural steel work that inspections and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expense, as necessary to reconfirm any noncompliance of original work and to show compliance of corrected work.
- G. Shop-Bolted Connections: Inspect or test in accordance with AISC specifications.
 - 1. Verify that gaps of installed Direct Tension Indicators are less than gaps specified in ASTM F959, Table 2.
- H. Shop Welding: Inspect and test during fabrication of structural steel assemblies, as follows:
 - 1. Certify welders and conduct inspections and tests as required by AWS D 1. 1. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
 - 2. Perform visual inspection of all fillet and partial penetration welds.
 - 3. Perform tests of complete penetration welds as follows. Inspection procedures listed below are to be selected at the Contractor's option.
 - a. Liquid Penetrant Inspection: ASTM E165.
 - b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration not acceptable.

- c. Radiographic Inspection: ASTM E94 and ASTM E142; minimum quality level "2-2T."
 - d. Ultrasonic Inspection: ASTM E164.
- I. Field-Bolted Connections: Inspect in accordance with AISC specifications.
 - 1. or Direct Tension Indicators, comply with requirements of ASTM F959. Verify that gaps are less than gaps specified in Table 2.
- J. Field Welding: Inspect and test during erection of structural steel as follows:
 - 1. Certify welders and conduct inspections and tests as required per AWS D 1.1. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
 - 2. Perform inspection of all welds as enumerated for Shop Welding above.
 - 3. Perform tests of welds as follows as enumerated for Shop Welding above:
 - a. Liquid Penetrant Inspection: ASTM E165.
 - b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration not acceptable.
 - c. Radiographic Inspection: ASTM E94 and ASTM E142; minimum quality level "2-2T".
 - d. Ultrasonic Inspection: ASTM E164.

3.3 WASTE CONTROL

- A. Separate and recycle steel waste as part of Waste Management Plan.

END OF SECTION

SECTION 05400 - COLD-FORMED METAL FRAMING**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section includes load bearing and non load bearing formed steel stud exterior wall framing; and formed steel joist roof framing; and slotted channel framing and bridging.
- B. Related Sections:
 - 1. Section 09220 - Gypsum Board Assemblies: Light weight, non-load bearing metal stud framing.
 - 2. Section 06100: Rough Carpentry.
 - 3. Section 07620: Sheet Metal Work, Head and sill flashings.

1.2 REFERENCES

- A. American Iron and Steel Institute:
 - 1. AISI - Residential Steel Framing Manual.
 - 2. AISI SG-973 - Cold-Formed Steel Design Manual.
- B. ASTM International:
 - 1. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 2. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 3. ASTM A780 - Practice for Repair of Damaged Hot-Dip Galvanized Coatings.
 - 4. ASTM C955 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases.
- C. American Welding Society:
 - 1. AWS D1.1 - Structural Welding Code - Steel.
 - 2. AWS D1.3 - Structural Welding Code - Sheet Steel.
- D. International Conference of Building Officials (ICBO):
 - 1. Evaluation Report ER-4943P
- E. National Association of Architectural Metal Manufacturers:
 - 1. NAAMM ML/SFA 540 - Lightweight Steel Framing Systems Manual.
- F. SSPC: The Society for Protective Coatings:
 - 1. SSPC Paint 15 - Steel Joist Shop Paint.
 - 2. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).
- G. Steel Stud Manufacturers Association:
 - 1. SSMA - Product Technical Information.

1.3 SYSTEM DESCRIPTION

- A. General: Design all structural members in accordance with the American Iron and Steel Institute (AISI) "Specification for the Design of Cold-Formed Steel Structural Members", latest edition.

- B. Size components to withstand design loads as follows:
 1. Vertical Loads: Per Design Calculations and Framing Location.
 2. Wind Load: 20 psf.
- C. Maximum Allowable Deflection: 1: 360 of span for Wind Load on wall studs; 1: 240 of span for roof joists.

1.4 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Submittal requirements.
- B. Shop Drawings: If different from design drawings.
 1. Indicate component details, framed openings, bearing, anchorage, loading, welds, type and location of fasteners, and accessories or items required of related Work.
 2. Indicate stud, floor joist, ceiling joist, and roof joist layout.
 3. Describe method for securing studs to tracks and for screwed and welded framing connections.
 4. Submit calculations for loadings and stresses of specially fabricated framing, under Professional engineer's seal.
- C. Product Data: Submit data on standard framing members; describe materials and finish, product criteria, and limitations.
- D. Manufacturer's Installation Instructions: Submit special procedures, and perimeter conditions requiring special attention.
- E. Mill Certifications: Submit mill certifications for steel delivered to site. Certify steel bare metal thickness in 0.001 inch yield strength, tensile strength, total elongation in 2 inch or 8 inch gauge length, chemical analysis, and galvanized coating thickness.

1.5 QUALITY ASSURANCE

- A. Calculate structural properties of framing members in accordance with AISI SG-973 Specification for Design of Cold-Formed Steel Structural Members.
- B. Furnish framing materials in accordance with SSMA - Product Technical Information.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
 1. Current member of Steel Stud Manufacturers Association.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.
- C. Form, fabricate, provide, and connect components in accordance with NAAMM ML/SFA 540 - Lightweight Steel Framing Systems Manual.

1.7 COORDINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate placement of components within stud framing system specified in other sections of the specification or the drawings

PART 2 - PRODUCTS

2.1 COLD-FORMED METAL FRAMING

- A. Manufacturers:
1. The Steel Network, Inc. (888) 474-4876.
 2. Tri-Steel Structure, Inc. (415) 883-1651.
 3. Angeles Metal Systems (213) 260-5380.
 4. California Building Systems, Inc.
 5. Current members of the Steel Stud Manufacturer's Association.
 6. Cemco
 7. Substitutions: Not permitted.

2.2 FRAMING MATERIALS

- A. General: Form galvanized studs and joists from steel that corresponds to the minimum requirements of A.I.S.I. Standards (current edition).
- B. Studs: ASTM A653/A653M Class SS-Structural Steel, Grade 33 ksi sheet steel, formed to channel shape, punched web, knurled faces; walls use 43 mils thick, 3 5/8 or 5 1/2 inch face and 1.625 inch depth.
1. Designation: 362S16244 or 550S162-43 walls as noted on the drawings.
 2. At bathrooms, shower areas and kitchen use stainless steel studs and tracks
- C. Track: Formed steel; channel shaped; same width as studs, tight fit; match stud thickness at studs.
- D. Framing Materials: Roll from new sheet steel; cold reduction steels not being acceptable.
- E. Hat Channels at furred concrete tilt panels: Formed steel; Hat shaped; 150M 25-43 at 16" o.c. with 0.145 Hitil shot pins at 16" o.c. staggered.

2.3 ACCESSORIES

- A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined by performance requirements specified.
- B. Plates, Gussets, Clips: Formed sheet steel, thickness determined by performance requirements specified.
- C. Shop and Touch-Up Primer: SSPC Paint 15, Type I, red oxide.
- D. Touch-Up Primer for Galvanized Surfaces: SSPC Paint 20, zinc rich.

2.4 FASTENERS

- A. Self-drilling, Self-tapping Screws, Bolts, Nuts, and Washers: Steel, hot dip galvanized to ASTM A123/A123M 1.25 oz/sq ft.
- B. Anchorage Devices: Cast in Place Anchors or Power actuated and/or drilled expansion bolts.
- C. Welding: In conformance with AWS D1.1 and AWS D1.3.

2.5 FABRICATION - GENERAL

- A. Shop assemble or field assemble light gauge steel framing. Prefabricated panels shall be square, with components attached in a manner to prevent racking and to minimize distortion when lifting and transporting.
- B. Subcontractor shall coordinate stud locations with the following:
 - 1. Mechanical work.
 - 2. Coordinate interface between light gauge steel framing and gypsum drywall studs and to ensure proper support for gypsum board and gypsum sheathing to be installed under Section 09260.
- C. Fabricate metal framing in accordance with manufacturer's printed or written instructions unless otherwise indicated.
- E. Framing components shall be straight and true prior to fabrication. Flattening or straightening of components shall be done by a process not injurious to materials.
- F. Cut framing components squarely for attachment to perpendicular members or as required for an angular fit against abutting member.
- G. No splices will be allowed in studs. Stud tracks shall be continuous, with splices butt welded or with lap stud per detail on drawings.
- H. Provide lateral bracing and bridging to manufacturer's specifications and recommendations as required by design loads specified in Article 1. 3 of this Section.
- I. Provide all angles, clips, and other miscellaneous pieces necessary to attach light gauge framing panels to building structure or to attach other materials to light gauge framing panels. All vertical deflection connection products must have a valid ICC ES Report or equivalent complying with ICC Acceptance Criteria AC261.
- J. Set components square and in line and hold firmly in position until properly fastened.
- K. Join panel components by welding or with screws.
 - 1. Welders: Grade certified for the weight and type of materials and the type of equipment being used.
 - 2. Welding: In accordance with AWS D 1. 1.
- L. Finished assemblies shall be free from twists, bends, or open joints with all members straight, square and true to line.

2.6 FINISHES

- A. Studs: Galvanize to G60 coating class.
- B. Tracks and Headers: Galvanize to G60 coating class.
- C. Joists: Galvanize to G60 coating class.
- D. Bracing, Furring, and Bridging: Same finish as framing members.
- E. Plates, Gussets, and Clips: Same finish as framing members.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Verify supporting substrate and abutting structural framing for compliance with requirements, including tolerances and other conditions affecting performance of cold-formed metal framing.
- C. Verify rough-in utilities are in proper location.
- D. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 ERECTION OF STUDS

- A. Align floor and ceiling tracks; locate to wall and partition layout. Secure in place with fasteners or by welding at maximum **16 inches** on center.
- B. Place studs at **16 inches** on center; not more than **2 inches** from abutting walls and at each side of openings. Connect studs to tracks using fastener method.
- C. Construct corners using minimum three studs. Double stud wall openings, door jambs, and window jambs. Erect load bearing studs one piece full length. Splicing of studs is not permitted.
- D. Erect load bearing studs, brace, and reinforce to develop full strength, to achieve design requirements.
- E. Fully seat axial loaded studs in receiving tracks (maximum **1/16 inch** gap between stud and track web).
- F. Coordinate placement of insulation in multiple stud spaces after erection.
- G. Install intermediate studs above and below openings to align with wall stud spacing.
- H. Install studs with deflection allowance in stud track, directly below horizontal building framing at non-load bearing framing. Friction-fit deep-leg track assemblies and tracks relying on steel flexure to perform are unacceptable.
- I. Attach cross studs to studs for attachment of fixtures anchored to walls.
- J. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
- K. Touch-up field welds and damaged galvanized and primed surfaces with primer.
- L. Complete framing ready to receive exterior and interior sheathing materials.

3.3 ERECTION OF JOISTS

- A. Provide uniform and level joist bearing at foundation walls by means of shims and/or non-shrink grout.
- B. Install framing components.

- C. Make provisions for erection stresses. Install temporary bracing to maintain alignment, until permanent bracing and attachments are installed.
- D. Place joists **16 inches** on center; not more than **2 inches** from abutting walls. Connect joists to supports using fastener method.
- E. Set joists parallel and level, with lateral bracing and bridging.
- F. Locate joist end bearing directly over load bearing studs or install load distributing member to top of stud track.
- G. Provide additional joist under parallel partitions when the partition length exceeds one-half the joist span.
- H. Provide additional joist around all floor and roof openings, which interrupt one or more spanning members, unless otherwise noted.
- I. Install web stiffeners at reaction points and/or points of concentrated loads where indicated on Drawings.
- J. Provide end blocking where joist ends are not otherwise restrained from rotation.
- K. Touch-up field welds and damaged galvanized surfaces on fabricated and installed cold-formed metal framing with galvanizing repair paint according to ASTM A780 and the manufacturer's instructions.
- L. Touch-up field welds of carbon sheet steel with primer.
- M. Complete framing ready to receive interior sheathing materials.

3.4 ERECTION TOLERANCES

- A. Maximum Variation from Indicated Plan Position: 1/8 inch in 10 feet. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
- B. Maximum Variation of Members from Plane: 1/8 inch in 10 feet.

3.5 PROTECTION AND CLEANING

- A. During erection of light gauge steel framing work, protect the work of other trades against damage or staining by the exercise of reasonable care and precaution. Repair or replace any work so damaged.
- B. Upon completion of this work, remove all rubbish, debris, and tools from the work area and leave the premises broom clean.

END OF SECTION

SECTION 05500 - MISCELLANEOUS METALS**1.00 GENERAL**

1.01 DESCRIPTION

- A. Work included: Furnish and install all miscellaneous architectural and structural metal work and products as shown on drawings and/or specified, including all anchorage devices and required appurtenances.
- B. Related work specified elsewhere:
 - 1. Concrete work - Section 03300
 - 2. Structural steel – Section 05100

1.02 QUALIFICATIONS

- A. Welders: Welds made only by operators who have been qualified by tests, as prescribed in "Standard Qualifications Procedure", AWS Designation B3.0, American Welding Society, to perform the type of work required, except that this provision need not apply to tack welds not later incorporated into finished welds carrying calculated stress.

1.03 SUBMITTALS

- A. Shop drawings: Submit shop and erection drawings, clearly showing each piece required for fabrication and erection. Submit drawings for approval prior to fabrication.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle materials in a manner to protect them from corrosion, deformation and other types of damage.
- B. Remove any damaged items from the site and replace at no cost to the Owner.

1.05 FIELD MEASUREMENTS

- A. Where various items are indicated to fit to other construction, check actual dimension of other construction by accurate field dimensions before fabrication; show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of work.

2.00 PRODUCTS

2.01 MATERIALS

- A. General: All materials new and of commercial quality, stock items manufactured by concerns specializing in the particular articles and subject to approval by Architect.
- B. Steel:
 - 1. Plates, shapes and bars: Cold-rolled sections conforming to ASTM A 36.
 - 2. Sheet: Cold-rolled sheets, per ASTM A 366, if zinc coated, hot dipped galvanized per ASTM A 525, 1.25 oz./sq.ft.

- C. Steel pipe: Type S, seamless, Grade B, standard weight, galvanized finish at exterior, black finish at interior, conform to ASTM A 53.
- D. Steel tubes: Seamless carbon steel, cold formed, hollow structural tubing conforming to ASTM A 500, Grade B.
- E. Anchors, bolts and fastenings: Conform to ASTM A 307.
- F. Welding in Building Construction" AWS D1.0-69, American Welding Society. Electrodes shall be as recommended by their manufacturer's for the positions and other conditions of actual use.
- G. Paint: Alkyd Metal Primer conforming to Federal Specification TT-P-86, Type II.
- H. Non-shrink grout: Embeco 636 (Master Builders) conform to ASTM C 1107, Grade C.

2.02 FENCE GATES FRAMING

- A. Frame: Tube steel, conform to ASTM A 500, Grade B, hot dip galvanized, sizes as shown. All joints welded. Posts set in concrete
- B. Solid panels at gates: Sheet steel metal decking, conform to ASTM A 446 with galvanized coating per ASTM A 525. ASC Pacific B-36, 20 gage, 1 1/2" deep x 36" wide. Welded to frame. Steel plate welded to panel for mounting hardware.
- C. Jamb frame: Steel plates, welded to channel shape shown with 3/8" diam. bars welded to plates for anchorage into masonry.
- D. Hardware for pair of gates: See Section 02830

2.03 RAINWATER LEADER PIPING

- A. Pipe: Steel pipe, round, Grade B, Schedule 40, standard, hot-dip galvanized finish, welded joints.
- B. Attachment to building: Steel plates, 1/4" thick, welded to pipe and to 1/4" anchor plates. Anchor plates with 3/8" steel studs welded to plate for anchorage at masonry, drilled holes for 1/4" lag bolt anchorage to wood frame construction. Hot-dip galvanized finish.

2.04 METAL PIPE BOLLARDS

- A. Pipe: Steel pipe, round, Grade B, Schedule 40, standard, hot-dip galvanized finish, welded joints.
- B. Set in concrete footings at the fuel tank pad: Steel plates, 1/4" thick, seal welded to pipe bottom. Opened top to allow for filling with concrete. Fill with concrete, overfilling slightly so as to allow the top to be sloped to drain. Hot-dip galvanized finish. Paint

2.05 FENCE GATES FRAMING

- A. Frame: Tube steel, conform to ASTM A 500, Grade B, hot dip galvanized, sizes as shown. All joints welded. Posts set in concrete.
- B. Jamb frame: TS 3x3 , conform to ASTM A 500, Grade B, hot dip galvanized, sizes as shown. All joints welded. Posts set in concrete

- C. Hardware for single person gate:

2.06 GATES – TRASH/RECYCLE ENCLOSURE

- A. Frame: Tube steel, conform to ASTM A 500, Grade B, hot dip galvanized, sizes as shown. All joints welded. Posts set in concrete.
- B. Wood infill panels at fence and gates: Clear Redwood 1x6. Continuous steel plate tab welded to upper and lower for mounting wood fence boards.
- C. Jamb frame: TS 3x3 , conform to ASTM A 500, Grade B, hot dip galvanized, sizes as shown. All joints welded. Posts set in concrete
- D. Hardware for pair of gates: Stanley, unless noted otherwise.
2 pr butts, McKinney 706, 4 1/2 x 4 1/2, zinc plated
1 Cane bolt, CD 1009-18" w/ 3/4"x 1" pipe sleeve keeper
1 Slide action bolt, CD 1009
Weld to gate panels

2.07 METAL RAILINGS

- A. General: Fabricate handrails and railing systems of steel, galvanized at the interior, to comply with requirements indicated for design, dimensions, details, finish, and member sizes, post spacing and anchorage, but not less than those required to support structural loads.
- B. Welded connections: Fabricate railing systems and handrails for connection of members by welding. For connections made during fabrication, weld corners and seams continuously to comply with the following:
 - 1. Tee and cross intersections: Notch ends of intersecting members to fit contour of pipe to which end is joined and weld all around.
 - 2. Exposed connections: Finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surfaces matches those adjacent.
- C. Railing posts welded to steel stair strings: Preset sleeves of steel, not less than 5" long, inside dimensions not less than 1/2" greater than outside dimensions of post, with steel plate forming bottom closure. 3/8" x 12" rebar welded to each side of sleeve for anchorage. Fill with non-shrink grout after installation of posts.
- D. Installation:
 - 1. Preparation: Coordinate setting drawings and directions for installation of anchorages that are to be embedded in concrete construction.
 - 2. Exposed connections: Fit accurately together to form tight, hairline joints.
 - 3. Cutting, fitting and placement: Perform as required for installation. Set handrails and railings accurately in location, alignment, and elevation, measured from established lines and levels and free from rack.

4. Posts: Set plumb within a tolerance of 1/4" in 12 ft.
5. Exposed connections: finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.
6. Welded connections: Use fully welded joints for permanently connecting railing components. Cope or butt components to provide 100 percent contact.

2.08 STEEL FRAMED STAIRS

- A. Stair framing: Stringers and beams of structural steel tubing, bearing plates and other components as shown or as necessary for a complete assembly. Round steel pipe column. All connections welded. Anchor to structure as shown.
- B. Stair treads, risers and landings: Precast concrete Steps/Landings, refer to Section 03410. Coordinate installation.

3.00 EXECUTION

3.01 CONDITION OF SURFACES

- A. Prior to installation: Inspect subsurfaces and structure to which miscellaneous metal work is applied or installed. Report to Contractor, with copy to Architect, any condition which may prove detrimental to this work.
- B. Commencement of work: Construed as acceptance of conditions.

3.02 COORDINATION

- A. Coordinate with other trades so as not to interfere with each other. Interference's between various trades brought to Architect's attention and resolved before work is commenced.
- B. Coordinate with other trades to effect prompt delivery of all materials needed for installation

3.03 ERECTION

- A. Errors in shop fabrication or deformation: That prevent proper assembly and fitting of parts, report to Architect, and obtain approval of method of correction. Approved corrections made at no additional cost to Owner.
- B. Anchor bolts and anchors: Locate properly and build into connection work.
- C. Templates: Furnish for setting of anchors, anchor bolts and bearing plates.
- D. Painting after erection of steel: Coat all exposed surfaces of bolts, nuts and welds required for field assembly of shop painted steel. Repair abraded and damaged coating.
- E. Galvanized surfaces: Damaged in installation and erection, apply coating equal to galvanizing application.

3.04 INSTALLATION

- A. Install all items specified, true, square, plumb and accurately fitted.

3.05 CLEAN-UP

- A. On completion of work, remove all excess material, equipment, debris and cuttings, dispose of away from premises. Leave work in clean acceptable condition.

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SECTION 06100 - ROUGH CARPENTRY**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes: Provision of rough carpentry items including, but not necessarily limited to the following:
 - 1. Framing with dimension lumber.
 - 2. Wood nailers and blocking.
 - 3. Plywood wall sheathing.
 - 4. Rough hardware.
- B. General provisions of the Contract, including General and Supplementary General Conditions and Division 1 apply to work of this Section.

1.2 REFERENCES

- A. AISI - American Iron and Steel Institute.
- B. APA - American Plywood Association.
- C. ASTM - American Society for Testing and Materials.
 - 1. A153 - Standard Specification for Zinc-Coating (Hot-Dip) on Iron and Steel Hardware.
 - 2. A307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - 3. A563 - Standard Specification for Carbon and Alloy Steel Nuts.
 - 4. ICC - International Conference of Building Officials.
 - 5. N.F.P.A. - National Forest Products Association - Manual for Wood Frame Construction.
 - 6. RIS - Redwood Inspection Service.
 - 7. WCLIB - West Coast Lumber Inspection Bureau - Standard Grading Rules for West Coast Lumber No. 16.
 - 8. WWPA - Western Wood Products Association - Western Lumber Grading Rules.

1.3 SUBMITTALS

- A. General: Section 01300 – Submittal Procedures.

- B. Product Data: Submit manufacturer's product data.
- C. Shop Drawings: Submit shop drawings showing materials, member sizes, dimension, hardware, anchorage and relationship to adjacent materials.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Rough carpentry work shall conform to CBC, Chapter 23 and the National Design Specification (NDS) for Wood Construction.

PART 2 - PRODUCTS

2.1 LUMBER, GENERAL

- A. Lumber Standards: 100% of all wood products on this project is to be FSC-Certified' manufactured to comply with PS 20.
- B. Grade Stamps: Provide lumber with each piece factory-marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.
- C. Nominal and actual sizes are indicated, except as shown by detail dimensions. Provide actual sizes as required by PS 20, for moisture content specified for each use. Where actual sizes are specified they are minimum dressed sizes for dry lumber.
 - 1. Provide dressed lumber, S4S, unless otherwise indicated.
 - 2. Provide seasoned lumber with 19 percent maximum moisture content at time of dressing and shipment for sizes of 2 inches nominal or less in thickness.
- D. Provide lumber certified by SmartWood or Rain Forest Action Alliance meeting specified requirements wherever possible.
- E. Lumber in direct contact with concrete shall Pressure Treated Douglas Fir or Hem Fir. All fasteners in contact with pressure treated material shall be hot dipped galvanized.

2.2 DIMENSION LUMBER

- A. For light framing (2 to 4 inches nominal thickness, 2 to 4 inches nominal width) provide the grade and species as scheduled on drawings.
- B. For structural framing (2 to 4 inches nominal thickness, and in widths greater than 5 inches nominal), provide the grade and species as scheduled on the Drawings.

2.3 SHEATHING MATERIALS

- A. Plywood or OSB Wall Sheathing: APA RATED SHEATHING Structural 1.
Plywood or OSB Roof Sheathing: APA RATED SHEATHING Structural 2 with Radiant Barrier.
 - 1. Exposure Durability Classification: EXPOSURE 1.
 - 2. Span Rating: As required to suit stud or roof joist spacing indicated and as specified on drawings.
- B. General: Provide lumber for support or attachment of other construction including support bases, bucks, nailers, blocking, furring, grounds, stripping, paneling and similar members.
 - 1. Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.
 - 2. Moisture Content: 19 percent maximum measured at time of installation for lumber items not specified to receive wood preservative treatment.
 - 3. Grade: "Standard" grade light framing size lumber of any species or board size lumber as required. "No. 3 Common" or "Standard" grade boards per WCLIB or WWPA rules.

2.5 MISCELLANEOUS MATERIALS

- A. Fasteners
 - 1. General: Provide fasteners with a hot-dip zinc coating per ASTM A153 or of AISI Type 304 stainless steel.
 - 2. Nails, Wire, Brads, and Staples: FS FF-N-105.
 - 3. Wood Screws: ANSI B18.6.1.
 - 4. Lag Bolts: ANSI B18.2.1.
 - 5. Bolts: Steel bolts complying with ASTM A307, Grade A; with ASTM A563 hex nuts and where indicated, flat washers.
 - 6. All fasteners in contact with pressure treated wood material shall be hot dipped galvanized.

2.6 METAL FRAMING ANCHORS

- A. Provide metal-framing anchors of type, size, metal and finish indicated that comply with requirements specified including the following:
 - 1. Current Evaluation/Research Reports: Provide products for which ICBO evaluation/research reports exist that are acceptable to authorities having jurisdiction and that evidence compliance of metal framing anchors for application indicated in accordance with CBC.

2. Allowable Design Loads: Provide products for which manufacturer publishes allowable design loads that are determined from empirical data or by rational engineering analysis and that are demonstrated by comprehensive testing performed by a qualified independent testing laboratory.
3. Galvanized Steel Sheet: Steel sheet zinc-coated by hot-dip process on continuous lines after fabrication to comply with ASTM A153; as standard with manufacturer for type of anchor indicated.
4. Manufacturer: Simpson Strong-Tie Company, Inc., or equal.
5. All metal framing clips or hangers in contact with pressure treated material shall be hot dipped galvanized or coated with Simpson Strong-Tie Company, Inc Z-max coating.

2.7 TREATMENTS

- A. Fire-Retardant Treatment: Same as Koppers Co., Inc.'s "Non-Com" J.H. Baxter and Co.'s "Baco-Pyresote"; or equal product substituted per Division 1 - Section "Product Substitution Requirements".
- B. Preservative Treatment: Furnish in accordance with AWWA.
 - a. Contractor shall coordinate the selection of fasteners and hardware that come into contact with treated woods, to ensure that appropriate coatings and treatments for all fasteners and hardware have been utilized, based on the type of treated wood purchased and installed for the project. Refer to "Simpson" Technical Bulletin T-PTWOOD06 1/06 (a copy can be found at www.strongtie.com or by calling 800-999-5099) and AWWA recommendations for metal in contact with

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. General: Rough carpentry shall produce joints true, tight, and well-nailed with members assembled in accordance with drawings and with all pertinent codes and regulations. Set rough carpentry to required levels and lines, with members plumb and true to line and cut and fitted.
- B. Selection of lumber pieces: Carefully select all members; select individual pieces so that knots and obvious defects will not interfere with placing bolts or proper nailing or making proper connections.
- C. Shimming: Do not shim sills, joists, short studs, trimmers, headers, lintels, or other framing components.
- D. Fit rough carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.

- E. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated.
- F. Install wood nailers, blocking and sleepers where shown and where required for attachment of other work. Form to shapes as shown and cut as required for true line and level of work to be attached. Coordinate location with other work involved.
- G. Firestop concealed spaces of wood framed walls and partitions at each floor level. Where firestops are not automatically provided by the framing system used, use closely fitted wood blocks of 2 inch nominal thickness lumber of the same width as framing members.

3.2 WOOD FRAMING, GENERAL

- A. Framing Standard: Comply with N.F.P.A. "Manual for Wood Frame Construction," unless otherwise indicated.
- B. General: In addition to all framing operations normal to fabrication and erection indicated on the drawings, install all backing required for work of other trades. Install furring, stripping, grounds, curbs, cants, etc. indicated, specified, or required.
- C. Set horizontal or sloped members with crown up.
- D. Do not notch, bore, or cut members for pipes, ducts, conduits, or for other reasons except as shown on drawings, or as specifically approved in advance by the Architect.
- E. Joists and beams at same level shall be connected with metal framing devices, "U" type, except as noted.
- F. Provide furring as needed to accommodate and/or conceal the various components and equipment of Mechanical, Electrical and Systems of other Divisions of Work.
- G. Install framing members of size and spacing indicated.
- H. Anchor and nail as shown, and to comply with CBC.
- I. Do not splice structural members between supports.

3.3 STUD FRAMING

- A. General: Arrange studs so that wide face of stud is perpendicular to direction of wall or partition and narrow face is parallel. Install single bottom plate and double top plates using 2 inch nominal thickness members whose widths equal that of studs. See Drawings for wall framing.
- B. Construct corners and intersections with not less than 3 studs. Install miscellaneous blocking and framing as shown and as required for support of facing materials, fixtures, specialty items, and trim.

1. Install continuous horizontal blocking row at walls over 10 feet high and at any horizontal element, using 2-inch nominal thickness members of same width as wall or partitions.
- C. Frame openings with multiple studs and headers. Install nailed header members of thickness equal to width of studs. Set headers on edge and support on jamb studs.
1. For non-bearing partitions, install double-jamb studs and headers not less than 4 inch nominal depth for openings 36 inches and less in width, and not less than 6 inches nominal depth for wider openings.
 2. For load bearing partitions, install double-jamb studs for openings 72 inches and less in width, and triple-jamb studs for wider openings. Install headers of depth shown, or if not shown, as recommended by N.F.P.A. "Manual for House Framing".

3.4 CEILING JOIST FRAMING

- A. Ceiling Joists: Install ceiling joists with crown up and to comply with requirements specified above for floor joists. Face nail to ends of parallel rafters.
- B. Rafters: Notch to fit exterior wall plates and toe nail or use special metal framing anchors as detailed on the Drawings.
1. At hips, install hip rafters of size shown. Bevel ends of jack rafters for full bearing against hip rafters.
- C. For interior ceilings receiving water resistant gypsum board, install wood framing 12 inches on center.

3.5 INSTALLATION OF PLYWOOD SHEATHING

- A. Placement:
1. Place plywood with face grain perpendicular to supports and continuously over at least two supports, except where otherwise specifically shown on drawings.
 2. Center joints accurately over supports, unless otherwise specifically shown on the drawings, stagger the end joints of plywood panels to achieve a minimum of continuity of joints.
 3. Nail all panel edges to framing members or blocking at least 1-1/2 inch thick and as shown on drawings. Space nails at panel edges as indicated on drawings, or if not indicated, according to the California Building Code requirements. Place nails not less than 3/8 inch from panel edges and driven solidly into the support.
 4. Provide 1/8 inch minimum separation at ends and edges of plywood sheathing installed under cement plaster.
 5. Sheathing surfaces shall be free of warp, twist, buckles, holes, and other defects.

- B. Glued Plywood: Install in accordance with APA recommendations. Apply a bead of adhesive to joints and to edges at all floor joists and beams. Apply a bead in a snake-like manner to joints at plywood butt edges.
- C. Protection of Plywood: Protect all plywood from moisture by use required waterproof coverings until plywood has in turn been covered with the next succeeding component or finish.

3.6 ROOF CURBS AND SLEEPERS

- A. Provide where required for attachment of other work. Form to the shapes and cut as required for true line and level of work to be attached. Set true to line and level, plumb, with other work involved.
- B. Attach to substrates securely as required to support the applied loading.

3.7 CLEANING UP

- A. General: Keep premises in a neat, safe, and orderly condition at all times during execution of this portion of the work, free from accumulation of sawdust, cut-ends, and debris.
- B. Sweeping:
 - 1. At the end of each working day, or more often if necessary, thoroughly sweep all surfaces where refuse from this portion of the work has settled.
 - 2. Remove refuse to area of job site set aside for its storage.
 - 3. Upon completion of work, remove debris, rubbish, and surplus materials from site, resulting from work under this section. Do not leave any wood, shavings, or sawdust on ground or buried in fill or inside framing.

END OF SECTION

SECTION 06191 – ENGINEERED LUMBER CONSTRUCTION**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section includes glued laminated timber beams GLB and Parallam® parallel strand lumber PSL, and Microlam® Laminated Veneer Lumber LVL, steel hardware and attachment brackets.
- B. Related Sections:
 - 1. Section 033000 – Cast-in-Place Concrete: Setting anchors in foundations.
 - 2. Section 051200 – Structural Steel: Fabricated steel structural supports.
 - 3. Section 061000 – Rough Carpentry: Roof sheathing.
 - 4. Section 099113 – Paints and Coatings: Field finishing.

1.2 REFERENCES

- A. American Institute of Timber Construction:
 - 1. AITC 117 - Standard Specifications for Structural Glued Laminated Timber of Softwood Species.
 - 2. AITC A190.1 - Wood Products - Structural Glued Laminated Timber.
- B. ASTM International:
 - 1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
 - 2. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - 3. ASTM D2559 - Standard Specification for Adhesives for Structural Laminated Wood Products for Use Under Exterior (Wet Use) Exposure Conditions.
- C. American Wood-Preservers' Association:
 - 1. AWPA C1 - All Timber Products - Preservative Treatment by Pressure Process.
 - 2. AWPA C20 - Structural Lumber - Fire-Retardant Treatment by Pressure Processes.
 - 3. AWPA C28 - Standard for Preservative Treatment of Structural Glued Laminated Members and Lamination Before Gluing of Southern Pine, Coastal Douglas Fir, Hemfir and Western Hemlock by Pressure Processes.
- D. American Welding Society:
 - 1. AWS D1.1 - Structural Welding Code - Steel.
- E. Canadian Construction Materials Centre (CCMC):
 - 1. PSL Report No. 11161-R & LVL CCMC 08675-R.
- F. International Conference of Building Officials:
 - 1. ICC Evaluation Service PSL Report No. ER-ESR 1387 & LVL ER ESR 1387.

1.3 DESIGN REQUIREMENTS

- A. Design and laminate members to AITC 117 Standard and APA/EWS NER-486.

1.4 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Submittal procedures.

- B. Shop Drawings: Indicate size and camber of beams.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with the CBC standards.
- B. Perform welding Work in accordance with AWS D1.1.
- C. Maintain one copy on site.

1.6 QUALIFICATIONS

- A. Manufacturer/Fabricator: Company specializing in manufacture of glue laminated structural units with three years experience, and certified by AITC and APA/EWS, or in accordance with ANSI A190.1.
- B. Erector: Company specializing in erection of this Work with 10 years documented experience and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Product storage and handling requirements.
- B. Protect members to AITC or APA/EWS requirements for individually wrapped.
- C. Leave individual wrapping in place until finishing occurs when possible.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Lumber: Softwood lumber conforming to grading rules with 15 percent maximum moisture content before fabrication. Design for the following values:
 1. Bending (Fb): 2400 psi.
 2. Tension Parallel to Grain (Ft): 1100 psi.
 3. Compression Parallel to Grain (Fc): 1600 psi.
 4. Compression Perpendicular to Grain Bottom (Fc): 650 psi.
 5. Compression Perpendicular to Grain Top (Fc): 650 psi.
 6. Horizontal Shear (Fv): 190 psi.
 7. Modulus of Elasticity (E): 1,800,000 psi.
- B. Parallam® Parallel Strand Lumber: 2.0E
 1. Comply with ICC ES Report NO. ES ESR-1387, or CCMC Report No. 11161-R.
 2. Adhesives: Waterproof type conforming to requirements of ASTM D-2559.
- C. Microlam® Laminated Veneer Lumber: 1.9E
 1. Comply with ICC ES ESR 1387, or CCMC Report No. 08675-R.
 2. Adhesives: Waterproof type conforming to requirements of ASTM D-2559.
- D. Steel Connections and Brackets: ASTM A36/A36M weldable.
- E. Hardware: ASTM A307, structural quality steel, bolts.
- F. Anchor Bolts: ASTM A307 steel.
- G. Laminating Adhesive: ASTM D2559 or ANSI A190.1; Type for wet condition of service.

- H. Wood Sealer: Manufacturer's Standard.

2.2 FABRICATION

- A. Fabricate glue laminated structural members in accordance with AITC or APA/EWS Industrial grade.
- B. Verify dimensions and site conditions prior to fabrication.
- C. Cut and fit members accurately to length to achieve tight joint fit.
- D. Camber: See drawings.
- E. Do not splice or join members in locations other than those indicated without permission.
- F. Fabricate steel hardware and connections with joints neatly fitted, welded, and ground smooth.
- G. After end trimming, seal with penetrating sealer in accordance with AITC or APA/EWS requirements.
- H. Field Finishing of Members: Specified in Section 099100.

2.3 FABRICATION – PARALLAM® PARALLEL STRAND LUMBER & MICROLAM

- A. General: Manufacture Parallam® PSL and Microlam LVL by TrusJoist in a plant listed in the reports referred to in Paragraph 2.1.B and under the supervision of an approved third-party inspection agency.
- B. Manufacturer from strands of wood fiber in a continuous process with all strands oriented to the length of the member and then fed into a press in the desired lay-up pattern.
- C. All members are to be free of finger or scarf joints or mechanical connections in full-length members.
- D. Identify Parallam® PSL and Microlam by a stamp indicating the product type and grade, ICC, ES or CCMC evaluation report number, manufacturer's name, plant number, and the independent inspection agency's logo.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 013000 - Administrative Requirements: Coordination and project conditions.
- B. Verify supports are ready to receive units.
- C. Verify sufficient end bearing area.

3.2 PREPARATION

- A. Coordinate placement of support items.

3.3 ERECTION

- A. Lift members using protective straps to prevent visible damage.
- B. Set structural members level and plumb, in correct positions or sloped where indicated.
- C. Install temporary bracing and anchorage to hold members in place until permanently secured.
- D. Fit members together accurately without trimming, cutting, or other unauthorized modification.
- E. Swab and seal interior wood surfaces of field drilled holes in members with sealer.

3.4 ERECTION – PARALLAM PSL & LVL.

- A. Install Parallam PSL & LVL in accordance with the drawings and any Trus Joist drawings and installation suggestions.
- B. Temporary construction loads that cause stresses beyond design limits are not permitted.
- C. Provide safety bracing to keep Parallam PSL and LVL straight and plumb as required and to ensure adequate lateral support for the individual Parallam PSL or LVL members and the entire system until the sheathing material has been applied.

3.5 TOLERANCES

- A. Section 014000 - Quality Requirements: Tolerances.
- B. Framing Members: 1/2 inch maximum from indicated position.
- C. GLB, PSL & LVL:
 - 1. Finished Length (as specified): Plus or minus 1/4 inch.
 - 1. Depth: Plus or minus 1/16 inch.
 - 2. Width: Plus or minus 1/16 inch.

END OF SECTION

SECTION 06400 – ARCHITECTURAL WOODWORK**1.00 GENERAL**

1.01 DESCRIPTION

- A. Work included: Furnish and deliver all casework, exterior and interior finish wood trim and related items, as set forth in “Scope of Millwork”, Manual of Millwork, May 1, 2003 Woodwork Institute.
- B. Related work specified elsewhere:
 - 1. Installation at job site – Section 06100
 - 2. Carpentry – Section 06100
 - 3. Wood Doors – Section 08200
 - 4. Painting – Section 09900

1.02 SUBMITTALS

- A. Shop drawings for casework: Submit for approval prior to fabrication. Show location and size, accessories, materials, finishes, and filler panels. Include fully dimensioned plans, elevations and anchorage details to countertop and walls.
- B. Shop drawings for countertops: Show sizes, shapes, edges and backsplash profiles, cutouts for plumbing/electrical fixtures, and methods of joining.
- C. Samples: Submit manufacturer's color charts showing the full range of colors, textures, and patterns available for each type of material indicated.

1.03 QUALITY ASSURANCE

- A. Manufacturer and installation: Millwork and cabinets in accordance with standards in latest edition of Manual of Millwork of the Woodwork Institute in the grades specified or shown.
- B. Shop drawings for millwork and cabinets: Bear the W.I. Certified Compliance Label indicating that drawings meet the requirements of the grade specified.
- C. Plastic laminate countertops: Bear the W.I. Certified Compliance Label indicating that the tops meet the requirements of the grade specified.
- D. Composite Wood Products: Hardwood plywood, particleboard and medium density fiberboard composite wood products used on the interior or exterior of the building shall meet the requirements for formaldehyde as specified in 2013 CGC Table 5.504.4.5

1.04 DELIVERY, STORAGE AND HANDLING

- A. Protect finish wood materials and cabinets during transit, delivery, storage and handling to prevent damage, soiling and deterioration.
- B. Do not deliver finish wood materials and cabinets, until painting, wet work, grinding and similar operations which could damage, soil or deteriorate woodwork has been completed in installation areas.

1.05 PROJECT CONDITIONS

- A. Environmental conditions: Do not install finish items until required temperature and relative humidity conditions have been stabilized and maintained in installation area.
- B. Field measurements: Take as may be required in manufacturer and ordering of materials.
- C. Discrepancies: Report any discrepancy between drawings and field measurements to Architect prior to manufacturer or fabrication. Failure to do so, Contractor shall be responsible for correction of errors.

1.06 FABRICATION

- A. Fabrication: Including assembly, finishing, and hardware application, before shipment to site to maximum extent possible. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming and fitting.

2.00 PRODUCTS

2.01 WOOD PRODUCT QUALITY STANDARDS

- A. Softwood lumber standards: Comply with PS 20 and with applicable grading rules of the respective grading and inspecting agency for species and product indicated.
- B. Softwood plywood standard: Comply with PS 1-83.
- C. Exterior finish: Redwood, comply with Standard Specifications for Grades of California Redwood Lumber (RIS), 2000 edition.
- D. Woodworking standard: Comply with specified provision of the Woodwork Institute (WI) "Manual of Millwork", May 1, 2003.

2.02 MATERIALS

- A. Nominal sizes: As indicated, except as shown by detailed dimensions. Provide dressed lumber, as applicable, manufactured to actual sizes as required by PS 20 or to actual sizes and patterns as shown.
- B. Moisture content of softwood lumber: Provide seasoned, kiln dried (KD) lumber having a moisture content from time of manufacture until time of installation not greater than values required by the applicable grading rules of respective grading and inspecting agency for species and product indicated.
- C. Lumber: Surfaced all sides (S4S). For painted finish, pieces which are either glued-up lumber or made of solid lumber stock.

2.03 WOOD MATERIALS

- A. Interior finish – softwood: Douglas Fir, opaque finish, W.I. Custom Grade.
- B. Exterior finish: Redwood, Clear (para.105).

2.04 WOOD CASEWORK

- A. Grades: W.I. Custom Grade.
- B. Construction style: Style A frameless
- C. Construction Type: Type I
- D. Exposed portions: Plywood or solid stock, visible edges of plywood edge-banded. Plastic laminate covered Softwood.
- E. Semi-exposed portions: Same as exposed portions.
- F. Interior finish surfaces: Melamine overlay.
- G. Backs: Plywood, 1/2" minimum, finished backs where exposed.
- H. Wood doors-hinged: Type I, flush overlay, 3/4" thick to 4ft height, 1 1/8" thick over 4ft. Bevel doors over 1" thick.
- I. Drawers: Flush overlay.
- J. Wood shelves: Not less than 3/4" thickness up to 3ft. length; exceeding 3ft., not less than 1" net.
- K. Shelf standards: Knape & Vogt 255 flush standards and 256 supports, zinc plated finish.
- L. Coat hanging rod: Knape & Vogt KV2NP, Bright nickel plated extension rod.

2.05 CABINET HARDWARE

- A. Each door:
 - 1 pr hinges, Grass Nexis Impreso soft-closing, doors to 4ft., 3/4" thick, overlay
 - 1-1/2 pr Grass Nexis Impreso soft-closing door over 4ft., 1-1/8" thick, overlay
 - 1 wire pull, Trimco 562-3, 3-1/2" c.c.
 - 1 magnetic stop, Hager 1437, 2 on doors over 4ft high.
- B. Each drawer:
 - 1 wire pull, Trimco 562-3, 3-1/2" c.c., 2 on drawers over 3 ft.
 - 1 pr Drawer slides, Accuride 3132EC, Eclipse East-Close, 100# rating, fully concealed, full extension.

2.06 LAMINATED PLASTIC SURFACES

- A. Laminated plastic sheets – all others: General Purpose, Grade 10 per NEMA LD 71. Type 1, Class 1 and 2, 58 matte finish(Formica).

- B. Substrate: MDF (Medium Density Fiberboard) or a 45 lb density Industrial Grade particleboard, cs236-66, Type 1, Grade B, Class 2, 3/4" thick.
- C. Adhesive: Approved water-resistant type for proposed use.
- D. Countertops and backsplash: Stainless steel counter top with back splash. Splsh height as shown.
- E. Joints: Neatly made and connecting surfaces flush.
- F. Cutouts: Inside corners radiuses as large as possible, 1/8" minimum.
- G. Exposed edges: Plastic laminate covered.

2.07 MISCELLANEOUS MATERIALS

- A. Fasteners for exterior finish carpentry: Nails or screws of stainless steel or hot-dip galvanized steel.
- B. Fasteners for interior finish carpentry: Nails, screws and other anchoring devices of a type, size, material and finish required for application indicated to provide secure attachment, concealed where possible.
- C. Glue: Aliphatic-or phenolic-resin wood glue recommended by manufacturer for general carpentry.
- D. Sealant: Sika-flex 1a (Sika Corp.)

3.00 EXECUTION

3.01 SURFACE CONDITIONS

- A. Substrates: Examine for compliance with requirements, for installation tolerances and other conditions affecting installation and performance of cabinets and finish carpentry.
- B. Installation: Do not proceed until unsatisfactory conditions have been corrected.

3.02 FABRICATION

- A. Fabrication: In strict accordance with approved shop drawings and referenced standards.

3.03 INSTALLATION

- A. Installation: Install work in accordance with approved shop drawings and referenced standards.
- B. Jointing and fastening:
 1. Make joints to conceal shrinkage; miter exterior joints; cope interior joints; miter or scarf end-to-end joints.
 2. Install trim in pieces as long as possible, jointing only where solid support is obtained.

3. Install items straight, true, level, plumb, and firmly anchored in place.
4. Where blocking or backing is required, coordinate as necessary with other trades to ensure placement of required backing and blocking in a timely manner.
5. Nail trim with finish nails of proper dimension to hold the member firmly in place without splitting the wood.
6. On exposed work, set nails for putty.
7. Screw, do not drive, wood screws; except that screws may be started by driving and then screwed home.

3.04 FINISHING

- A. Sandpaper finished wood surfaces thoroughly as required to produce an uniformly smooth surface, always sanding in the direction of the grade; except do not sand wood which is designed to be left rough.
- B. No coarse grained sandpaper mark, hammer mark, or other imperfections will be accepted.
- C. Ease edges.

3.05 CLEAN UP

- A. Keep the premises in a neat, safe and orderly condition at all times during execution of this portion of the work, free from accumulation of sawdust, cut-ends and debris.
- B. Upon completion of this portion of work, broom clean all floor surfaces.

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SECTION 07190 – WATER REPELLENTS**1.00 - GENERAL**

1.01 DESCRIPTION

- A. Work included: Water repellent coatings for masonry exterior and interior exposed surfaces.
- B. Related work:
 - 1. Masonry – Section 04200

1.02 QUALITY ASSURANCE

- 1. Use only qualified workers skilled and trained in the techniques of applying water repellents.

1.03 SUBMITTALS

- A. Product data: Submit product data of materials specified together with manufacturer's specifications prior to start of work. Refer to Section 01300.
- B. Manufacturer Certificate: Signed by manufacturer certifying that water repellent complies with requirements.

1.04 GUARANTEE

- A. Water Repellent: Provide a manufacturer's written warranty, signed by the Contractor, covering materials and workmanship for a period of ten (10) years from the date of completion of the work.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Deliver materials in the manufacturer's unopened containers bearing the manufacturer's directions. Containers must be clearly marked with manufacturer's name, brand, and type.
- B. Storage: Store in accordance with manufacturer's instructions. Do not use materials that have been stored for a period of time exceeding the maximum recommended shelf life of the materials.

1.06 JOB CONDITIONS

- A. Weather: Do not proceed when surface and air temperatures are below 40°F and above 90°F at time of application. Do not apply on hot, windy days.

2.00 - PRODUCTS

2.01 MATERIALS

- A. Water Repellent: Sure Klean Weather Seal Siloxane WB Concentrate (PROSOCO, Inc. Lawrence, KS. 800.255.4255)
 - 1. Technical Data:

Form: Clear amber liquid
 Specific Gravity: 0.96
 Active Content: 100%
 PH: N/A
 Wt./Gal.: 7.9 lbs.
 Flash Point: 69 degrees F concentrate ASTM D 3278
 140 degrees F in 9:1 dilution
 Freeze Point: <-22 degrees F
 Voc Content: Complies with all known national, state and district AIM VOC regulations at recommended dilutions

3.00 - EXECUTION

3.01 PREPARATION

- A. Protection: Protect people, vehicles, property, plants and all non masonry from product splash, residue, fumes and wind drift.
- B. Joint sealants: Install before application of repellent. Sealant, thoroughly cured before application begins.

3.02 EQUIPMENT

- A. Low pressure, airless spray equipment, fitted with solvent-resistant hoses and gaskets to avoid discoloration. Brushes and rollers may not achieve a uniform, extended coverage rate.

3.03 SURFACE TESTING

- A. Test a minimum 4 ft. by 4 ft. area for suitability and results before application. Let test area treatment cure before inspection. Keep test area available for comparison throughout the treatment work. Manufacturer's representative shall be present to determine the coverage rate.

3.04 APPLICATION

- A. Dilution: Dilute with clean, potable water. Mixing vessels clean, dry and free of contaminants. Mix lightly to produce a uniform consistency. 1 part concentrate: 9 parts water
- B. Appropriate coverage rate: Concrete block
 - 1. Smooth surface: 30 – 100 sq. ft.
 - 2. Split faced: 30 – 85 sq. ft.
- C. Most effective if repellent applied within 8 hours of dilution and must be applied within 24 hours.
- D. Apply "wet-on-wet" to a visibly dry and absorbent surface.
- E. Apply by spray in a saturating application from the bottom up. Apply enough material to create a 4" to 8" rundown below the spray contact point.

- F. Let the first application penetrate the masonry surface for 2-3 minutes, then reapply in the same manner. Less material will be required for the second application.

3.05 CLEANING

- A. Immediately clean water repellent from adjoining surfaces and surfaces soiled or damaged by application as work progresses. Repair damage caused by water-repellent application. Comply with manufacturer's written cleaning instructions.

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SECTION 07210 – BATT & SPRAY FOAM BUILDING INSULATION

1.00 - GENERAL

1.01 DESCRIPTION

- A. Work included:
 - 1. Thermal batt insulation
 - 2. Thermal spray polyurethane foam insulation
 - 3. Sound insulation
- B. Related work specified elsewhere:
 - 1. Cold Formed Metal Framing – Section 05400
 - 2. Gypsum Drywall – Section 09250

1.02 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Deliver materials to job in manufacturer's original unopened packaging.
- B. Storage: Store materials in a dry area, off the ground, protect from exposure from harmful weather conditions.

2.00 - PRODUCTS

2.01 MATERIALS

- A. Insulation: Glass fiber Thermal Batt Insulation, packages labeled with manufacturer's name, thickness and R-value. (Owens-Corning Fiberglas or CertainTeed)
- B. Insulation: Spray polyurethane foam insulation: Insulation, packages labeled with manufacturer's name, thickness and R-value. (Owens-Corning Fiberglas or CertainTeed)
- C. Thermal insulation:
 - 1. Exterior walls: Steel z-channel or metal stud furring on existing concrete walls: closed cell spray polyurethane foam insulation, medium density closed cell foam insulation, core density a nominal 2.0 pcf. 5" thick, R-value 32. Flame spread index <25; smoke index <450 per ASTM E84. Cover with 5/8" gypsum wall board
 - 2. Attic at wood trusses/rafters: closed cell spray polyurethane foam insulation, medium density closed cell foam insulation, core density a nominal 2.0 pcf. 5" thick, R-value 32. Flame spread index <25; smoke index <450 per ASTM E84.
 - a. As an alternative to UBC required 15 minute thermal barrier of ½" minimum gypsum board thermal barrier at open attic space where foam insulation is exposed, provide International Fireproof Technology, Inc. spray applied thermal barrier coating, DC315.
 - i. Meets testing performed under NFPA 286, FM-4880, UL-1040 or UL-1715; DC315 is a Certified Warnock Hershey listed (WHI-No. 20947) and rated product which has passed certified testing for both the (UL-1715) "15-minute" Thermal Barrier and the NFPA 286 (AC-377) standards as an Ignition Barrier
 - ii. ICC-ES 3072 and CCRR10215 compliant or equivalent per CBC 2603.4.1.6
- D. Sound Attenuation Insulation:

1. At all Dorm Rooms, Exam Room and Office Ceilings as shown on the Drawings: Owens-Corning Sound Attenuation Batt Insulation (SAB), Unfaced, 24" width, 108" length, 3 1/2" thick. Conform to ASTM C 665, Type I and ASTM E 136.
2. At all Dorm Rooms, Exam Room, Hall and Office party walls as shown on the Drawings: Owens-Corning Sound Attenuation Batt Insulation (SAB), Unfaced, 16" width, 108" length, 3 1/2" thick. Conform to ASTM C 665, Type I and ASTM E 136 Thickness as specified for Thermal insulation.

3.00 - EXECUTION

- 3.01 A. Inspect areas in which insulation materials will be installed. Verify that no condition exists which will prevent installing materials as specified.
- B. Do not install materials until conditions are satisfactory.

3.02 INSTALLATION

- A. Thermal insulation: Install between furring, studs, or roof joists as shown. Where pipes, conduits, electrical boxes and the like are encountered insulate between exterior face and obstruction, compressing the insulation as necessary.
- B. Sound attenuation insulation:
1. Walls: Install in stud walls as shown. Where pipes, conduits, electrical boxes and the like are encountered insulate around them, compressing insulation as necessary.
 2. Ceilings: Lay insulation at ceilings over T-bar grid/ tile or gypsum board ceiling on framing as shown. Attach to framing and/or support with wire mesh or other approved method.

SECTION 07270 - FIRESTOPPING**1.00 GENERAL****1.01 DESCRIPTION**

- A. Work included: Firestopping, firesafing and smoke seals to include:
 - 1. All openings in fire rated floors, walls and ceilings, both empty and those accommodating penetrating items such as cables, conduits, pipes and ducts.
 - 2. Firestopping for Mechanical and Electrical work.
 - 3. Safing insulation in stud walls.
- B. Related work specified elsewhere:
 - 1. Building insulation: Section 07210

1.02 REFERENCED STANDARDS

- A. American Society for Testing and Materials (ASTM):
 - 1. E84: "Standard Test Method for Surface Burning Characteristics of Building Materials".
 - 2. E119: "Standard Methods of Fire Tests of Building Construction and Materials".
 - 3. E136: "Safing Insulation and Firespan Insulation".
 - 4. E184: "Standard Method of Fire Tests of Through-Penetration Fire Stops".
 - 5. E814: "Safing Insulation used in Conjunction with Smoke Seal Compound or with Firecode Compound".
- B. Underwriters Laboratories Inc. (UL)
 - 1. "Building Materials Directory – 2004".
 - 2. "Fire Resistance – Volumes 2A and 2B 2004, Hourly Ratings for Joint Systems, Through-Penetration Firestop Systems and Electrical Circuit Protective Systems and Duct Assemblies".

1.03 QUALITY ASSURANCE

- A. Provide firestopping materials meeting following conditions:
 - 1. Listed and labeled in accordance with requirements of UL Building Materials Directory.
 - 2. Conforming with both Flame (F) and Temperature (T) ratings as determined in accordance with UBC Standard 43-6.
 - 3. F and T rating must be a minimum of one hour but not less than the fire resistance rating of the assembly being penetrated.

4. Fire tests shall be conducted with a minimum positive pressure differential of 0.03 inches of water column.
 5. Materials shall conform to all applicable governing codes:
 - a. Rated one-hour when tested in accordance with ASTM E 119.
 - b. Classified Class 1 when tested in accordance with ASTM E 84.
 6. Materials: Asbestos free.
- B. Applicator Qualifications:
1. Trained or approved by firestop manufacturer.
 2. Equipment used shall comply with firestop manufacturer's printed installation instructions.
- C. Products used shall have been accepted by local building officials through use of ICBO Evaluations or other documents acceptable to local authorities.

1.04 SUBMITTALS

- A. Product data: Manufacturer's technical data including:
1. Illustrations, annotated to indicate specific product types, variations and materials involved.
 2. Substantiating test data and reports.
 3. Performance and limiting criteria.
 4. Certification that products have been accepted by local building officials as required by Article "Quality Assurance".

1.05 PROJECT CONDITIONS

- A. Follow manufacturer's instructions for temperature, ventilation and other conditions for mixing and installing foam seals.
- B. Observe and follow manufacturer's precautions when using materials considered as toxic or otherwise hazardous.
1. Cure materials in accordance with temperature and humidity requirements.
 2. Conform to ventilation and safety requirements.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's original unopened containers or packages with manufacturer's name, trade name and UL label; include product identification, lot numbers, mixing and installation instructions, as applicable.
- B. Store materials in original, unopened containers or packages, off the ground and protected from adverse environmental conditions as required by material manufacturer.

1.07 SCHEDULING

- A. Do not cover up those firestopping installations that will become concealed behind other construction until authority having jurisdiction, if required, have examined installations.

2.00 PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with Specification and code requirements, provide materials and systems of one or more of the following firestopping systems:
 1. United States Gypsum Co.(USG)
 2. Dow Corning
 3. 3M
 4. Chase Technology
 5. Bio Fireshield, Inc.

2.02 LIFE SAFETY INSULATION

- A. Sealing Compound: USG Thermafiber Smoke Seal Compound, smoke resistant, UL labeled.

2.03 FOAM FIRESTOPPING

- A. Two-component silicone elastomer: Dow Corning 3-6548 Silicone RVT Foam.
- B. Accessories: Including but not necessarily limited to:
 1. Foaming/damming materials: Mineral fiberboard or others as suitable. Use UL listed material if it is to remain in place in the completed work.
 2. Primer, sealant and solvent cleaner: As recommended by foam manufacturer.

2.04 PUTTY AND CAULK FIRESTOPPING

- A. Single-component synthetic elastomers: 3M "Fire Barrier CP 25WB+Caulk, one-part, premium intumescent latex-based caulk. Flame spread 0, smoke developed 5.0, WL 1001.
- B. Single-component silicone system: Bio Fireshield "Bio-therm 100/200".
- C. Accessory materials: As recommended by manufacturer or as required by UL to achieve required noted hour material rating.

2.05 PENETRATING SEALING SYSTEMS

- A. Prepackaged components: 3M Corp., "Series 7902 and Series 7904 Fire Barrier Penetration Sealing Systems".
- B. Firestop sleeves for plastic pipe penetrations: Bio Fireshield "Firestop Sleeves" steel casings lined on inside surfaces with intumescent materials capable of expanding to seal the softening plastic pipe against smoke, toxic gases and flames.

- C. Firestop sleeves for large plastic pipe penetrations: Bio Fireshield "Bio Crash Foam", stainless housing, lined with an intumescent compound, having a spring loaded shut off mechanism to seal the penetration by crushing the softened plastic pipe.
- D. Accessory materials: As recommended by manufacturer or as required by UL to achieve the noted material rating.

3.00 EXECUTION

3.01 INSPECTION

- A. Verify that job conditions and conditions of openings and voids to be sealed are satisfactory for installation of fire-stopping materials. Support framing and surrounding construction is dry.
- B. Do not commence work until unsatisfactory conditions have been corrected.

3.02 USAGE

- A. Interior walls: Provide firestopping where penetrations create voids in fire rated construction.
- C. Penetrations for conduit, cable, wire, pipe, duct and other elements passing through rated floor or wall:
 - 1. Firestopping to completely fill spaces for full depth of rated assembly.
 - 2. Firestopping in addition to sleeves and escutcheons or other trim which may be provided under other Sections.
- C. Miscellaneous voids and openings: Firestopping throughout the work to maintain fire ratings of construction.

3.03 PROTECTION

- A. At exposed locations: Provide protection to prevent damage to adjacent surfaces and finishes.
- B. Installed firestopping: Protect from damage by other construction operations.

3.04 INSTALLATION

- A. Provide firestopping for conditions specified and as encountered in the work:
 - 1. Use only firestopping materials for the work of this Section.
 - 2. Verify that anchoring devices, back-up materials, clips, sleeves, supports and other materials used in the actual fire tests are installed.
 - 3. Install firestops with sufficient pressure to properly fill and seal openings to ensure an effective smoke seal.
 - 4. Tool or trowel exposed surfaces.

- 5. Comply with Underwriters Laboratory Designs as shown.
 - 6. Remove excess firestop material promptly as the work progresses and upon completion.
- B. Comply with manufacturer's installation instructions as applicable to conditions encountered.
 - C. Safing Insulation (SAFB): Install in stud cavities where required to achieve fire-rated design. Friction fit securely between studs. Butt ends of blankets closely together and fill all voids.
 - D. Putty, caulk and prepackaged sealing systems: Comply with manufacturer's installation instructions.
 - E. Penetration systems: Comply with manufacturer's installation instructions.

3.05 FIELD QUALITY CONTROL

- A. Notify Architect immediately if firestopping systems provided cannot meet the Specification requirements due to conditions encountered.
- B. Examine completed firestops to assure proper installation and full compliance with this Specification.
- C. Maintain access to areas of work until inspection by applicable code authorities.
- D. Correct unacceptable firestops and provide additional inspection to verify compliance with Specification at no additional cost.

3.06 COMPLETION

- A. Finish exposed surfaces of firestopping to a uniform level and condition.
- B. If exposed in the finished work, remove temporary dams after initial cure of firestop material.
- C. Remove spilled and excess materials adjacent to work without damaging adjacent surfaces.
- D. Correct staining and discoloring on adjacent surfaces.
- E. Leave finished work in a neat and clean condition.

* * * * *

SECTION 07500 – MEMBRANE ROOFING**1.00 GENERAL****1.01 DESCRIPTION**

- A. Work Included:
 - 1. Insulation board to provide roof slope
 - 2. Built-up roofing.

- B. Related work specified elsewhere:
 - 1. Carpentry – Section 06100
 - 2. Composition Shingle Roofing – Section 07310
 - 3. Roof Underlayment – Section 07501
 - 4. Sheet metal work – Section 07600
 - 5. Sheet metal roofing – Section 07610
 - 6. Plumbing – Section 15401

1.02 QUALITY ASSURANCE

- A. Contractor: Experienced in built-up roofing and an approved applicator by roofing material manufacturer for type of roofing and warranties specified.

1.03 FIELD-QUALITY CONTROL

- A. Architect may cut sections from completed roofing, approximately 41" wide x 42" long, and at right angles to direction felt is laid.
- B. If any lapping of felt or application of asphalt is found to be less than specified, Contractor shall at no expense to Owner, install additional roofing materials as required to bring the roofing up to specifications.
- C. Not more than one cut shall be made in each 25 square or fraction thereof of surface, and only one cut made of roofs containing less than 26 squares.
- D. Replace cut sections of roofing with the same quality, quantity and thickness of materials and extend each layer of such repair felt and roofing a minimum of 6" beyond respective underlying layers on all sides and lap shingle fashion.

1.04 REFERENCE STANDARDS

- A. Code: California Building Code – 2013 Edition, Chapter 15.
- B. ASTM Standards: As noted.
- C. Underwriter's Laboratories (UL): Class A rating.
- D. Health, Safety and Environmental: Observe all health, safety and environmental procedure involving storing and handling of roofing materials as outlined on container labels and MSDS.

1.05 SUBMITTALS

- A. Product Data: Prior to delivery of materials, submit materials list of specified products, manufacturer's specifications and other data required for compliance with these specifications.
 - B. Installation: Manufacturer's recommended method of installation and data to demonstrate compliance with these specifications.
- 1.06 DELIVERY, STORAGE AND HANDLING
- A. Delivery of materials: Deliver materials to site in manufacturer's original, packages, container or bundles.
 - B. Storage: Store unopened packaging in a cool, clean, dry location. Store roll material on end on raised surface. Protect against damage.
- 1.07 ENVIRONMENTAL CONDITIONS
- A. Weather: Do not apply roofing unless correct asphalt application temperature can be maintained, or if the roof deck surface temperatures are less than 40°F.
 - B. Water: Do not conduct roofing operation when water in any form is present on deck or materials are wet.
- 1.08 PROTECTION
- A. Provide special protection or avoid heavy traffic on completed work when ambient temperature is above 80°F.
 - B. Restore to original condition or replace work or materials damaged during handling of bitumens and roofing materials.
 - C. Protect paving and building walls adjacent to hoist and kettles prior to starting work.
 - D. Provide and maintain fire extinguisher(s).
 - E. Take precautions to prevent other Trades from damaging the roof during and after construction.
 - F. At the end of each day's work, seal work performed during that day at edges to prevent moisture from getting under materials.
- 1.09 WARRANTY
- A. Roofing Contractor's Warranty: All work shall be free from defects of materials and workmanship for a period of 2 years from date of completion of the Work.
 - B. Manufacturer's Warranty:
 - 1. Manufacturer's 20 Year No Dollar Limit (NDL) System Warranty from date of completion of the Work, including but not necessarily limited to the following:
 - a. Deterioration of roofing membrane and base flashing system resulting from ordinary wear and tear by the elements.
 - b. Workmanship of the roofing membrane and base flashing system.
 - c. Blisters, bare spots, fishmouths, wrinkles or ridges in the built-up roofing.

- d. Splits in the roofing membrane not caused by structural movement of failure or movement of any material underlying the roofing membrane or base flashing.
 - e. Slippage of the roofing membrane or base flashing.
 - f. Unlimited penal sum, not prorated.
2. Arrange for roofing manufacturer's representative and roofing contractor to conduct required inspections and submit drawings, details and questionnaires required to roofing manufacturer for obtaining the manufacturer's standard 20 year NDL labor and material warranty. 4 physical roof inspection by the manufacturer's representative will be required.
 3. Upon completion of work and prior to final payment, submit the following:
 - a. Manufacturer's standard 20 year NDL labor and material warranty issued to Owner and in force.
 - b. Copies of punch list items with documentation that punch list items have been completed.
 - c. Manufacturer's report that roof has been inspected and is suitable for warranty.

2.00 PRODUCTS

2.01 MATERIALS

- A. Roofing System: Johns Manville (JM) Four Ply White Coated Mineral Surfaced Fiber Glass Built-Up Cool Roof , 4GNC-CR, UL Class A.
- B. Insulation, cants and crickets:
 1. Top Layer at tapered insulation: Perlite utility board complying with ASTM C 728. Thickness 3/4". JM Fesco Board.
 2. Tapered Insulation to provide required drainage: Tapered perlite board complying with ASTM C 728. JM Taper Fesco Board.
 3. Cants: Perlite-based cant strip complying with ASTM C 728. JM FesCant Plus.
- C. Insulation securement:
 1. First layer: Mechanically fasten to deck using manufacturer approved fasteners and insulation plates.
 2. Remaining layers: Hot mopped together using asphalt complying with ASTM D 312.
- D. Membrane and flashing:
 1. Ply Sheets: Asphalt coated, wet process fiber glass sheet complying with ASTM D178 Type VI. JM GlasPly Premier.
 2. Cap Sheet: White mineral surfaced, white acrylic coated, fiber glass cap sheet for use in built-up roofing systems complying with ASTM D 3909, ASTM C 1549, ASTM E 903 and ASTM E 408 and California Title 24. JM SBS GlasKap CR.
 3. Base Flashing Backer Sheet: 180 gram, polyester reinforced, smooth surfaced, SBS modified bitumen cap sheet complying with ASTM D 6164, Type I, Grade S. JM DynaLastic 180 S.
 4. Base Flashing Cap Sheet: White mineral surfaced, white acrylic coated, fiber glass cap sheet for use in built-up roofing systems complying with ASTM D 3909,

ASTM C 1549,ASTM E 903 and ASTM E 408 and California Title 24. JM GlasKap CR.

- E. Adhesives, coatings and primers:
 - 1. Pipe Flashing: Liquid applied flashing system. JM Permaflash.
 - 2. Coated Cap Sheet Touch-up: Acrylic elastomeric coating complying with ASTM D 6083 JM TopGard 4000.
- G. All other materials not specifically described, but required for a complete and proper installation of roofing, shall be selected by approved manufacturer and subject to approval by Architect.
- H. Thermometer: A suitable, calibrated asphalt thermometer at all times while asphalt is being heated and use constantly. For immersion type kettles, use spear type thermometers.
- I. Roof deck drains: Zurn Z-100 15" diameter. Furnished and installed under Section 15401 Plumbing.

3.00 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas and conditions under which roofing will be applied for compliance with requirements.
- B. Verify that roof openings and penetrations are in place and set and braced and that roof drains are properly clamped into position.
- C. Verify that wood blocking, curbs and nailers are securely anchored to roof deck at roof penetrations and terminations.
- D. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in access of 1/16" out of plane.
- E. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Cleaning: Clean entire roof surface of all dust, debris and other substances detrimental to roofing installation according to roofing system manufacturer's instructions.
- B. Roof drains: Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof drain plugs when no work is taking place or when rain is forecast.

3.03 INSULATION INSTALLATION

- A. Base Layer: Mechanically fasten to deck using approved fasteners and insulation plates. Field, 1 fastener/4 sq. ft.,Perimeter 1 / 2 sq. ft.,Corners 1 / 1 sq. ft.
- B. Board installation: Install with long joints continuous and running in direction parallel to decking. Stagger short joints. Butt joints tightly.
- C. Perlite board insulation: Solidly adhere one layer of perlite board using a 33 lb. per square application of

Type IV asphalt applied at it's EVT temperature or use Urethane Insulation Adhesive. Step-in each board to assure maximum adhesion. Butt joints tightly. Fill open joints 1/4" or wider with insulation.

- D. Tapered insulation: Install system as shown and as required to provide positive drainage at all roof areas. Starting at drain sumps, install tapered insulation in full moppings of asphalt. Fill open joints 1/4" or wider with perlite insulation.
- E. Cants: Apply continuous at intersections of roof with curbs extending above roof and walls. Cants rigid, ends set flush, corners mitered and bear on deck and fit flush to vertical surface. Apply with heavy mopping of hot asphalt.
- F. Application: Apply no insulation than can be completely covered with the 4 ply felt membrane on the same day.

3.04 MEMBRANE INSTALLATION

- A. At end of each days work, protect installed roofing and insulation by closing off edge of system with water cut-off, consisting of 2 plies of felt and mopping of asphalt on to deck and top edge of membrane at least 4" and 6".
- B. Remove water cut-off completely and clean prior to resuming roofing application.
- C. Asphalt: Type IV.
- D. Bitumen temperature:
 1. Never heat asphalt to or above Flash Point (FP).
 2. Do not heat asphalt above Finished Blowing Temperature (FBT) for longer than 4 hours.
 3. Apply asphalt at a temperature range within 25° above, or below Equiviscous Temperature (EVT).
- E. Starting at low edge, apply one 12" wide felt; over that one 24" wide felt; over these 2, a full 36" wide felt in steep asphalt at a rate of 23 lbs. per each layer of felt.
- F. Apply following felts full width, overlapping each preceding felt by 24-2/3".
- G. Install each felt so that it is firmly and uniformly set, in hot asphalt, without voids. Broom felts lightly during application. No dry edges.
- H. Cap Sheet installation:
 1. Cut cap sheet into practical lengths.
 2. Lay the material out on the roof and allow to relax and flatten.
 3. Apply hot asphalt at approx. 20°F above the EVT temperature to maximize bonding at a nominal rate of 23 lbs. per square.
 4. Flop the cap sheet into the hot asphalt.
 5. Maintain 2" side laps and 6" end laps. Set cap sheet uniformly without voids, into the hot asphalt.
 6. Do not apply cap sheet when temperature drops to 40°F or less. Follow manufacturer's cold application guidelines strictly when installing cap sheet in temperatures between 40° and 70°F.
 7. Apply loose white granules into the fluid asphalt extrusions before it has time to cool.

3.05 FLASHING INSTALLATION

- A. Preparation: Inspect walls, curb heights, counter flashings, etc. and check for conformance with minimum base flashing height of 8". Bring non-conforming areas to attention of Architect for correction.
- B. Primer: Prime all masonry and metal surfaces from top of roof membrane to termination of flashing level with asphalt primer at rate of 1 gallon per 100 square feet or as recommended by manufacturer. Allow primer to dry thoroughly.
- C. Masonry walls: JM Specification CR-1 (LB)
 - 1. Extend roofing membrane to top of cant strip. Mop the masonry wall and the surface of the felts on the cant with Type IV asphalt.
 - 2. Immediately place backer felt, DynaLastic 180 S, into the hot asphalt, bottom edge terminate at base of cant.
 - 3. Mop the wall, above backer felt, surface of backer felt and out onto the roof membrane minimum of 4"
 - 4. Lay into place GlasKap CR in the asphalt over the backer felt on wall and out onto the membrane.
 - 5. Mechanically fasten GlasKap 6"o.c. along top edge. Fasteners with 1" min. diameter integral cap or driven through 1" min. diameter rigid metal discs.
 - 6. Metal counter flashing installed over top edge of wall flashing.
- D. Wood surfaced parapet walls: JM Specification CR-3 (WH)
 - 1. Extend roofing membrane to top of cant strip.
 - 2. Install JM Base Sheet on wall not less than 8" nor more than 24", terminate at base of cant. Nail 9"o.c. both ways.
 - 3. Mop surface of Base Sheet from the top edge and out onto the membrane 4" minimum with hot Type III or IV asphalt. Place DynaLastic 180 S over the Base Sheet on wall and out onto roof membrane 4" minimum.
 - 4. Place Base Sheet on wall, overlap 4" minimum of DynaLastic 180 S. Extend over top of parapet to within 2" of front edge. Nail 9"o.c. both ways.
 - 5. Apply 2nd layer of wall flashing, GlasKap CR over Base Sheet and extend over top of parapet wall past the edge of the Base Sheet.
 - 6. At walls over 24" high, set GlasKap CR in MBR Utility Cement.
- E. Metal flanges (metal edges, vents, etc.): Prime both sides of the flange with JM Metal Primer. Set on top of roofing felts into a bed of MBR Utility Cement. Cover flange with a layer of DynaLastic 180 S set in MBR Utility Cement. Follow with GlasKap CR. At vent flashing, roll the top edge of the lead boot down into the pipe a minimum of 1". Minimum weight of lead sheet, 2.5 lbs. per square foot. Refer to JM Flashing Specification/Detail CR-9.

3.06 PROTECTION OF PROPERTY

- A. Protective coverings:
 - 1. Install protective coverings at paving and building walls adjacent to hoist and kettles prior to starting work.
 - 2. Secure coverings against wind and vent to prevent collection of moisture on covered surfaces.
 - 3. Keep coverings in place for duration of roofing work.
- B. Special protection: Provide approved special protection and avoid heavy traffic on completed work.

- C. Dripping of bitumen: Seal joints in and at edges of deck as necessary to prevent dripping of bitumen into building or down exterior walls.
- D. Damaged work and materials: Restore work and materials damaged during handling of bitumen and installation of roofing materials to original condition or replace with new materials.

3.07 INSPECTION

- A. Make a final inspection after job completion with the principal material manufacturer's representative, Contractor and Architect.

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SECTION 07620 – SHEET METAL WORK**1.00 - GENERAL**

1.01 DESCRIPTION

- A. Work included: Furnish and install all sheet metal work as shown on drawings and/or specified herein.
- B. Related work:
 - 1. Pipe rainwater leaders – Section 05500
 - 2. Membrane roofing - Section 07500
 - 3. Sheet metal roofing – Section 07610
 - 4. Door louvers – Section 08100
 - 5. Painting – Section 09900
 - 6. Plumbing, roof drains – Section 15401

1.02 STANDARDS

- A. Materials, methods and workmanship: As shown in “Architectural Sheet Metal Manual,” Fourth Edition, 1987 of Sheet Metal and Air Conditioning Contractors National Association, Inc., (SMACNA) unless noted or detailed otherwise.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle: Materials in manner to protect them from corrosion, deformation and other types of damage.
- B. Damaged items: Remove from site and replace at no cost to Owner.

2.00 - PRODUCTS

2.01 MATERIALS

- A. Galvanized sheet steel: Standard galvanized iron, 24 gage, unless noted otherwise.
- B. Solder: Grade A, 95-5 conform to ASTM B32. No reworked or remelted solder permitted.
- C. Nails, rivets, screws and fasteners: Hot-dipped galvanized or stainless steel. Hot-dipped galvanized nails for galv. steel. Where sheet metal is built-in over roofing materials or other sheet metal, use nails with 1” tinned discs or neoprene washers. Rivets, tinned soft iron rivets.
- D. Cement: Bituminous plastic, Fed. Spec, SS-C-153.
- E. Flux: Approved brand of soldering flux for galvanized steel.
- F. Mastic: Alcoa alumilastic compound.
- G. Sealant: Sikaflex-1a (Sika Corp.) 1-part polyurethane-base, non-sag elastometric sealant comply with Fed. Spec. TT-S-00230C, Type II Class A.
- H. Lead flashing: 4 lb. sheet of common desilverized pig lead.

- I. Gutters: Fabricate to size and shape shown.
- J. Rainwater leaders: Round, 2" diameter with 1 1/2" wide straps to structure at Kennel and Cabana. Round, 2" or 3" diameter to match existing at main building. Pipe to wall mounted steel pipe rainwater leaders provide under Section 05500.

2.02 FABRICATION

- A. General: Fabricate sheet metal flashing and materials to shapes and sizes detailed, allowing sufficient material for up-standing leg. Surfaces free from waves and/or buckles, with lines, arises, and angles sharp and true, and formed in accordance with detailed drawings. No raw, exposed edges permitted.
- B. Standards: Fabricate sheet metal materials in accordance with "Architectural Sheet Metal Manual."

3.00 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Substrates and structure: Prior to installation, inspect all existing conditions to which sheet metal work is applied or installed. Report to Contractor, with copy to Architect, any condition which may prove detrimental to this work.
- B. Commencement of work: Construed as acceptance of building conditions and structure.

3.02 FIELD MEASUREMENTS

- A. Dimensions: Verify by taking field measurements; proper fit and attachments of all parts is required.

3.03 COORDINATION

- A. Coordination: Coordinate work and cooperate with any other Trades whose work relates to sheet metal.

3.04 INSTALLATION

- A. Workmanship: Conform to quality, procedures and methods recommended in "Architectural Sheet Metal Manual." Sheet metal work accurately formed, fitting snugly, exposed edges folded under at least 1/2" and no sharp corners left exposed. Properly shield material against galvanic action with asphalt base paint or an equivalent. Securely fasten metal and make watertight.
- B. Installation: Attach sheet metal to surfaces which are even, smooth, sound, thoroughly dry and clean, free of all defects which might affect its application. Any materials furnished hereunder, and to be built into the work by others, shall be in condition for proper installation. Do all cutting, fittings, drilling or other operations in sheet metal, required to accommodate the work of other trades. Provide any items essential to complete the sheet metal installation, even though not specifically shown or specified. Such items of the same kind, quality and type as similar items utilized elsewhere in building. Apply all sealant and butyl tape in accordance with manufacturer's instructions.
- C. Soldering: Clean all surfaces before soldering. Perform soldering slowly with heated tools as to thoroughly heat the sheet and completely sweat the solder through the full width of

seam. Lock seam work flat and true to line and be sweated full of solder. Flat lock seams and lap seams, where soldered, shall be at least 1/2" and made in direction of drainage flow. Lap seams, not soldered, lap according to the pitch but in no case less than 3". Thoroughly wash all acid flux work after soldering.

- D. Nails, rivets, screws: In general, space not more than 8" apart, unless noted otherwise and where exposed to weather use lead or neoprene washers.
- E. Joining parts: With concealed rivets or sheet metal screws where necessary for strength or stiffness. Place sheets together before drilling. Where lap joints are used, lap sheets at least 3".
- F. Cleaning: Clean surfaces which will be concealed after installation, removing grease and oil with solvent or gasoline and wiping with clean rags.
- G. Fabrication: Detailed items as shown, calk joints with appropriate metal calking compound and make watertight.
- H. Flashing: All junctions between vertical and horizontal surface to provide watertight installation.
- I. Gravel stops and metal edging: Install cooperation of roofing subcontractor in Roofing Cement on top of built-up roofing piles. Nail to deck through flanges, 3" o.c., 2 barbed shank 1" long nails, staggered, through end laps.
- J. Gutters and rainwater leaders: At locations shown. Secure rainwater leaders to building with straps, top and bottom minimum.
- K. Plumbing vents: Flash with sheet lead.

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SECTION 07720 – ROOF ACCESSORIES**1.00 - GENERAL**

1.01 DESCRIPTION

- A. Work Included:
 - 1. Solatube
- B. Related Work:
 - 1. Rough Carpentry – Section 06100
 - 2. Membrane Roofing - Section 07500
 - 3. Gypsum Drywall - Section 09250
 - 4. Acoustical Treatment – Section 09500
 - 5. Painting – Section 09900
 - 6. Electrical – Section 16050

1.02 SUBMITTALS

- A. Shop Drawings: Prior to fabrication, submit shop drawings of all items specified, showing sizes of all members, methods of construction and mounting techniques. Showing fabrication and installation of each product. Detail of fastening and anchorage to adjoining work.

1.03 MEASUREMENTS

- A. Dimensions: Verify all dimensions by taking field measurements; proper fit and attachment of all items is required.

1.04 PRODUCT HANDLING

- A. Delivery: Deliver manufacturer's materials in original packaging bearing manufacturer's name and brand.
- B. Storage: Store materials in a dry protected area. Protect from damage. Remove any damaged item from site. Replace at no cost to Owner.

2.00 - PRODUCTS

2.01 DAYLIGHTING SYSTEM

- A. SolaMaster Series: Solatube 750 DS. Closed Ceiling, 14".
 - 1. Closed Ceiling Diffuser: Prismatic Diffuser.
 - 2. Dome: Acrylic Outer Dome + Acrylic Inner Dome.
 - 3. Flashings: Curb Mounted Cap.
 - 4. Dimmer: Daylight Dimmer, variable butterfly baffle to control light output. Power supply 110v.
 - 5. Dimmer Switch: Double-Pole Double-Throw switch, wall plate and cable. Multiple Daylight Dimmers controlled by one switch as shown.
 - 6. Extension Tubes: Spectralight Infinity Tubes with extensions as required to run from top of flashing to bottom of ceiling plane.

- 7. Transition Box: Ceiling mounted box transitioning from round to square ceiling assembly, 2ft x 2 ft.
- 8. Protection Band at Roof: Dome Edge Protection Band for Class A fire roof rating.

3.00 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Substrates and structure: Prior to installation, inspect all existing conditions to which specified products are applied or installed. Report to Contractor, with copy to Architect, any condition which may prove detrimental to this work.
- B. Commencement of work: Construed as acceptance of building conditions and structure.

3.02 FIELD MEASUREMENTS

- A. Dimensions: Verify by taking field measurements; proper fit and attachments of all parts is required.

3.03 COORDINATION

- A. Coordination: Coordinate work and cooperate with other Trades whose work relates to work in this Section.

3.04 INSTALLATION

- A. Workmanship: Conform to quality, procedures and methods recommended by manufacturer. Securely fasten items to structure and make watertight.
- B. Solatube: Install on wood curb constructed under Rough Carpentry.

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SECTION 07900 – JOINT SEALERS**1.00 - GENERAL**

1.01 DESCRIPTION

- A. Work included: Furnish and install all caulking and sealing work as shown and/or specified herein.
- B. Related work:
 - 1. Concrete – Section 03300
 - 2. Hollow Metal Doors and Frames – Section 08100
 - 3. Aluminum Windows – Section 08520

1.02 QUALITY ASSURANCE

- A. Use only qualified workmen skilled and trained in the techniques of caulking, who can demonstrate to satisfaction of Architect their ability to fill joints solidly and neatly.
- B. Preconstruction compatibility and adhesion testing: Submit to joint sealant manufacturer's samples of materials that will contact or affect joint sealants for compatibility and adhesion testing.
 - 1. Use test methods standard with manufacturer to determine if priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

1.03 SUBMITTALS

- A. Samples: Submit sample of each material specified together with 4 copies of manufacturer's specifications or directions for approval before work is commenced.

1.04 GUARANTEE

- A. Sealant: Provide a manufacturer's written warranty, signed by the Contractor, covering materials and workmanship for a period of ten (10) years from the date of completion of the work. Repair or, where appropriate, as a matter of sound and prudent practice, replace defective materials and workmanship, including without limitation, failure of watertightness, adhesion, cohesion, migration, flow, staining or other general forms of deterioration, at the Contractor's expense.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Deliver materials in the manufacturer's unopened containers bearing the manufacturer's mixing directions. Containers must be clearly marked with manufacturer's name, brand, type, color grade and packaging date.
- B. Storage: Store in accordance with manufacturer's instructions. Do not use sealant materials that have been stored for a period of time exceeding the maximum recommended shelf life of the materials.

1.06 JOB CONDITIONS

- A. Joint substrate conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.
- B. Weather: Do not proceed with installation of sealants under adverse weather conditions, or when temperatures are above or below the manufacturer's recommended temperature range for installation. Proceed with the work only when forecasted weather conditions are favorable for proper cure and development of highly early bond strength.

2.00 - PRODUCTS

2.01 MATERIALS

- A. Sealant at metal doors and windows and masonry, plaster or other dissimilar materials: Sikaflex-1a (Sika Corp.) premium-grade, high performance, moisture cured, 1-component, polyurethane base, non-sag elastomeric sealant. Meet Federal Specification TT-S-00230C, Type II, Class A. Meet ASTM C920, Type S, Grade NS, Class 25, use T, NT, O, M, G, I. Colors as selected.
- B. Sealant at concrete flatwork expansion joints: Sikaflex-2c NS, Traffic Grade.
- C. Primer: Sikaflex Primer 429, as recommended by manufacturer.
- D. Back-up material: Foamed polyethylene or polystyrene rod stock, sizes as required by joint condition.

3.00 - EXECUTION

3.01 CONDITION OF SURFACES

- A. Examine subsurfaces to receive work. Report in writing to Contractor, with a copy to Architect, any conditions which may prove detrimental to work of this Section.
- B. Commencement of work will be construed as acceptance of all subsurfaces and conditions.

3.02 JOINT SEALANTS INSTALLATION

- A. Clean all joints of contaminants and impurities to the depth at which silicone building sealant and backer rod are to be installed. May be accomplished by abrading with a wire brush (power or hand), grinding, saw cutting, or solvent cleaning.
- B. Blow out dust, loose particles and other debris with oil-free compressed air; 90 psi air pressure recommended; no moisture or oil allowed in air. Occasionally a second pass with a wire brush and air blast is needed to ensure the joint is clean. Loose pieces of sealant or backer rod that have become lodged in the joint should also be removed.
- C. After cleaning, the joints must be thoroughly dry, dust free and frost free before resealing.
- D. Mask joint edges if possible to facilitate application and clean-up.
- E. Apply primer to cleaned surfaces before installing silicone building sealant.
- F. Install back-up material in joints to proper design depth.
- G. Apply sealant in a continuous operation to properly fill and seal joint width.

- H. Using a blunt instrument, dry tool the joint so it is slightly concave, tooling as soon as possible after sealant application. Remove masking as necessary.
- I. Seal a test joint and check adhesion after curing 7 to 21 days.

3.03 QUALITY ASSURANCE

- A. Field Adhesion Hand Pull Test: As a check for adhesion, a hand pull test is required at all substrates after the sealant is fully cured (7 to 21 days).
 - 1. Make a knife cut horizontally from one side of the joint to the other.
 - 2. Make 2 vertical cuts (from the horizontal cut) approximately 3" long, at both sides of the joint.
 - 3. Place a 1" mark on the sealant tab.
 - 4. Grasp the 2" piece of sealant firmly just beyond the 1" mark and pull at a 90° angle.
 - 5. If dissimilar substrates are being sealed, check the adhesion of sealant to each substrate separately. This is accomplished by extending the vertical cut along one side of the joint, checking adhesion to the opposite side, and then repeating for the other surface.
 - 6. Pass/fail criteria for sealant is to pull tab 3.0" (300% extension) without bond loss. If the sealant does not pass according to the guidelines provided, consult distributor representative.
 - 7. Inspect the joint for complete fill. Joint should not have voids.
 - 8. Record test results in a field adhesion test log. Log will need to be retained as part of warranty procedure.
- B. Repair of Sealant in Adhesion Test Area: Repair sealant pulled from test area by applying new sealant to test area. Assuming good adhesion was obtained, use same application sealing procedure as was originally used to repair the areas. Take care to ensure that original sealant surfaces are clean and that new sealant is in contact with original sealant.

3.04 CLEAN UP

- A. Clean all surfaces adjacent to the joints where sealant was applied so that no excess sealant or other visible signs of sealant work remain. Clean surfaces as work progresses, before sealant begins to cure. All cleaning methods and acceptable procedures are subject to approval of Architect.

3.05 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of completion.

SECTION 08100 - HOLLOW METAL DOORS AND FRAMES**1.00 GENERAL**

1.01 DESCRIPTION

- A. Work included: Furnish and install all steel hollow metal doors and frames.
- B. Related work specified elsewhere
 - 1. Wood Doors – Section 08200
 - 2. Finish Hardware - Section 08700
 - 3. Painting - Section 09900

1.02 SUBMITTALS

- A. Shop drawings: For fabrication and installation of steel door and frames. Provide schedule of door and frames using same reference numbers for details and openings as those on drawings.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle: In manner to prevent damage and deterioration.
- B. Packaging: Provide cardboard or other containers, separators, banding and paper wrappings to protect hollow metal items.
- C. Special storage and handling: As required by manufacturer.

1.03 LABEL SERVICE

- A. Labeled doors and frames: Conform to requirements of Underwriters Laboratories (UL) and carry their labels of approval and inspection.

2.00 PRODUCTS

2.01 HOLLOW METAL FRAMES

- A. Manufacturers: Ceco, Steelcraft or Timely.
- B. Standard door frames: 16 gage cold rolled, electro-galvanized steel for 1-3/4" doors. Mortised and reinforced for heavy gage steel reinforcements for hinges and lock strikes. Corners mitered, fitted, welded and ground smooth. Rubber mutes shipped attached to lock jamb, 3 per frame.
- C. Label frames: Underwriters labeled frames for openings (Class A, B, C, D, E or F), of the construction and design as required to comply with code, having specific UL approval according to current procedures.
- D. Jamb anchors: Furnish jamb anchors as required to secure frames to adjacent construction, formed of not less than 18-gage galvanized steel.
- E. Floor anchors: Provide floor anchors for each jamb, formed of not less than 14-gage galvanized steel sheet.

- F. Spreader bars: Provide removable spreader bar across bottom of frames, tack welded to jambs and mullions.

2.02 HOLLOW METAL DOORS

- A. Doors: Standard flush, 1 3/4" thick doors, steel doors, face sheets, 18 gage cold rolled leveled sheet steel, sound deadening on inner surfaces of face sheets.
- B. Louvers: Steel frames, steel louvers, 45° angle blades, thickness to match door. Anemostst SRDL.

2.03 HARDWARE PREPARATION FOR DOORS AND FRAMES

- A. Doors and frames: 1 3/4" doors, prepare to receive 1 1/2 pair, 4 1/2 x 4 1/2 full mortise standard weight template hinges, closer and locksets with 2 3/4" backset. Refer to Finish Hardware Section 08700.

2.04 SHOP FINISH

- A. Doors: Chemically washed, rinsed, and dried prior to receiving 1 coat of metal primer.
- B. Frames: Bonderized and receive 1 shop coat of baked-on metal primer.
- C. Finish: Finish on all doors capable of passing a 200-hour salt spray test and a 200-hour humidity test as certified by an independent testing laboratory and in accordance with Fed. Standard 141, Methods 6061 an 6201.

3.00 EXECUTION

3.01 INSTALLATION OF HOLLOW METAL FRAMES

- A. Setting of frames: Exercise care in setting to maintain scheduled dimensions, hold head level and maintain jambs plumb and square.
- B. Anchorages and connections: Secure to adjacent construction.
- C. Door frame spreader bars: Leave intact until frames are set square and plumb and anchors securely attached.

3.02 INSTALLATION OF DOORS

- A. Installation: Install hollow metal doors in frames, apply hardware in accordance with manufacturer's templates and instructions.
- B. Installation: Install wood doors in frames, apply hardware in accordance with manufacturer's templates and instructions
- C. Operable parts: Adjust for correct function.

3.03 PRIME COAT TOUCH-UP

- A. Damaged prime coat: Sand smooth and touch-up with same primer as applied at shop.

SECTION 08200 - WOOD DOORS**1.00 - GENERAL**

1.01 DESCRIPTION

- A. Work included:
 - 1. Fire rated and non- rated flush wood doors in hollow metal frames.
- B. Related work specified elsewhere:
 - 1. Hollow Metal Frames – Section 08200
 - 2. Finish hardware - Section 08700
 - 3. Glass and Glazing – Section 08800
 - 4. Painting - Section 09900

1.02 QUALITY ASSURANCE

- A. Quality Standards: Comply with the following standards:
 - 1. Flush Wood Doors: WDMA Quality Standard: I.S.I “Industry Standard for Wood Flush Doors”, of Window & Door Manufacturers Association (WDMA).
- B. Manufacturer: Obtain doors from a single manufacturer.
- C. Compliance: Provide WI-Certified Compliance Certificate indicating that doors meet requirements of grade specified.

1.03 REGULATORY REQUIREMENTS

- A. Fire-rated doors: NFPA 80

1.04 SHOP DRAWINGS AND SUBMITTALS

- A. Shop drawings: Submit to Architect for review and approval prior to fabrication.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Protect doors during transit, storage and handling to prevent damage, soiling and deterioration.
- B. Comply with manufacturer’s instructions.

1.06 PROJECT CONDITIONS

- A. Conditioning: Do not deliver or install doors until conditions for temperature and relative humidity have been stabilized and will be maintained in storage and installation areas during remainder of construction period to comply with the requirements applicable to project’s geographical location.

1.07 WARRANTY

- A. General: Warranties shall be in addition to, and not a limitation of, other rights the Owner may have under the Contract Documents.

- B. Door Manufacturer's Warranty: Submit written agreement on door manufacturer's standard form signed by Manufacturer, Installer and Contractor, agreeing to repair or replace defective doors that have warped (bow, cup or twist) or that show telegraphing of core construction in face veneers, or do not conform to tolerance limitations of referenced quality standards.
- C. Warranty shall be in effect during following period of time after date of completion.
 - 1. Solid Core Doors: Life of installation
- D. Contractor's Responsibilities: Replace or refinish doors where Contractor's work contributed to rejection or to voiding of manufacturer's warranty.

2.00 - PRODUCTS

2.01 MANUFACTURERS

- A. Flush wood: Marshfield Door Systems, Inc
- B. Cutouts for lights: Seal with 2 coats of exterior sealer
- C. Panic device: At pairs of doors, drill for concealed vertical rod
- D. Workmanship: First class, sand door smoothly, free from cross-sanding, sand-through and burnishing, ready for finisher

2.03 FLUSH WOOD SOLID CORE DOORS - INTERIOR

- A. Doors: Marshfield, Durable Door, 5-ply Particleboard Core Doors (DPC-I).
- B. Thickness: 1-3/4", refer to schedule.
- C. Faces: Wood veneer for paint finish.
- D. Crossbands: Engineered fiber.
- E. Stiles: 1 3/8" Laminated Strand Lumber (LSL) with veneer band to match face.
- F. Rails: 1 1/8", mill option.
- G. Face Assembly Adhesive: Type I (waterproof).
- H. Core Assembly Adhesive: Type II (water resistant).
- I. Core: Particleboard, comply with ANSI A 208.1-LD-2
- J. Vision Light: Metal vision frame.

2.04 FLUSH WOOD FIRE RATED DOORS

- A. Doors: Marshfield, Durable Door, 5-ply Particleboard Core Doors, 20, 45 and 90 minute fire rated, DFP 20, DFP 45, DFP 90 Underwriters Label.
- B. Thickness: 1 3/4"
- C. Faces: Wood veneer for paint finish.

- D. Crossbands: Engineered fiber.
- E. Stiles: 1 3/8", LSL
- F. Rails: 1 1/8", mill option.
- G. Face assembly adhesive: Type 1 (waterproof).
- H. Core assembly adhesive: Type II (water resistant).
- I. Core: Asbestos-free incombustible mineral.
- J. Vision light: Metal frame for 1/4" glass, 100 sq.in. max.

3.00 - EXECUTION

3.01 EXAMINATION

- A. Examine installed door frames prior to hanging door:
 - 1. Verify that frames comply with indicated requirements for type, size, location and swing characteristics and have been installed with plumb jambs and level heads.
 - 2. Reject doors with defects.
- B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Manufacturer's Instructions: Install wood doors to comply with manufacturer's instructions, referenced AWI standard and as indicated.
- B. Fire rated doors: Install in fire rated frames, same as door, in accordance with NFPA 80.
- C. Job-fit doors: Align and fit doors in frames with uniform clearances and bevels as indicated below. Machine doors for hardware. Seal cut surfaces after fitting and machining.
 - 1. Fitting Clearances for Non-Rated Doors: Provide 1/8" at jambs and heads; 1/8" per leaf at meeting stiles for pairs of doors; and 1/8" from bottom of door to top of floor finish. Where threshold is scheduled, provide 1/4" clearance from bottom of door to top of threshold.
 - 2. Bevel non-rated doors: 1/8" in 2" at lock and hinge edges.
 - 3. Trim fire rated doors: Trim fire door height at bottom edge only, in accordance fire rating requirements.
- D. Field-finished doors: Refer to Section 09900 - Painting.

3.03 ADJUSTING AND PROTECTION

- A. Operation: Rehang or replace doors which do not swing or operate freely.
- B. Finished Doors: Refinish or replace doors damaged during installation.

- C. Protection: Protect doors as recommended by manufacturer to ensure that doors will be without damage or deterioration at time of completion.

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SECTION 08330 – ROLLING COUNTER DOORS**1.00 - GENERAL**

1.01 DESCRIPTION

- A. Work included:
 - 1. Manual and motor operated, fire rated rolling counter doors with integral frame built-in type.
- B. Related work specified elsewhere:
 - 1. Cast- In-Place Concrete – Section 03300
 - 2. Concrete Masonry – Section 04200
 - 3. Rough Carpentry – Section 06100
 - 4. Gypsum Drywall – Section 09250

1.02 QUALITY ASSURANCE

- A. Manufacturer: ISO 900:2000 registered and a minimum of 5 years experience producing counter doors with integral frame assembly of type specified.
- B. Installer: Manufacturer's approval.

1.03 SUBMITTALS

- A. Submit in accordance with Section 01300 Submittals:
 - 1. Products Data.
 - 2. Shop Drawings: Include special conditions not detailed in Product Data. Show interface with adjacent work.
 - 3. Quality Assurance:
 - a. Proof of ISO 9001:2000 registration.
 - b. Proof of manufacturer and installer qualification.
 - c. Manufacturer's installation instructions.
 - 4. Closeout documents:
 - a. Operations and Maintenance Manual.
 - b. Certificate stating that installed materials comply with specifications.
 - c. Warranty.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Delivery, storage and handling: Protect counter door to prevent soiling and damage.
- B. Manufacturer: Follow manufacturer's instructions.

1.05 WARRANTY

- A. Warranty: Against defects in materials and workmanship for a period of 2 years from date of completion.

- B. Maintenance: Submit for Owner's consideration and acceptance of a maintenance agreement for installed product.

2.00 - PRODUCTS

2.01 ROLLING COUNTER DOOR

- A. Manufacturer: Alpine Overhead Doors Inc., UL ISO 9001:2000 registered.
- B. Models: as detailed on drawings

2.02 MATERIALS

- A. Curtain:
 1. Slats: No. 1F, interlocked flat-faced slats, 1-1/2" high by 1/2" deep, 22 gage, AISI type 304 series stainless steel with stainless steel angle bottom bar with lift handles and vinyl astragal.
 2. Fabrication: Interlocking slat sections with high strength molded nylon end locks riveted to ends of alternate slats.
 3. Slat finish: Stainless steel No. 4 finish.
 4. Bottom bar finish: Stainless steel No. 4 finish.
- B. Head and Jamb Frame: Integral welded with guide groove incorporated into jamb design to fit wall thickness.
 1. Frame: Stainless steel 16 gage AISI 300 series formed shape. No. 4 finish.
- C. Countertop: Integral 14 gage AISI 300 series stainless steel formed shape, No. 4 finish.
- D. Countertop Shaft Assembly:
 1. Barrel: Steel pipe capable of supporting curtain load with maximum deflection of 0.03" per foot of width.
 2. Spring Balance: Oil-tempered, heat-treated steel helical torsion spring assembly designed for proper balance of door to ensure that maximum effort to operate will not exceed 25 lbs. provide wheel for applying and adjusting spring torque.
- E. Brackets: Fabricate from reinforced AISI 300 series stainless steel plate with bearings at rotating support points to support counterbalance shaft assembly and form end closures for hood.
 1. Finish: Stainless steel No. 4 finish.

2.03 ACCESSORIES

- A. Locking: Lockable slide bolt on coil side of bottom bar at each jamb extending into slots in guides.

2.04 FABRICATION

- A. Fabricate: Factory weld head, jamb and countertop into single unit, fully assembled, ready for installation.

2.05 OPERATION

- A. Manual push-up: Provide lift handles on bottom bar and pole with hook.

3.00 - EXECUTION

3.01 EXAMINATION

- A. Substrates: Examine substrates upon which work will be installed and verify conditions are in accordance with approved shop drawings.
- B. Corrective work: Coordinate with Contractor to perform corrective work on unsatisfactory substrate.
- C. Commencement of work by installer: Acceptance of substrate.

3.02 INSTALLATION

- A. General: Install door unit and operating equipment with necessary hardware, anchors, inserts, hangers and support.
- B. Follow manufacturer's installation instructions.

3.03 ADJUSTING

- A. Follow in completion of installation, including related work by others, lubricate, test and adjust doors for ease of operation, free from warp, twist or distortion.

3.04 CLEANING

- A. Clean surfaces soiled by work as recommended by manufacturer.
- B. Remove surplus material and debris from site.

3.05 DEMONSTRATION

- A. Demonstrate proper operation to Owner.
- B. Instruct Owner in maintenance procedures.

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SECTION 08520 – ALUMINUM WINDOWS**1.00 - GENERAL**

1.01 DESCRIPTION

- A. Work included:
 - 1. Aluminum windows
 - 2. Glass and glazing for windows
 - 3. Window hardware and accessories
- B. Related work specified elsewhere:
 - 1. Aluminum Entrances and Storefronts – Section 08460

1.02 REFERENCES

- A. American Architectural Manufacturers Association (AAMA).
- B. American Society of Test Materials (ASTM).
- C. Aluminum Association (AA).
- D. California Association of Window Manufacturers (CAWM).

1.03 SYSTEM DESCRIPTION

- A. General: In addition to requirements shown or specified comply with:
 - 1. Applicable provisions of AAMA Windows and Sliding Glass Doors Manual for design, materials, fabrication and installation of component parts.
- B. Design requirements: Arcadia 200 Series AP-HC70 (non-thermal) Heavy Commercial Awning and Hopper Windows 2" depth. Hinged compression sealed aluminum windows. Suitable for inside or outside glazing.
- C. Performance requirements: Each assembly tested by a recognized testing laboratory/agency in accordance with specified test methods.
 - 1. Conformance to AP-HC70 specifications in AAMA/NWWDA 101/I.S. 2/97.
 - a. Air infiltration: Accordance with ASTM E 283 at a static air pressure difference of 6.24psf. Air infiltration shall not exceed .30 cfm per sq. ft.
 - b. Water resistance: Accordance with ASTM E 331/ASTM E547 at a static air pressure difference of 10.5 psf. No water leakage.
 - c. Uniform load structural: Operable when tested per ASTM E 330 at a static air pressure difference of 105 psf.
 - d. Component testing: Accordance with procedures in AAMA/NWWDA 101/I.S. 2-97.
 - e. Forced entry resistance: Conform to CAWM 301-90.

- f. Thermal movements: Allow thermal movement resulting from the following maximum change in ambient temperature. 120°F, ambient; 180°F material surfaces.

1.04 QUALITY ASSURANCE

- A. Provide test reports from AAMA accredited laboratories certifying the performances as specified in 1.03.

1.05 SUBMITTALS

- A. Product data: Submit manufacturer's product specifications, technical support data, installation and maintenance recommendations and standard details for each type of unit required.
- B. Shop drawings: Prior to fabrication, submit shop drawings for:
 - 1. Each type of window specified, submit standard assembly and details.
- C. Color samples: Samples of Kynar finish.
- D. Certification: Provide certification by a recognized, independent testing laboratory certifying that each type of window complies with performance requirements indicated.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Protection: Comply with manufacturer's instructions for protection of units from damage in delivery, storage and handling.

1.07 WARRANTY

- A. Warranty: Provide manufacturer's standard limited warranty for materials and workmanship.
 - 1. Aluminum Window Warranty Period: 1 year.
 - 2. Standard Insulating Glass Warranty Period: 5 years.

2.00 PRODUCTS

2.01 WINDOWS

- A. Series 6000 outside glazed thermal break aluminum windows with 2-1/2 inch frame depth; thermal strut
- B. Outside Glazed Windows: Series 6000 as manufactured by All Weather Architectural Aluminum Inc.
 - 1. Window Type: Casement windows.
 - a. Compliance: C-AW100.
 - 2. Frame Material: Extruded aluminum, alloy 6063-T6.
 - 3. Offset Thermal Strut: Standard, 20 mm thickness.
 - 4. Corners of Frame and Ventilators: Mitered and crimped; muntin and intermediate bars attached to cross joints and abutting sash sections.
 - 5. Glazing: Insulated glazed units, 1 inch (25.4 mm) overall thickness.

6. Weatherstripping: Two rows of santoprene, 64A durometer black bulb insert inserted in extruded slot at perimeter of vent and opening; replaceable in field.
7. Hardware: Standard, 4-bar heavy duty stainless steel hinges, white bronze hardware.
8. Hardware: Standard hardware with multipoint locking mechanism and snubbers.
9. Screens: Painted roll formed aluminum frames to match window frame; installed and removable from inside. Frames factory-drilled/tapped to receive screen attachment hardware.
 - a. Screen Mesh: Standard, charcoal fiberglass mesh.

C. Requests for substitutions will be considered in accordance with provisions of Section 01000

2.02 GLASS AND GLAZING

- A. Glass: Insulating, dual glazed glass, butyl sealed. Comply with ASTM E 774 Class A rating. PPG Solar Ban 60 Low-E, tempered safety glass at all windows, bronze tinted.
 1. Thickness: Series 6000 Casement, 15/16".
- B. Glazing: Factory glaze, except where field glazing is required due to window dimensions.

2.03 FINISH

- A. Single Color Frames:
 1. Finish: 70 percent Kynar paint, Color to be selected from manufacturer's standard and/or custom color palette.
- B. Dual Color Frames:
 1. Inner Frame Color:
 - a. Finish: 70 percent Kynar paint, Color to be selected from manufacturer's standard and/or custom color palette.
 2. Outer Frame Color:
 - a. Finish: 70 percent Kynar paint, Color to be selected from manufacturer's standard and/or custom color palette.

2.04 WEATHER PROTECTION

- A. Sealant: Sikaflex-1a (Sika Corp.).

3.00 EXECUTION

3.01 EXAMINATION

- A. Wall openings and adjoining materials: Verify that they are acceptable for window installation.

3.02 INSTALLATION

- A. Manufacturers instructions: Install windows and control system in accordance with approved shop drawings and manufacturer's installation instructions.
- B. Window control system: Install concealed in masonry walls in Gym for operation of high windows as shown. Finish all surfaces after systems have been installed.
- C. Sealant: Apply at perimeter of windows for weathertight installation. Apply back up material as required. Apply primer to joints in accordance with manufacturer's recommendations.

3.03 FIELD QUALITY CONTROL

- A. Adjustments: Make all necessary final adjustments to attain normal operation of each window and its mechanical hardware and control system.

3.04 CLEANING

- A. Glass surfaces: Clean exterior and interior surfaces after installation. Take care to avoid damage to protective coatings and finishes.
- B. Aluminum: Clean all surfaces.
- C. Petroleum distillants: Do not use to clean windows.

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SECTION 08700 - FINISH HARDWARE**1.00 - GENERAL**

1.01 DESCRIPTION

- A. Work included: Furnish and install all materials and services required for a complete installation of finish hardware for doors as shown on drawings and specified herein.
- B. Related work:
 - 1. Metal Gates – Section 02830
 - 2. Hollow Metal Doors and Frames – Section 08100
 - 3. Wood Doors - Section 08200

3.2 SUBMITTALS

- A. Schedule: Prior to placing factory order, submit a hardware schedule for approval. List equivalent numbers or those specified, for all items. Approval of hardware schedule does not relieve Contractor of responsibility for furnishing all necessary hardware.
- B. Samples: Submit samples for approval, of all hardware items proposed as a substitution to those specified.
- C. Catalogs: Submit along with the samples, applicable catalogs for all hardware items proposed as a substitution to those specified.

1.03 DELIVERY AND STORAGE

- A. Delivery: Deliver hardware to the site with each unit wrapped carefully, packed neatly and plainly labeled for the openings to which they apply together with the proper item number in the hardware schedule.
- B. Storage: Store all materials in dry, protected areas.

3.2 COORDINATION

- A. Coordinate hardware with other work in respect to both fabrication and installation.
- B. Furnish templates for doors, frames, and other work specified to be factory prepared for the installation of hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

1.05 QUALITY ASSURANCE

- A. Single source responsibility: Obtain each type of hardware (latch and locksets, hinges, closers, etc.) from a single manufacturer.

2.00 - PRODUCTS

2.01 MANUFACTURERS

- A. Unless otherwise specified, the numbers listed in the hardware groups are taken from the catalogues of the following manufacturer's, listed first, acceptable substitutions are listed thereafter.

Butts and Hinges	McKinney, Stanley, Hager
Closers	LCN, Norton
Locksets	Schlage
Exit Devices	Von Duprin
Door Holders/Stops	Trimco
Thresholds	Pemko
Others	As specified

- B. Architectural hardware of equivalent size, type, finish and function to that specified, will be accepted by Architect as equal to the respective items specified provided the manufacturer, design and function is approved by Architect.

2.02 MATERIALS AND FABRICATION

- A. Base metals: Produce hardware units of basic metal and forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness, but in no case of lesser (commercially recognized) quality than specified for applicable hardware units by applicable (ANSI/BHMA A156 series standards for each type of hardware item and with ANSI/BHMA A156.18 for finish designations indicated. Do not furnish "optional" materials or forming methods for those indicated, except as otherwise specified.
- B. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware that has been prepared for self-tapping sheet metal screws, except as specifically indicated.
- C. Screws: Furnish for installation with each hardware item, Phillips flat-head screws except as otherwise indicated. Finish exposed screws to match hardware finish or, if exposed in surfaces of other work, to match finish of this other work as closely as possible including "prepared for paint" surfaces to receive painted finish.

2.03 FINISHES

- A. 626 Satin Chrome

2.04 KEYS AND KEYING

- A. Master key: To match existing system. Furnish 4.
- B. Keying: 6-pin with 2 nickel silver keys per lock. Cores master keyed.
1. Confirm Owner desires: Keyed Different (KD), Master Keyed (MK). Furnish 2 each

3.00 - EXECUTION

3.01 INSTALLATION

- A. Verify all dimensions and be responsible for the correct installation and fit of hardware at the locations indicated and as specified.
- B. Provide all necessary screws, bolts, toggle bolts expansion shields, and other proper means for correct and secure applications. Such fastenings shall be suitable size and type and shall harmonize with the hardware as to design, material and finish.

- C. Except where flat-head screws are necessary for proper clearance and fit, use oval-head screws for hardware application. In general, all exposed screws required for the attachment of architectural hardware items shall be Reed & Prince recessed head type.
- D. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in the Division 9 Sections. Do not install surface-mounted items until finishes have been completed on the substrates involved.
- E. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- F. Unless otherwise indicated or required, locate hardware items as follows:

Locksets:	38" finish floor to center of knob or lever
Top Hinge:	5" head rabbet to top of hinge
Bottom Hinge:	10" finish floor to bottom of hinge
Center Hinge:	Equal distance between top and bottom hinges
Exit Device:	39 5/8" finish floor to center line

3.02 ADJUSTING, CLEANING AND DEMONSTRATING

- A. Adjust and check each operating item of hardware and each door to ensure proper operation of function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.
- B. Adjust door closers to comply with Code accessibility requirements for effort to operate doors within pressure allowed:
 1. Interior doors: 5 lbs. maximum pressure.
 2. Exterior doors: 8.5 lbs. maximum pressure.
 3. Fire Rated doors: 15 lb. maximum pressure.
- C. Clean adjacent surfaces soiled by hardware installation.

3.03 HARDWARE SCHEDULE

- A. General Requirements
 1. If there are any omissions in hardware groups, call to attention of Architect prior to bid opening for instructions: otherwise, list will be considered complete. No extra will be allowed for omissions, changes or corrections necessary to facilitate proper installation.
- B. Schedule:

Group A Exterior Single 3-0 x 7-0 x 1-3/4 HM x HMF
 1-1/2 pr butts A2714 4-1/2 x 4-1/2 NRP at outswing
 2 pr butts at 8-0 doors

1 exit device 99L-NL- Rhodes
 1 closer 4020 series push side, size 4, 4020-18 plate, satin chrome
 1 concealed overhead door stop 814S, stainless steel
 1 automatic door bottom Pemko 411 RL, 411 end plates
 1 threshold Pemko 272D
 1 door top drip, Pemko, 346
 1 kickplate KOO50-10" Satin Chrome
 3 rubber frame bumpers

Group B Exterior Pair 3-0 x 7-0 x 1-3/4 HM x HMF
 3 pr butts A2714 4-1/2 x 4-1/2 NRP at outswing
 2 exit devices 9947 x 9947L 338 top strike 385A bottom strike, Rhodes
 2 closer 4020 push side, size 4, 4020-18 plate, satin chrome
 2 concealed overhead door stop 814S, stainless steel
 2 automatic door bottom Pemko 411 RL, 411 end plates
 1 threshold, Pemko 272
 1 door top drip, Pemko, 346-C-72,
 2 kickplate KOO50-10" satin chrome
 6 rubber frame bumpers

Group C Interior Single 3-0 x 7-0 x 1-3/4 WD x HMF
 1-1/2 pr butts A2714 4-1/2 x 4-1/2 NRP at outswing
 2 pr butts A2714 4-1/2 x 4-1/2 NRP at outswing @ 8-0 doors
 1 exit device 99L-NL- Rhodes
 1 closer 4020 series push side, size 4, 4020-18 plate, satin chrome
 1 concealed overhead door stop 814S, stainless steel
 1 kickplate KOO50-10", satin chrome
 3 rubber frame bumpers

Group D Interior Single 3-0 x 7-0 x 1-3/4 WD x HMF, fire rated
 1-1/2 pr butts A2714 4-1/2 x 4-1/2
 1 exit device 99L-NL-F Rhodes
 1 closer 4020 series push side, size 4, 4020-18 plate, satin chrome
 1 concealed overhead door stop 814S, stainless steel
 1 threshold, Pemko R1FMR w/ AK finish
 2 kickplate KOO50-10", satin chrome
 1 set smoke seals

Group E Interior Single 3-0 x 7-0 x 1-3/4 WD x HMF fire rated
 1-1/2 pr butts per door A2714 4-1/2 x 4-1/2
 1 ND94PD, Rhodes (Classroom)
 1 closer 4020 series push/pull side, size 4, 4020-18 plate, satin chrome
 1 concealed overhead door stop 814S, stainless steel @ Kitchen
 2 kickplate KOO50-10", satin chrome
 1 set smoke seals

Group F Interior Single 3-0 x 7-0 x 1-3/4 WD x HMF
 1-1/2 pr butts per door A2714 4-1/2 x 4-1/2
 1 ND94PD, Rhodes (Classroom)
 1 closer 4020 series push/pull side, size 4, 4020-18 plate, satin chrome
 2 kickplate KOO50-10", satin chrome
 1 set smoke seals

Group G Interior Single 3-0 x 7-0 x 1-3/4 WD x HMF
 1-1/2 pr butts A2714 4-1/2 x 4-1/2
 1 lockset ND 96 PD, Rhodes (Storeroom lock)
 2 kickplate KOO50-10" satin chrome
 1 wall 1271 TB or floor bumper 1211
 3 rubber frame bumpers

Group H Interior Single 3-0 x 7-0 x 1-3/4 WD x HMF
 1-1/2 pr butts A2714 4-1/2 x 4-1/2
 1 lockset ND 96 PD, Spartan (Storeroom lock)
 1 closer 4020 series push side, size 4, 4020-18 plate, satin chrome
 2 kickplate KOO50-10" satin chrome
 1 wall bumper 1271 TB
 3 rubber frame bumpers

Group J Interior Single 3-0 x 7-0 x 1-3/4 WD x HMF
 1-1/2 pr butts A2714 4-1/2 x 4-1/2
 1 ND10S Rhodes (Passage lock)
 1 closer 4020 series pull side, size 4, 4020-18 plate, satin chrome
 1 concealed overhead door stop 814S, stainless steel
 2 kickplate KOO50-10" satin chrome
 3 rubber frame bumpers

Group K Interior Single 3-0 x 7-0 x 1-3/4 WD x HMF
 1-1/2 pr butts A2714 4-1/2 x 4-1/2
 1 lockset ND10S, Rhodes (Passage lock)
 1 closer 4020 series pull side, size 4, 4020-18 plate, satin chrome
 1 wall bumper 1271 TB
 3 rubber frame bumpers

Group L Pair 2-6 x 7-0 x 1-3/4 WD x HMF
 3 pr butts A2714 4-1/2 x 4-1/2
 1 lockset ND 96 PD, Spartan (Storeroom lock)
 1 set top and bottom manual flush bolts
 6 rubber frame bumpers

Group M - Single 3-0 x 6-0 gates at side yard
 2 pr spring hinges, Stanley 2060R 4-1/2 x 4-1/2 at gates over 6 ft. wide
 1-1/2 pr 2060R 4-1/2 x 4-1/2 all other gates
 1 rim exit device 99L w/ Rhodes lever
 1 cylinder

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SECTION 08 90 00 - LOUVERS AND VENTS**PART 1 - GENERAL**

1.1 SUMMARY

- A. Section Includes:
 - 1. Fixed, extruded-aluminum louvers.
 - 2. Wall vents (brick vents).
- B. See Division 8 Section "Steel Doors and Frames" for louvers in hollow-metal doors.
- C. See Division 8 Section "Flush Wood Doors" for louvers in flush wood doors.
- D. See Division 15 Sections for louvers that are a part of mechanical equipment.

1.2 PERFORMANCE REQUIREMENTS

- A. Design: Design louvers, including comprehensive engineering analysis by a qualified engineer, using structural performance requirements and design criteria indicated.
- B. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver blade rattle or flutter, or permanent damage to fasteners and anchors.
 - 1. Wind Loads: Determine loads based on a uniform pressure of 30 lb./sq. ft. (1435 Pa), acting inward or outward.
- C. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.
- B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.
- C. Samples: For each type of metal finish required.
- D. Submittal: For louvers indicated to comply with structural performance requirements and design criteria indicated.
- E. Product Test Reports: Based on tests performed according to AMCA 500-L.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum Extrusions: ASTM B 221M, Alloy 6063-T5.
- B. Aluminum Sheet: ASTM B 209M, Alloy 3003 with temper as required for forming.
- C. Fasteners: Use types and sizes to suit unit installation conditions.
 - 1. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.

2.2 FABRICATION, GENERAL

- A. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
- B. Join frame members to each other and to fixed louver blades with fillet welds concealed from view welds, threaded fasteners, or both, as standard with louver manufacturer unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.3 FIXED, EXTRUDED-ALUMINUM LOUVERS

- A. Horizontal Non-drainable Blade Louver 45-degree Storm K blade extruded aluminum stationary louver:
 - Basis-of-Design Product: Architectural Louvers by Harry, LLC; Model E4KS.
 - Architectural Louvers - <http://www.archlouvers.com> - phone: 888-568-8371
- 1. Subject to compliance with requirements, provide the specified product or comparable product by one of the following:
 - a. Manufacturers of equivalent products submitted and approved in accordance with Section 01630 - Product Substitution Procedures.
 - 2. Louver Depth: 4 inches (100 mm)
 - 3. Blade Profile: Plain blade with center baffle.
 - 4. Frame and Blade Nominal Thickness: Not less than 0.080 inch (2.03 mm).
 - 5. Louver Performance Ratings:
 - a. Free Area: Not less than 8.06 sq. ft. (0.75 sq. m) for 48-inch- (1220-mm-) wide by 48-inch- (1220-mm-) high louver.
 - b. Point of Beginning Water Penetration: Not less than 888 fpm (4.5 m/s).
 - c. Air Performance: Not more than 0.13-inch wg (32-Pa) static pressure drop at 800 fpm (4.6 m/s) free-area velocity.
 - 6. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

2.4 LOUVER SCREENS

- A. General: Provide screen at each exterior louver.

- B. Louver Screen Frames: Same kind and form of metal as indicated for louver to which screens are attached.
- C. Louver Screening: Same kind of metal as indicated for louver.
 - 1. Insect Screening: Aluminum, 16 x 18 square mesh, 0.011-inch wire.
 - 2. Bird Screening: Flattened, expanded aluminum, 3/4 by 0.050 inch (19 by 1.27 mm) thick.

2.5 ALUMINUM FINISHES

- A. High-Performance Organic Finish: 3-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pre-treat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Locate and place louvers and vents level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weather-tight connection.
- C. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- D. Repair damaged finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory and refinish entire unit or provide new units.
- E. Protect galvanized and nonferrous-metal surfaces that will be in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint.

END OF SECTION 08900

SECTION 09250 - GYPSUM DRYWALL**1.00 - GENERAL**

1.01 DESCRIPTION

- A. Work included:
 - 1. Gypsum wallboard.
 - 2. Taping and joint treatment for gypsum wallboard.
 - 3. Metal Stud System – See Section 05400
 - 4. Cement Backer Board
- B. Related work specified elsewhere:
 - 1. Cold formed Steel Framing – Section 05400
 - 2. Carpentry – Section 06100
 - 3. Firestopping – Section 07270
 - 4. Painting - Section 09900

1.02 REFERENCED STANDARDS

- A. American Society for Testing and Materials (ASTM):
 - 1. C 36: “Standard Specification for Gypsum Wallboard”
- B. Underwriters Laboratories Inc. (UL)
 - 1. “Building Materials Directory – 2006

1.03 PRODUCT HANDLING

- A. Storage: Store materials off ground, adequately covered against weather. Remove any unsuitable materials from site.

2.00 - PRODUCTS

2.01 MATERIALS - GYPSUM DRYWALL

- A. Gypsum wallboard: Tapered edge, 5/8” thick, Type X, Sheetrock Firecode, conforming to ASTM C 36 (U.S. Gypsum or National Gypsum).
- B. Gypsum wall and ceiling board, moisture conditions: Tapered edge, 5/8” Fiberrock Aqua-Tough Interior Panel/Mold Tough
- C. Fasteners:
 - 1. Steel framing: Corrosion-resistant, self-drilling, self-tapping Type S drywall screws, 1”.
 - 2. Wood framing: 1-7/8” 6d Gypsum Panel Nails or Type W Bugle Head screws, 1 1/4”.
- D. Metal trim: Galvanized steel suitable for intended usage.

1. Corner beads: Formed to an angle of 80° to 90° and with flanges of either fine mesh expanded, all metal or tough paper joining tape.
 2. Edge trim: Angle or channel shape.
- E. Taping and finishing materials: U.S. Gypsum "Perf-A-Tape Joint System" or National Gypsum's "Joint Treatment System".
- F. Sealant: Highly elastic, water base acrylic caulking, nonbleeding and staining, fire-retardant Sheetrock Acoustic Sealant.

2.02 MATERIALS – METAL STUD SYSTEM

- A. See Section 05400, Cold Formed Metal

2.03 CEMENT BACKER BOARD

- A. Cement Backer Board: Durock Cement Board, 1/2" thick, comply with ANSI A118.9. (U.S. Gypsum Co.).
- B. Joint reinforcement: Durock Interior Tape, 2"x 50'.
- C. Fasteners: Durock Steel Screws, 1-1/4".

3.00 - EXECUTION

3.01 CONDITION OF SURFACES

- A. Subsurfaces: Inspect building, prior to commencement of work, to determine if subsurfaces are in proper condition to receive drywall materials. Advise Contractor if surfaces are not acceptable.
- B. Commencement of work: Construed as acceptance of building conditions and sub-surfaces.

3.02 FIRE RATED CONSTRUCTION

- A. Walls: Comply with UL Design No. U419, 1- hour.

3.03 METAL STUD SYSTEM

- A. Floor runners: Secure to concrete floor with powder-driven fasteners with washers, not less than 6" from each end and 24"o.c.
- B. Ceiling runners: Fasten to structure above with screws, 24"o.c. Provide bridging as required when tracks parallel framing. Securely brace partitions at top to structure above.
- C. Metal studs: Install in floor and ceiling runners, 16"o.c., attach to flanges with screws. No spliced studs permitted. Extend studs full height to ceiling runner.
- D. Horizontally reinforcement - partitions: Reinforce partitions extending floor to structure above with 1-1/2" steel channel running through studs at midpoint of span. Tie to each stud with 2 loops of 18 gage tie wire.
- 1 row at spans to 14 ft.
2 rows at 1/3 points, spans to 20 ft.

- E. Horizontally reinforcement – door frames: Reinforce head section of door frames with 1-1/2" channel and tie onto next 2 studs past each jamb. Reinforce all other openings as shown or required for loads imposed.
- F. Backing plates: Install plates and reinforcement of various types detailed or required for the mounting of all items on or in partitions or furred walls. Position of backing work as designated by the Trade whose work will be fasten thereto. All items attached to or in gypsum board surfaces shall be firmly attached. Contractor, at his option, may install fire-retardant treated wood blocking or backing in lieu of steel plates.
- G. Openings: Frame openings in partitions with stud section fastened with formed extension splicers or other approved method.
- H. Miscellaneous steel sections: Furnish and install as shown or required to complete the work.
- I. Erection technique: Shall result in plumb and straight walls with no waves or buckles or unevenness at joints. Finished walls plumb to within 1/ 8" in 10 feet when checked in any direction with a 10 foot straight-edge.

3.04 GYPSUM WALLBOARD

- A. Standards: In accordance with "Standard Specifications for the Application and Finishing of Gypsum Wallboard" A97.1 latest edition, as approved by American Standards Association; except where more stringent requirements are called for in this Specification, in Codes or by manufacturer of gypsum wallboards.
- B. Temperature: Maintain temperature 55° to 90° F until building is closed and ventilated to eliminate excessive moisture.
- C. Coordination: With work of other Trades whose work connects with, is affected or concealed by wallboard. Do butting and patching of work as may be required to accommodate other Trades.
- D. Framing: Before applying wallboard, check that corners and framing are plumb, true and solid. Do not apply wallboard until conduits, pipes, ducts, vents, supports, fixture frames, etc., are in place and tested as required. Solid bearing required at edges and ends of wallboard.
- E. Application: Apply wallboard to framing members in horizontal application, abutting ends and edges over supports. Neatly fit and stagger end joints. Boards brought into moderate contact, but not forced into place, 1/8" max. joint. Cut and fit around all devices in surface.
- F. Fastening:
 - 1. Steel framing: Screws 8" o.c. at panel edges, 12" in field of panel.
 - 2. Wood framing: Nails 8" o.c. at walls, 7" o.c. at ceilings or screws 16" o.c. at walls, 12" o.c. at ceilings. Fastener driven home with heads slightly below the surface of wallboard in a dimple, but without undue damage to face or core of board.
- G. Trim: Install metal corner trim at vertical and horizontal external corners and angles and metal edge trim at all junction of gypsum wallboard and walls of other materials or where there are exposed edges.

- I. Workmanship: Install wallboard in straight surfaces with no waves or buckles, free of unevenness at joints. Maximum variation in surface, 1/4" in 10'-0".
- 3.05 CEMENT BACKER BOARD
- A. Fastening: Fasten with screws, maximum 8"o.c. around perimeter and all supporting studs. Fasten 3/8" from edges and 2" in from corners. Set heads flush with surface without over driving.
- 3.06 TAPING AND FINISHING
- A. Level of finish: Gypsum Association Level 4, suitable for surfaces receiving light textured finish wall coverings and flat paint.

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SECTION 09300 - TILE WORK**1.00 - GENERAL**

1.01 DESCRIPTION

- A. Work included:
 - 1. Ceramic tile.
 - 2. Cementitious backer board.
- B. Related work specified elsewhere:
 - 1. Gypsum Drywall – Section 09250
 - 2. Solid Surface Wall Cladding -Section 09750

1.02 REFERENCES AND STANDARDS

- A. ANSI A108.1 Installation of Ceramic Tile with Portland Cement Mortar.
- B. ANSI A108.5 Ceramic tile installed with Dry-set Portland Cement Mortar or Latex Portland Cement.
- C. ANSI A108.10 Installation of Grout in Tile Work.
- D. ANSI A108.11 Interior installation of cementitious backer units.
- E. ANSI A118.1 Dry-Set Mortar.
- F. ANSI A118.4 Latex-Portland Cement Mortar.
- G. ANSI A118.6 Ceramic Tile Grout.
- H. ANSI A137.1 Ceramic Tile.
- I. Tile Council of America: 2003-2004 Handbook for Ceramic Tile Installation.
- J. Federal Specifications: SS-T-308c and SS-T-00227e.

1.03 SUBMITTALS

- A. Samples: Submit samples, in duplicate, marked with name of material, manufacturer's name and location to be used of all tile specified.
- B. Certificate: Submit Master Grade Certificate for conformance with ANSI A137.1 before shipment of tile.

1.04 PRODUCT LABELING, DELIVERY AND HANDLING

- A. Delivery: Materials in manufacturer's sealed containers, labels legible and intact identifying brand name and contents.
 - 1. Tile cartons grade-sealed by manufacturer in accordance with ANSI A137.1.
 - 2. Manufactured mortars and grout shall contain hallmarks certifying compliance with reference standards and be types recommended by tile manufacturer for application.

- B. Storage: Store materials under cover in manner to prevent damage or contamination.

1.05 JOB CONDITIONS

- A. Environmental:

- 1. Set and grout tile when ambient temperature is at least 50° F or greater.

- B. Protection:

- 1. Protect adjoining work surfaces during tile work.
- 2. Close to traffic or other work spaces in which tile is being installed, keep closed until tile is set.
- 3. Protect tile from damage until acceptance of work. Repair damaged work at no cost to Owner.

2.00 - PRODUCTS

2.01 CEMENTITIOUS BACKER BOARD

- A. Cementitious Backer Board: Durock Cement Board, 1/2" thick, comply with ANSI A118.9, (U.S. Gypsum Co).
- B. Joint Reinforcement: Durock Interior Tape, 2" x 50'.
- C. Fasteners – wood framing: Durock Wood Screws 1/4"x 1-5/8".

2.02 TILE MATERIALS

- A. Manufacturers: Dal-Tile. Colors as selected.
- B. Wall tile: Semi-Gloss Series glazed interior tile with glazed finish, 3"x6x1/4"". Surface Cap, 3"x6", 3"x6" edge bullnose trim. Other trim pieces as required
- C. Colors: As selected from manufacturer's standard color line. At Toilet Room walls, provide a contrasting color band from the field tile, as shown.

2.03 THRESHOLDS

- A. Marble threshold: I Calcite or II Dolomite honed marble, comply with ASTM C 503 and MIA Group "A" for soundness, shaped to provide a transition between tile and other floor finishes. Dimension and thickness as shown.
- B. Finish: Smooth matte surface.

2.04 SETTING MATERIALS

- A. Dry-set Mortars: ANSI A118.1 American Olean thin set mortar.
- B. Latex-Portland cement mortar: Conform to ANSI A118.4.
- C. Portland cement: ASTM C 150 Type 1.

- D. Sand: ASTM C 144.
- E. Water: Clean and drinkable.
- F. Portland cement mortar: 1 part Portland cement, 4 to 5 parts damp sand, by volume.
- G. Bond coat: Portland cement paste on a plastic mortar bed or dry-set mortar or latex-Portland cement mortar on a cured bed.

2.05 GROUTING MATERIALS

- A. Ceramic mosaic tile and floor tile: Portland cement and fine graded clean sand or commercial sanded Portland cement type, colors as selected (Custom Building Products).
- B. Glazed wall tile: Commercial, Portland cement type, white color.
- C. Joint sealer: Stoneteck Sealer.

2.06 EXPANSION JOINTS

- A. Sealant: Premium grade, high-performance moisture- cured, 1-component, polyurethane-based, non-sag elastomeric sealant, Sikaflex -1a. Conform to Fed. Spec.TT-S-00230C, Type II, Class A. Meet ASTM C 920, Type S, Grade NS, Class 25, use T, NT,O,M,G,I.
- B. Back-up strip: Flexible and compressible type of closed cell foam, polyethylene or buty rubber, rounded at surface to contact sealant. As recommended by sealant manufacturer.

3.00 - EXECUTION

3.01 INSPECTION OF SURFACES

- A. Examine surfaces to receive ceramic tile, setting beds or accessories before tile installation begins for:
 1. Defects or conditions adversely affecting quality and execution of tile installation.
 2. Examine substrates and areas where tile will be installed for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
 3. Verify that substrates for setting tile are firm, dry, clean and free from oil or waxy films and curing compounds.
 4. Verify that installations of grounds, anchors, recessed frames, hangers, bucks, electrical and mechanical units of work, and similar items located on or behind tile has been completed before installing tile.
- B. Do not proceed with installation work until unsatisfactory conditions are corrected.

3.02 CEMENTITIOUS BACKER BOARD

- A. Install Cement Board onto studs with screws, 8" o.c. leaving an 1/8" space at joints and corners. Stagger end joints in successive courses.

- B. Fill Cement Board joints with adhesive and then embed tape and level joints.

3.03 LAYOUT

- A. Layout tile work so as to minimize cuts less than one-half in size.
- B. Locate cuts in walls and floors as to be less conspicuous.
- C. Align wall joints to give straight uniform grout lines, plumb and level.
- D. Align floor joints to give straight uniform grout lines parallel with walls.

3.04 WORKMANSHIP

- A. First class workmanship in tile work.
- B. Use products in accordance with recommendations and directions of manufacturer.
- C. Proportion mixes in accordance with ANSI Standard Specifications, latest edition.
- D. Smooth all exposed cut edges. Be sure cut edges are clean before installing tiles.

3.05 TILE INSTALLATION

- A. Floors, Interior – concrete subfloor: Dry Set Mortar or Latex-Portland Cement Mortar, TCA Method F113-03. Installation, tile, ANSI A108.5; grout, ANSI A108.10.
- B. Floors, Interior - wood subfloor: Cement Mortar Bed with reinforcing mesh and waterproof membrane, TCA F141-03. Installation, tile ANSI A108.1A; grout ANSI A108.10.
- C. Walls, Interior: Wood studs, Cement Board, Dry-Set Mortar or Latex-Portland Cement. TCA Method W244-03. Installation, tile ANSI A108.5; grout, ANSI A108.10.

3.06 THRESHOLDS

- A. Marble thresholds: Install, as shown, to provide a smooth, safe transition between tile flooring and the abutting floor finish surface.
- B. Installation: In Same type of setting bed as the abutting tile.

3.07 GROUT

- A. Floor tile: 1 part Portland cement to 1 part graded sand, by volume or Commercial sanded Portland cement type per ANSI A108.10. Colors as selected.
- B. Wall tile: Commercial grout, white.
- C. Joint treatment: After tile has been cleaned and dried, treat joints with sealer.

3.08 CLEANING

- A. Clean tile surface as thoroughly as possible on completion of grouting.
- B. Remove grout haze, observing tile manufacturer's recommendations as to use of acid and chemical cleaners.

- C. Rinse tile work with clean water before and after using chemical cleaner.
- D. Polish surface of tile work with soft cloth.

3.09 PROTECTION

- A. Apply to all clean, completed tile walls and floors, a protective coat of neutral cleaner solution, 1 part cleaner to 1 part water.
- B. Protect newly tiled floors from foot and wheel traffic for at least 3 days after setting, preferably 7 days.
- C. Where use of newly tiled floors is unavoidable, place large flat boards for walkways.
- D. Remove any damaged tile and replace with new.
- E. Before final inspection, remove protective coverings, rinse and clean tile surfaces.

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SECTION 09500 – ACOUSTICAL TREATMENT**1.00 - GENERAL**

1.01 DESCRIPTION

A. Work included:

1. Acoustical treatment systems.

B. Related work specified elsewhere:

1. Gypsum wallboard – Section 09250
2. Mechanical registers/grilles – Drawings
3. Interior lighting fixtures – Drawings

1.02 STANDARDS

- A. Acoustic units: Fed Spec SS-S-118B, ASTM E-1264 for Class A.
- B. Suspension system: Comply with ASTM C 635 “Standard Specifications for Metal Suspension Systems for Acoustical Tile and Lay-In Panel Systems.”
- C. Manufacturer: Published recommendations of material manufacturers that pertains to installation of acoustical materials.

1.03 JOB CONDITIONS

- A. Before installing acoustical ceiling units and adhesive, permit them to reach room temperature, 65°F or over, for 24 hours before and 24 hours after installation and a stabilized moisture content.

2.00 - PRODUCTS

2.01 MATERIALS – ACOUSTICAL UNITS

- A. Acoustical units - suspension system: Fine Fissured, square lay-in, medium texture, 24 x 24 x 5/8, mineral fiber, NRC 0.55, fire resistance Class A, Flame Spread 25 or under, 0.84 light reflectance, factory-applied white vinyl paint. (Armstrong).

2.02 MATERIALS – SUSPENSION SYSTEM

- A. Exposed suspension system: Armstrong Prelude, 15/16” flange system, hot dipped galvanized steel, factory applied standard white finish. Wall, 7/8” hemmed angle molding, white finish.
- B. Hanger wires: No. 12, minimum, galvanized annealed steel wire.
- C. Attachment to framing: Hanger wires through eye screw attached to framing.
- D. Bracing: No. 12 gage galvanized steel wire.
- E. Vertical brace: EMT (electrical metallic tubing), to counteract uplift.

3.00 - EXECUTION

3.01 WORKMANSHIP

- A. Performance: As recommended by Acoustical Material Association. Finish surfaces plumb, straight, true and free from defects of any kind.
- B. Deflection: Limit deflection of ceiling, after installation, to 1/360 of the span of any section. Entire ceiling plane, true and level with a maximum allowable variation of 1/8" in any direction from true elevation.
- C. Bracing: Brace ceilings to structure for seismic bracing, to produce a stiff, rigid ceiling plane. Provide channel framing around obstructing beams, ducts, etc. Conceal bracing.
- D. Layout: Establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less-than-half-width units at borders, comply with reflected ceiling plans. Terminate edge conditions with perimeter molding.

3.02 INSTALLATION

- A. Suspension system:
 - 1. Hanger wires: Wires attached to eye screw above, spaced 4 ft. o.c. maximum, along main beam and at each corner of recessed lay-in lighting fixture. Hanger wire given at least 3 full turns around ceiling anchor and tee member.
 - 2. Exposed Tee Suspension System: Accurately level main beams and space 48" o.c. Securely anchor wall angle. Space cross tees 24" o.c., secure to main beams and wall angles. Install bracing wires splayed at 45° maximum for each 144 sq. ft. tributary area. Install vertical tubing to resist upward movement in addition to bracing wires.
- B. Acoustical units in suspension grid system: Lay-in panels at exposed tee systems, fit snugly. Scribe and cut panels to fit accurately at borders and penetrations.

3.03 CLEANING

- A. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings and suspension members.
- B. Comply with manufacturer's instructions for cleaning and touch-up of minor finish damage.
- C. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

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SECTION 09614
SURFACE APPLIED DETECTABLE TACTILE WARNING SURFACES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Special Conditions and Division 1 Specifications Section, apply to this Section.

1.2 DESCRIPTION

- A. This Section specifies furnishing and installing Surface Applied Detectable/Tactile Warning Surface Tiles where indicated. Not recommended for asphalt applications.

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's literature describing products, installation procedures and routine maintenance.
- B. Samples for Verification Purposes: Submit two (2) tile samples minimum 12"x12" of the kind proposed for use.
- C. Shop drawings are required for products specified showing fabrication details, composite structural system, tile surface profile, fastener locations, sound on cane contact amplification feature, plans of tile placement including joints, and material to be used as well as outlining installation materials and procedure.
- D. Material Test Reports: Submit complete test reports from qualified accredited independent testing laboratory's to qualify that materials proposed for use are in compliance with requirements and meet or exceed the properties indicated on the specifications. All tests shall be conducted on a Surface Applied Detectable/Tactile Warning Surface Tile system as certified by a qualified independent testing laboratory.
- E. Maintenance Instructions: Submit copies of manufacturer's specified installation and maintenance practices for each type of Detectable Warning Surface Tile and accessory as required.

1.4 QUALITY ASSURANCE

- A. Provide Surface Applied Detectable/Tactile Warning Surface Tiles and accessories as produced by a single manufacturer with a minimum of five (5) years' experience in the manufacturing of Surface Applied Detectable/Tactile Warning Surface Tiles.
- B. Installer's Qualifications: Engage an experienced Installer certified in writing by Surface Applied Detectable/Tactile Warning Surface Tile manufacturer as qualified for installation, who has successfully completed installations similar in material, design, and extent to that indicated for Project.
- C. Americans with Disabilities Act (ADA): Provide Surface Applied Detectable/Tactile Warning Surface Tiles which comply with the detectable warnings on walking surfaces section of the Americans with Disabilities Act (Title III Regulations, 28 CFR Part 36 ADA STANDARDS FOR ACCESSIBLE DESIGN, Appendix A, Section 4.29.2 DETECTABLE WARNINGS ON WALKING SURFACES).
- D. California Code of Regulations (CCR): Provide only approved DSAAC detectable warning products as provided in the California Code of Regulations (CCR) Title 24, Chapter 2, Section 202 definition of "Detectable Warning". Section 11B-247 and 11B-705 "Detectable Warnings And Detectable Directional Texture"
- E. Vitrified Polymer Composite (VPC) Surface Applied Detectable/Tactile Warning Surface Tiles shall be an epoxy polymer composition with an ultra violet stabilized coating employing aluminum oxide particles in the truncated domes. The tile shall incorporate an in-line pattern of truncated domes measuring nominal 0.2" height, 0.9" base diameter, and 0.45" top diameter, spaced center-to-center

2.35" to 2.40" as measured side by side in line. For wheelchair safety the field area shall consist of a non-slip surface with a minimum of 40 - 90° raised points 0.045" high, per square inch; "Armor-Tile" as manufactured by Engineered Plastics Inc., Tel: 800-682-2525, no known equal.

1. Dimensions: Surface Applied Detectable/Tactile Warning Surface Tiles shall be held within the following dimensions and tolerances:

Length and Width: 36x48 or 36x60 nominal to best fit condition

Depth: 0.1875 (3/16"), (+/-) 5% max.

Face Thickness: 0.1875 (3/16), (+/-) 5% max.

Warpage of Edge: 0.5% max.

2. Water Absorption of Tile when tested by ASTM D 570-98 not to exceed 0.05%.
3. Slip Resistance of Tile when tested by ASTM C 1028-96 the combined Wet and Dry Static Co-Efficients of Friction not to be less than 0.80 on top of domes and field area.
4. Compressive Strength of Tile when tested by ASTM D 695-02a not to be less than 28,000 psi.
5. Tensile Strength of Tile when tested by ASTM D 638-03 not to be less than 19,000 psi.
6. Flexural Strength of Tile when tested by ASTM D 790-03 not to be less than 25,000 psi.
7. Chemical Stain Resistance of Tile when tested by ASTM D 543-95 (re approved 2001) to withstand without discoloration or staining - 10% hydrochloric acid, urine, saturated calcium chloride, black stamp pad ink, chewing gum, red aerosol paint, 10% ammonium hydroxide, 1% soap solution, turpentine, Urea 5%, diesel fuel and motor oil.
8. Abrasive Wear of Tile when tested by BYK - Gardner Tester ASTM D 2486-00 with reciprocating linear motion of 37± cycles per minute over a 10" travel. The abrasive medium, a 40 grit Norton Metallite sand paper, to be fixed and leveled to a holder. The combined mass of the sled, weight and wood block is to be 3.2 lb. Average wear depth shall not exceed 0.060 after 1000 abrasion cycles when measured on the top surface of the dome representing the average of three measurement locations per sample.
9. Resistance to Wear of Unglazed Ceramic Tile by Taber Abrasion per ASTM C501-84 (re approved 2002) shall not be less than 500.
10. Gardner Impact to Geometry "GE" of the standard when tested by ASTM D 5420-04 to have a mean failure energy expressed as a function of specimen thickness of not less than 550 in. lbf/in. A failure is noted when a crack is visible on either surface or when any brittle splitting is observed on the bottom plaque in the specimen.
11. Accelerated Weathering of Tile when tested by ASTM G 155-05a for 3000 hours shall exhibit the following result – AE <4.5, as well as no deterioration, fading or chalking of surface of tile color No 33538
12. Accelerated Aging and Freeze Thaw Test of Tile and Adhesive System when tested to ASTM D 1037-99 shall show no evidence of cracking, delamination, warpage, checking, blistering, color change, loosening of tiles or other detrimental defects.
13. Salt and Spray Performance of Tile and Adhesive System when tested to ASTM B 117-03 not to show any deterioration or other defects after 200 hours of exposure.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Surface Applied Detectable/Tactile Warning Surface Tiles shall be suitably packaged or crated to prevent damage in shipment or handling. Finished surfaces shall be protected by sturdy wrappings and tile type shall be identified by part number.
- B. Surface Applied Detectable/Tactile Warning Surface Tiles shall be delivered to location at building site for storage prior to installation.

1.6 SITE CONDITIONS

- A. Environmental Conditions and Protection: Maintain minimum temperature of 40°F in spaces to receive Surface Applied Detectable/Tactile Warning Surface Tiles for at least 24 hours prior to

- installation, during installation, and for not less than 24 hours after installation.
- B. The use of water for work, cleaning or dust control, etc. shall be contained and controlled and shall not be allowed to come into contact with the general public. Provide barricades or screens to protect the general public.

1.7 GUARANTEE

- A. Surface Applied Detectable/Tactile Warning Surface Tiles shall be guaranteed in writing for a period of five (5) years from date of final completion. The guarantee includes defective work, breakage, deformation, fading and loosening of tiles.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. The Vitrified Polymer Composite (VPC) Surface Applied Detectable/Tactile Warning Surface Tile specified is based on Armor-Tile manufactured by Engineered Plastics Inc. (800-682-2525). No equal substitutions allowed after bidding process.
- B. Color: Yellow conforming to Federal Color No. 33538. Color shall be homogeneous throughout the tile.

2.2 MATERIALS

- A. Fasteners: Color matched, corrosion resistant, flat head drive anchor: ¼" diameter x 1 ½" long as supplied by Engineered Plastics Inc.
- B. Adhesive: Tactile Bond and Seal as supplied by Engineered Plastics Inc.
- C. Sealant: Tactile Bond and Seal as supplied by Engineered Plastics Inc.

PART 3 EXECUTION

3.1 INSTALLATION

- A. During all surface preparation and Surface Applied Detectable/Tactile Warning Surface Tile installation procedures, ensure adequate safety guidelines are in place and that they are in accordance with the applicable industry and government standards.
- B. The application of all tiles, adhesives, mechanical fasteners, and caulking shall be in strict accordance with the guidelines set by their respective manufacturers. Not recommended for asphalt applications.
- C. Coordinate with the Contractor or Engineer to ensure that the surfaces being prepared and fabricated to receive the tiles are constructed correctly and adequately for tile installation. Review manufacturer and contract drawings with the Contractor prior to the construction and refer any and all discrepancies to the Engineer.
- D. Set the tile true and square to the curb ramp area as detailed in the design drawings, so that its location can be marked on the concrete surface. A thin permanent marker works well. Remove tile when done marking its location.
- E. The surface to receive the Surface Applied Detectable/Tactile Warning Surface Tile is to be mechanically cleaned with a diamond cup grinder or shot blaster to remove any dirt or foreign material. This cleaning and roughening of the concrete surface should include at least 4 inches around the perimeter of the area to receive the tile, and also along the cross pattern established by the corresponding areas on the backside of the tile. Those same areas should then be cleaned with a clean rag soaked in Acetone.
- F. Immediately prior to installing the Surface Applied Detectable/Tactile Warning Surface Tile, the concrete surfaces must be inspected to ensure that they are clean, dry, free of voids, curing compounds, projections, loose material, dust, oil, grease, sealers and determined to be structurally sound and cured for a minimum of 30 days.
- G. Using Acetone, wipe the backside of the tile around the perimeter and along the internal cross pattern, to remove any dirt or dust particles from the area to receive the adhesive.
- H. Apply Tactile Bond & Seal adhesive to the backside of the tile, following the perimeter and internal

- crosspattern established by the tile manufacturer. Sufficient adhesive must be placed on the prescribed areas to have full coverage across the 2" width of the adhesive locator and shall be applied to within 1/4" continuously around the perimeter edge of the tile. The entire tube of adhesive shall be applied to the back of each tile, sizes 24" x 36" and greater.
- I. Set the tile true and square to the curb ramp area as detailed in the design drawings.
 - J. Working from the center of the tile outwards, proceed to drill and install all fasteners in the tile's molded recesses.
 - K. Standing with both feet applying pressure around the molded recess provided in the tile, drill a hole true and straight to a depth of 3½" using a 1/4" masonry drill bit. Drill through the tile without hammer option (on the drill) until the tile has been successfully penetrated, then with hammer option (on the drill) to drill into the concrete. Maintaining foot pressure on both sides of the hole while drilling prevents concrete dust from accumulating between the tile and concrete which can affect the tile being installed flush and may compromise installation integrity.
 - L. Immediately after drilling each hole, before moving on to the next, and while still applying foot pressure, mechanically fasten tiles to the concrete substrate using a leather bound or hard plastic mallet to set the fasteners. Ensure the fastener has been placed to full depth in the dome, straight, and flush to the top of dome. Drive the pin of the fastener with the mallet, taking care to avoid any inadvertent blows to the truncated dome or tile surface.
 - M. Following the installation of the fasteners, the concrete dust should be vacuumed, brushed or blown away from the tile's surface and adjacent concrete. Using Acetone on a rag, wipe the concrete around the tile's perimeter to ensure a clean, dry surface to receive perimeter sealant.
 - N. Tactile Bond & Seal perimeter caulking sealant should be applied following the sealant manufacturer's recommendations. Tape all perimeter edges of the tile back 1/16" from the tile's perimeter edge and tape the adjacent concrete back 1/2" from the tile's perimeter edge to maintain a straight and even caulking line. Apply sealant around tile perimeter using care to work sealant into any void between the tile and concrete interface. Tool the perimeter caulking with a rounded plastic applicator or spatula to create a cove profile between the tile and adjacent concrete. Remove tape immediately after tooling perimeter caulking sealant.
 - O. Do not allow foot traffic on installed tiles until the perimeter caulking sealant has cured sufficiently to avoid tracking. Curing time is weather dependent (average cure time at 75° F is 30 minutes). Adhesive or caulking on the surface of the Armor-Tile can be removed with Acetone.
 - P. If installing adjacent tiles, note the orientation of each tile. Careful attention will reveal that one of the long edges of the tile is different than the other in regard to the tiny dotted texture. You may also note a larger perimeter margin before the tiny dotted texture pattern begins. Consistent orientation of each Armor-Tile is required in order that the truncated domes on adjacent tiles line up with each other.
 - Q. In order to maintain proper spacing between truncated domes on adjacent tiles, the tapered edge should be trimmed off using a continuous rim diamond blade in a circular saw or mini-grinder. The use of a straightedge to guide the cut is required. All cuts should be made prior to installation of the tiles. If installing adjacent tiles, care should be taken to leave a 1/8 inch gap between each tile to allow for expansion and contraction.
 - R. If tiles are custom cut to size, if pre-molded recesses (to receive fasteners) are removed by the cut, or to maintain a tight installation to the substrate then any truncated dome can be center-drilled with a 1/4 inch masonry drill bit to create a through hole, and the through hole must be countersunk with a suitable carbide countersink bit to receive mechanical fasteners. Care should be taken to not countersink too widely or deeply. Fasteners should be flush with the top of the truncated dome when countersunk properly.

3.2 CLEANING, PROTECTING AND MAINTENANCE

- A. Protect tiles against damage during construction period to comply with Tactile Tile manufacturer's specification.
- B. Protect tiles against damage from rolling loads following installation by covering with plywood or hardwood.
- C. Clean Tactile Tiles not more than four days prior to date scheduled for inspection intended to establish date of substantial completion in each area of project. Clean Tactile Tile by method specified by Tactile Tile manufacturer.

- D. Comply with manufacturers maintenance manual for cleaning and maintaining tile surface and it is recommended to perform annual inspections for safety and tile integrity.

END OF SECTION

**SECTION 09650
RESILIENT FLOORING**

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 – Specification sections, apply to work of this section.

1.02 SUMMARY

- A. The work of this Section includes:
1. Rubber sheet flooring and rubber base
 2. Responsibilities, preparation/installation
- B. Related Sections: Other specification sections which directly relate to the work of this section include, but are not limited to, the following:
1. Section 03300 - Cast-In-Place Concrete; concrete substrate; slab surface tolerances;
 2. Section 06100 - Rough Carpentry; plywood substrate; surface tolerances
- C. References (Industry Standards):
1. American Society for Testing and Materials International
 - a. ASTM C518 Standard Test Method for Steady State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
 - b. ASTM D412 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension
 - c. ASTM D2047 Standard Test Method for Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine
 - d. ASTM D2240 Standard Test Method for Rubber Property – Durometer Hardness
 - e. ASTM D3389 Standard Test Method for Coated Fabrics Abrasion Resistance (Rotary Platform, Double Head Abrader)
 - f. ASTM D6499 Standard Test Method for The Immunological Measurement of Antigenic Protein in Natural Rubber and its Products
 - g. ASTM E90 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
 - h. ASTM E648 Standard Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source
 - i. ASTM E662 Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials
 - j. ASTM E1745 Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs
 - k. ASTM E2179 Standard Test Method for Laboratory Measurement of the Effectiveness of Floor Coverings in Reducing Impact Sound Transmission Through Concrete Floors
 - l. ASTM E2180 Standard Test Method for Determining the Activity of Incorporated Antimicrobial Agent(s) in Polymeric or Hydrophobic Materials
 - m. ASTM F386 Standard Test Method for Thickness of Resilient Flooring Materials Having Flat Surfaces
 - n. ASTM F925 Standard Test Method for Resistance to Chemicals of Resilient Flooring
 - o. ASTM F970 Standard Test Method for Static Load Limit
 - p. ASTM F1482 Standard Practice for Installation and Preparation of Panel Type Underlayments to Receive Resilient Flooring

- q. ASTM F1514 Standard Test Method for Measuring Heat Stability of Resilient Flooring by Color
 - r. ASTM F1859 Standard Specification for Rubber Sheet Floor Covering Without Backing
 - s. ASTM F1861 Standard Specification for Resilient Wall Base
 - t. ASTM F2169 Standard Specification for Resilient Stair Treads
 - u. ASTM F2199 Standard Test Method for Determining Dimensional Stability of Resilient Floor Tile after Exposure to Heat
 - v. ASTM G21 Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi
2. International Organization for Standardization
- a. ISO 140 Measurement of sound insulation in buildings and of building elements
3. National Fire Protection Association
- a. NFPA 253 Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source
 - b. NFPA 258 Test Method for Specific Density of Smoke Generated by Solid Materials

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's Installation Guide, Maintenance Guide and Safety Data Sheets (SDS) for each material proposed for use (available at www.nora.com/us).
- B. Samples: Submit two 3 inch by 3 inch samples of each product (except noraplan[®] degree and norament[®] stairtreads), in color specified, for verification. The noraplan degree product requires two 6 inch by 6 inch samples and norament stairtreads require two 2 inch wide samples.

1.04 QUALITY ASSURANCE

- A. Manufacturer: Provide resilient flooring manufactured by a firm with a minimum of 10 years' experience with resilient flooring of type's equivalent to those specified. Manufacturers proposed for use, which are not named in this section, should submit evidence of ability to meet performance requirements specified not less than 10 days prior to bid date.
 - 1. The manufacturer should have the Quality Management System approved by Lloyd's Register Quality Assurance to the Quality Management System Standard ISO 9001:2000
 - 2. Color Matching: Provide resilient flooring products, including wall base, accessories and subfloor preparation products from one manufacturer to ensure color matching and compatibility.
 - 3. Manufacturer must be capable of providing technical training and technical field service representation.
- B. Installer Qualifications: Installer should be nora[®] approved for the requirements of the project or INSTALL (International Standards & Training Alliance) resilient certified for the requirements of the project, including noraplan[®] nTx.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in labeled packages. Store and handle in strict compliance with manufacturer's recommendations. Protect from damage due to weather, excessive temperatures, and construction operations.
- B. Deliver materials sufficiently in advance of installation to condition materials to the required temperature for 48 hours prior to installation.

1.06 PROJECT CONDITIONS

- A. Maintain temperature and humidity at service levels or 68° F (20° C), \pm 5° F (3° C), and 50% RH \pm 10% in areas to receive resilient flooring. Specified temperature should be maintained at least 48 hours before, during, and 8 hours after installation.

1.07 WARRANTY

- A. Provide a one-year warranty against defects in manufacturing of all products supplied. Provide limited wear warranty for the flooring supplied, as detailed per product.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURER

- A. Nora systems, Inc., 9 Northeastern Blvd., Salem, NH 03079; telephone 800-332-NORA, or 603-894-1021; fax 603-894-6615.
- B. The Manufacturer should meet 1.04 A. and have or provide the following:
1. ISO 14001 Environmental Management Systems certification.
 2. Construction waste take back program for the purpose of reducing jobsite waste by taking back their uninstalled waste flooring. Details of the nora program are available at www.nora.com/us.
 3. Flooring and adhesive that requires no moisture or pH testing.
 4. Flooring surfaces that are easily cleaned and do not require coatings and stripping, or use chemicals that may be hazardous to human health.
 5. Supply all required products that are CA 01350 compliant.
 6. Flooring that is free of anything known to be teratogenic, mutagenic or carcinogenic.
 7. Flooring that contains no polyvinyl chloride or plasticizers.
 8. Flooring that contains no halogens.
 9. Flooring that contains no asbestos.

2.02 RESILIENT SHEET FLOORING FOR COMMERCIAL TRAFFIC

- A.
- | | |
|-------------------------------|---|
| 1. Product Name: | Noraplan environcare™ nTx 2.0 mm, Article 156A |
| 2. ASTM Specification: | ASTM F1859 Standard Specification for Rubber Sheet Floor Covering Without Backing, defined as Type I |
| 3. Limited Wear Warranty: | 5 years |
| 4. Material: | nora® vulcanized rubber compound 913 with environmentally compatible color pigments that are free of toxic heavy metals like lead, cadmium or mercury |
| 5. Composition: | Homogeneous rubber compound with a random scattered design |
| 6. Color: | 48 colors; minimum order quantities apply |
| 7. Surface: | Smooth |
| 8. Back of Tile/Sheet/Nosing: | Double-sanded smooth |
| 9. Material Size: | ~48.5 feet by 48 inches (14.8m by 1.22m), \geq amount specified |
| 10. Stairtread Length: | Not applicable |
| 11. Squareness: | Not applicable |
| 12. Thickness: | ~0.08 inches (2mm), ASTM F386, \pm 0.006 inches (\pm 0.15mm) is required |

13. Depth: Not applicable
14. Dimensional Stability: ASTM F2199, $\leq 0.15\%$ in both directions
15. Flammability: ASTM E648; NFPA 253; NBSIR 75 950, 0.88 achieved, ≥ 0.45 watts/sq. cm for Class 1 is required
16. Smoke Density: ASTM E662; NFPA 258; NBS, 199 (flaming) and 120 (non-flaming) achieved, < 450 is required
17. Tunnel Test: Not tested
18. CAN/ULC-S102.2: Surface Burning, FSC1 of 300 and SD of 1200, achieved
19. Burn Resistance: Resistant to cigarette and solder burns
20. Slip Resistance: ASTM D2047 Static coefficient of friction, Neolite dry 0.93, Neolite wet 0.9 achieved, $\geq .5$ required (not recommended for ramps)
21. Bacteria Resistance: ASTM E2180 and ASTM G21, resistant to bacteria, fungi, and micro-organism activity
22. VOC's: This flooring is GREENGUARD Gold Certified for Low VOC Emissions, GREENGUARD Certified for Low VOC Emissions, Blue Angel Certified and CA 01350 Compliant
23. Latex Allergies: ASTM D6499, Inhibition Elisa, below detection level
24. Sound Absorption: ASTM E2179 Δ IIC 11, ISO 140 Δ Lw 8dB (compare only Δ values)
25. Sound Generation: Not tested
26. Hardness: ASTM D2240, Shore type "A", 92 achieved, ≥ 85 is required
27. Static Load: ASTM F970, Residual compression of 0.002" with 800 lbs. achieved, ≤ 0.005 " with 250 lbs. required
28. Rolling Load Limit: ≤ 450 lbs. / sq. inch, with no forklift traffic
29. Abrasion Resistance: ASTM D3389, 1.1 lbs. (500g) load on H-18 wheel with 1000 cycles, 0.008 oz. (0.24g) weight loss achieved, ≤ 0.035 oz. (≤ 1.0 gram) is required
30. Elongation: ASTM D412 Modulus @ 10% is 866.8 lbs. per sq. inch achieved, ≥ 300 lbs. per sq. inch is required
31. Oil & Grease Resistance: No
32. Heat Resistance: ASTM F1514, Avg. $\Delta E \leq 8.0$ is required, easily achieved with all batches and regular maintenance
33. Light Resistance: ASTM F1515, Avg. $\Delta E \leq 8.0$ is required, easily achieved with all batches and regular maintenance
34. Static Generation: AATCC 134, < 2000 Volts at 20% RH, achieved
35. Decay Time: Not applicable
36. Conductivity: Not applicable
37. Thermal Transmission: ASTM C518, R-value 0.51, achieved
38. Cleaning: Cleaned and maintained effectively using the nora pro clean[®] system; water, nora[®] pads and a suitable machine, without the use of any factory and/or field-applied coatings. No need to use harsh chemicals that may be hazardous or containing any teratogenic, mutagenic or any other ingredients known to be carcinogenic.
39. Shine: Higher shine achieved by buffing without any artificial topical applied coatings.
40. Stain Removal: Samples of the product should be provided for stain removal testing by the owner. Sample size should be 24 inches by 24 inches, pre-cleaned by manufacturer per published recommendations. Samples should have no coatings, sealers, floor finish or other manually or mechanically applied finish on the surface of the product. Stain

testing should consist of application of common disinfectants and chemicals to include, but not limited to, Betadine, Methylene Blue, Silver Nitrate, black marker and alcohol based hand sanitizer. Duration of test period should be no less than one week. Removal of chemicals should be in accordance with manufacturers published cleaning and maintenance recommendations. ASTM F925 Suggested Test Reagents plus the common chemicals used in healthcare and education facilities were used.

41. Substrate Preparation: nora[®] nTx 010 and nora[®] nTx 020 products are recommended as required following the noraplan[®] nTx Installation Guide. Please contact your nora sales representative for specific recommendations.

2.03 RUBBER BASE and MOLDINGS

- A. Rubber Base: Molded rubber wall base, topset cove, 4" high, 1/8" thick. Plain color. Comply with ASTM F 1861, Type TS, Group 1, Styles A and B. BurkeMercer BurkeBase.
- B. Mouldings: Vinyl beveled edging strip, BurkeMercer No. 633, 1" x 1/8".

PART 3 – RESPONSIBILITIES

3.01 GENERAL CONTRACTOR RESPONSIBILITIES

- A. Supply a safe, climate controlled building and subfloor as detailed in the Noraplan nTx Installation Guide (available at www.nora.com/us).
- B. When required, protect the installed flooring from damage during construction operations using Masonite, plywood or a similar product, ensuring first that the flooring surface is free of all debris. Lay panels so the edges form a butt joint. Tape the joint to prevent both movement and debris entrapment underneath them. Inspect immediately before covering and after removal for final acceptance.

3.02 FLOORING CONTRACTOR RESPONSIBILITIES

- A. Provide trained installers that have at least one of the following:
1. Approved by Nora systems, Inc. for all of the requirements of the project or INSTALL (International Standards & Training Alliance) certified for the requirements of the project.
 2. An effective installation manager, to manage the project, installers, and ensure that all of the required procedures are followed as detailed in the Noraplan nTx Installation Guide (available at www.nora.com/us).
- B. Prepare the required substrate following the Noraplan nTx Installation Guide. Use only the Nora nTx 010 and Nora nTx 020 products after any required mechanical preparation. Review and comply with all relevant Safety Data Sheets (SDS), local, state and federal regulations.
- C. Install resilient flooring, including but not limited to the following, in accordance with the Noraplan nTx Installation Guide.
1. Do not mix manufacturing batches of a color within the same area.
 2. Do not install resilient flooring over building expansion joints.
 3. Do not install defective or damaged resilient flooring.

4. Layout resilient flooring to provide ~ equal size at perimeter. Adjust layout as necessary to reduce the amount of resilient flooring which is cut to less than half full width.
 5. Lay resilient flooring with arrows in the same direction (excluding borders).
 6. Install resilient flooring without voids at seams. Lay seams together without stress.
 7. Cut/scribe resilient flooring neatly at perimeter and obstructions.
 8. Extend resilient flooring into reveals, closets, and similar openings.
 9. Remove excess adhesive immediately.
 10. Install reducer strips at exposed edges.
- D. When required, install Nora[®] wall base in accordance with Noraplan nTx Installation Guide. Install in the longest practical lengths.
- E. When required, install resilient stairtreads and accessories in accordance with the Nora Installation Guide.
- F. When required, heat weld Noraplan nTx seams using a color coordinated Nora[®] heat welding rod in accordance with the Noraplan nTx Installation Guide.
- G. When required, cold weld Noraplan nTx using a color coordinated Nora[®] cold weld in accordance with the Noraplan nTx Installation Guide.
- H. When required, flash cove Noraplan nTx. Extend flooring up the wall using the boot flash coving method, to the required height. Provide cove stick and suitable capping strip. All internal and external vertical seams, or as specified, should be Noraplan cold welded with a color coordinated Nora cold weld. Note: Do not heat weld the vertical seams.
- I. Touch-up and repair any minor damage to eliminate all evidence of repair. Remove and replace work which cannot be satisfactorily repaired.

END OF SECTION

SECTION 09670
SEAMLESS QUARTZ FLOORING
UCRETE® HP

PART 1 GENERAL

1.01 WORK INCLUDED:

- A. Provisions established within the Contract, Division 1, General Requirements, the Drawings are collectively applicable to this Section.

1.02 Products installed but not furnished under this section

- A. Division 3: Concrete (poured in place).
- B. Division 7: Sealants: Control joints, expansion joints and doorframes.
- C. Division 15: Mechanical: Drains, shower pans

1.03 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM)

1.04 SUBMITTALS:

- A. Prior to commencing work, submit Manufacturer's technical information and installation details to describe materials to be used. The same Manufacturer shall supply all polymer underlayments, wall and floor finishes.
- B. Submit Manufacturer's certificate of compliance that materials meet specification requirements.
- C. Before beginning work, samples of the flooring system shall be provided for architect's approval.

1.05 QUALITY ASSURANCE:

- A. Contractor shall be an established firm regularly engaged in satisfactory installation of similar materials for the past 5 years. Contractor shall provide a letter of certification by Manufacturer that Contractor is a current qualified installer.
- B. Single source responsibility: Provide fillers, broadcast media, underlayments, polyurethane body coat produced by the same manufacturer with no less than 15 years' experience in the manufacture and supply of these principal materials for work in this section.
- C. Manufacturer Qualifications: Company shall be ISO 9001: 2000 Certified
- D. Verification must be supplied by the Manufacturer that the polyurethane concrete based flooring system has passed, with an Observed Growth Rating of one (1), ASTM G 21-90: *Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi*. This result will ensure that the polyurethane concrete based flooring system will not support the growth of hazardous fungi.
- E. Verification must be supplied by the manufacturer that the polyurethane concrete based flooring system has passed, ASTM G 22-76: *Standard Practice for Determining Resistance of Plastics to Bacterial, Procedure B*. No evidence of E.coli or Salmonella cholerasuis growth should be observed.
- F. Owner and Contractor shall review and mutually agree upon color, grade and final texture and chemical-resistant of the polyurethane composite floor system before starting installation.

- G. Prior to commencing the installation, the Contractor shall install, with Owner's approval, a mutually agreed upon sample ("mock-up" 10' by 10') to show final color and texture of the system. This mock-up shall serve as a job standard for the final installation.

1.06 DELIVERY AND STORAGE:

- A. Material shall be delivered to project site in Manufacturer's original unopened containers bearing manufacturer's name, product and color.
- B. Comply with Manufacturer's ordering instructions and lead-time requirements to avoid construction delays.
- C. Materials shall be stored indoors, protected from damage, moisture, direct sunlight and temperatures below 50 degrees F or above 80 degrees F.

1.07 PROJECT CONDITIONS

- A. Evaluate the substrate condition, including moisture content and extent of substrate leveling and repairs required, if any.
- B. Coordinate flooring work with other trades to ensure adequate illumination, ventilation, and dust free environment during application and curing of flooring.
- C. Comply with material Manufacturer's recommended temperature limitations for flooring application.

1.08 WARRANTY:

- A. Contractor shall furnish a written warranty covering both material and workmanship for a period of one (1) year from date of installation.

PART 2 PRODUCTS

2.01 MANUFACTURER:

BASF Corporation/ Performance Flooring
 889 Valley Park Drive
 Shakopee, MN 55379
 Customer Service: 800-433-9517
 Technical Service: 800-243-6739
 Direct Phone: 952-496-6000
 Internet: www.master-builders-solutions.basf.us

2.02 MATERIALS:

- A. UCRETE HP and Ucrete WR (cove base) Slip Resistant Polyurethane Concrete Flooring system comprised of an integral broadcast of a solid color or neutral quartz blend in addition to a pigmented polyurethane or epoxy lockcoat.

2.03 PHYSICAL PROPERTIES:

- A. Flooring system shall comply with the following minimum test standards:

Property	Test Standard	Result
Compressive Strength	ASTM C-579	8,128 psi
Tensile Strength	ASTM C-307	880 psi
Flexural Strength	ASTM C-580	2,325 psi
Modulus of Elasticity	ASTM C-469	1.7×10^5 psi
Density	ASTM C-905	130 lb./ft ³

Coefficient of Thermal Expansion	ASTM C-531	2.7×10^{-5} in/in/°F
Water Absorption	ASTM C-413	< 0.1%
Resistance to Fungi Growth Property	ASTM G-21 Test Standard	Observed Growth - 1 Result
Thermal Conductivity	ASTM C-179	6.78 Btu in./in-Ft ² °F
Service Temperature		-50°F to 210°F (-45°C to 104°C)
Abrasion Resistance	ASTM C-779A	0.014 @ 30 min.
Impact Resistance	ASTM C-131/C-535	7.0% weight loss

B. Flooring system shall show no chemical attack when tested in accordance with ASTM D-1308 at ambient temperature for 28 days immersion against the following reagent and concentrations noted.

<u>Reagent</u>	<u>Reagent</u>	<u>Reagent</u>
Boric Acid 100%	Phosphoric Acid 80%	Chlorobenzene All
Acetic Acid 20%	Ethylene Glycol 100%	Fatty Acid 100%
Hydrochloric Acid 35%	Ethylene Dichloride All	Glycolic 100%
Sodium hypochlorite 27%	Maleic Anhydride 100%	Picric 5%
Citric Acid 40%	Lactic Acid 85%	Benzene 100%
Copper Sulfate (in solution)	Nitric Acid 30%	Diesel Fuel 100%
Muriatic Acid 35%	Benzoic Acid 100%	Stearic Acid All
Sulfuric Acid 30%	Butyl Alcohol 100%	Amyl Acetate All

Note: resistance to specific chemicals not listed above is likely possibly through the selection of an appropriate lockcoat.

*Chemical resistance data is dependent upon the lock coat used. Specifier should insert the appropriate chemical resistance of the lock coat specified.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS:

- A. Concrete must have a curing period of 7 days minimum. The surface must be clean and dry, physically sound and free of contamination. Surfaces must be free of holes, voids or defects. Cracks and abrupt changes in surface profile must be corrected. Fins and projections must be removed. All curing compounds and sealers must be removed.
- B. Verify that moisture content is within range acceptable to Manufacturer, using calcium chloride test kit in accordance with ASTM F-1869.
- C. Contractor must report, in writing, surfaces left in improper condition by other trades. Application will constitute acceptance of surfaces by the applicator.

3.02 PREPARATION:

- A. Prepare surfaces by shotblast or similar mechanical method, as recommended by manufacturer.
- B. Patch all depressions, divots, honeycombed or scaled concrete with polyurethane concrete filler, as recommended by manufacturer.
- C. Fill all static (non-moving) cracks or control joints, greater than 28 days old, with polyurethane concrete, as recommended by manufacturer.

- D. All control joints less than 28 days old must be re-cut and honored through flooring system, filled with control joint filler.
- E. Fill all active (moving) cracks or joints with a firm but flexible (or non-rigid) sealant material, as recommended by Manufacturer. Expansion joints should be re-cut in finished floor and filled with elastomeric joint sealant.
- F. Saw cut a groove in the concrete (key in) at all free edges around perimeters, along channels or expansion joints, at doorways and columns, with a depth and width equal to twice the thickness of the flooring system.

3.03 INSTALLATION:

- A. Comply with flooring system Manufacturer's recommendations.
 - 1. Mix 4 component polyurethane concrete flooring system according to Manufacturer's instructions.
 - 2. Spread material to a minimum thickness of 3/16" in one application and backroll to allow to flow. Immediately broadcast quartz aggregate to excess at a rate of one and half pounds of aggregate per square foot (1-1/2 lb/sq. ft.). Multiple broadcast coats are not acceptable.
 - 3. Allow to cure for 12 hours at 70-75°F and remove excess broadcast aggregate.
 - 4. Apply Ucrete DP Topcoat, Selby polyurethane or other approved epoxy lockcoat at 5 mils WFT by squeegee and backroll to the desired uniform finish. Allow for a 12-hour cure at 70-75°F.
- B. Cove Base: Where specified, install a (6 ") high integral cove base with a nominal 1" radius onto concrete curb surfaces. All cove bases shall terminate into a stainless steel Z channel stop or a 1/4" deep x 1/4" wide saw-cut into the wall.

3.04 CLEANUP

- A. Remove waste materials, rubbish and debris and dispose of them in accordance with local regulations. Leave work areas in a clean condition.

3.05 PROTECTION:

- B. Protect the completed Ucrete HP or HP/Q flooring system from water, airborne particles or other surface contaminants until cured and tack free, approximately (12) twelve hours at 70°F after application, or until all other trades on the construction project are completed with their project work.
- C. Protect completed system from immersion and chemical exposure until thoroughly cured, approximately 7 days.
- D. Protect from migrating plasticizers from tires that may discolor the floor. Rubber mats made specifically for this purpose should be utilized as protection under the tires.

END OF SECTION

**SECTION 09751
SOLID SURFACE WALL CLADDING**

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. This Section includes the following horizontal and trim solid surface product types:
 - 1. Shower stall wall cladding.
 - 2. Trim.

- B. Related Sections include the following:
 - 1. Division 6 Section "Rough Carpentry" for Blocking.
 - 2. Division 6 Section "Solid Surface Fabrications."
 - 3. Division 10 Section "Toilet Partitions."

1.3 DEFINITION

- A. Solid surface is defined as nonporous, homogeneous material maintaining the same composition throughout the part with a composition of acrylic polymer, aluminum trihydrate filler and pigment.

1.4 SUBMITTALS

- A. Product data:
 - 1. For each type of product indicated.

- B. Shop drawings:
 - 1. Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices and other components.
 - a. Show full-size details, edge details, thermoforming requirements, attachments, etc.
 - b. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, waste receptacle and other items installed in solid surface.

- C. Samples:
 - 1. For each type of product indicated.
 - a. Submit minimum 6-inch by 6-inch sample in specified gloss.
 - b. Cut sample and seam together for representation of inconspicuous seam.
 - c. Indicate full range of color and pattern variation.
 - 2. Approved samples will be retained as a standard for work.

- D. Product data:
 - 1. Indicate product description, fabrication information and compliance with specified performance requirements.

- I. Maintenance data:
 - 1. Submit manufacturer's care and maintenance data, including repair and cleaning instructions.
 - a. Maintenance kit for finishes shall be submitted.
 - 2. Include in project closeout documents.

1.5 QUALITY ASSURANCE

- A. Qualifications:

1. 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. Fabricator/installer qualifications:
 1. Work of this section shall be by a certified fabricator/installer, certified in writing by the manufacturer.
- C. Applicable standards:
 1. Standards of the following, as referenced herein:
 - a. American National Standards Institute (ANSI)
 - b. American Society for Testing and Materials (ASTM)
 - c. National Electrical Manufacturers Association (NEMA)
 2. Fire test response characteristics:
 - a. Provide with the following Class A (Class I) surface burning characteristics as determined by testing identical products per UL 723 (ASTM E84) or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1) Flame Spread Index: 25 or less.
 - 2) Smoke Developed Index: 450 or less.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver no components to project site until areas are ready for installation.
- B. Store components indoors prior to installation.
- C. Handle materials to prevent damage to finished surfaces.
 1. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

1.7 WARRANTY

- A. Provide manufacturer's warranty against defects in materials.
 1. Warranty shall provide material and labor to repair or replace defective materials.
 2. Damage caused by physical or chemical abuse or damage from excessive heat will not be warranted.
- B. Optional Installed Warranty:
 1. To qualify for the optional Installed Warranty, fabrication and installation must be performed by a DuPont Certified Fabrication/Installation source who will provide a brand plate for the application.
 2. This warranty covers all fabrication and installation performed by the certified/approved source subject to the specific wording contained in the Installed Warranty Card.
- C. Manufacturer's Warranty Period:
 1. Ten years from date of substantial completion.

1.8 MAINTENANCE

- A. Provide maintenance requirements as specified by the manufacturer.

PART 2 — PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers:
 1. Subject to compliance with requirements, provide products by one of the following:
 - a. Corian® solid surfaces from the DuPont Company (basis of design).
 - b. Insert manufacturer's name.
 - c. Insert manufacturer's name.

2.2 MATERIALS

- A. Solid polymer components
 1. Cast, nonporous, filled polymer, not coated, laminated or of composite construction with through body colors meeting ANSI Z124.3 or ANSI Z124.6, having minimum physical and performance properties specified.

2. Superficial damage to a depth of 0.010 inch (25 mm) shall be repairable by sanding and/or polishing.

B. Thickness:

1. 1/2 inch.

C. Edge treatment:

1. Ease all exposed edges

E. Performance characteristics:

Property	Typical Result	Test
Tensile Strength	6,000 psi	ASTM D 638
Tensile Modulus	1.5×10^6 psi	ASTM D 638
Tensile Elongation	0.4% min.	ASTM D 638
Flexural Strength	10,000 psi	ASTM D 790
Flexural Modulus	1.2×10^6 psi	ASTM D 790
Hardness	>85	Rockwell "M" Scale
	56	ASTM D 785 Barcol Impressor
Thermal Expansion	3.02×10^{-5} in./in./°C (1.80×10^{-5} in./in./°F)	ASTM D 2583 ASTM D 696
Gloss (60° Gardner)	5–75 (matte—highly polished)	ANSI Z124
Light Resistance	(Xenon Arc) No effect	NEMA LD 3-2000 Method 3.3
Wear and Cleanability	Passes	ANSI Z124.3 & Z124.6
Stain Resistance: Sheets	Passes	ANSI Z124.3 & Z124.6
Fungus and Bacteria Resistance	Does not support microbial growth	ASTM G21&G22
Boiling Water Resistance	No visible change	NEMA LD 3-2000 Method 3.5
High Temperature Resistance	No change	NEMA LD 3-2000 Method 3.6
Izod Impact (Notched Specimen)	0.28 ft.-lbs./in. of notch	ASTM D 256 (Method A)
Ball Impact	No fracture—1/2 lb. ball:	NEMA LD 3-2000
Resistance: Sheets	1/4" slab—36" drop 1/2" slab—144" drop	Method 3.8
Weatherability	$\Delta E^*_{94} < 5$ in 1,000 hrs.	ASTM G 155
Specific Gravity †	1.7	
Water Absorption	Long-term 0.4% (3/4") 0.6% (1/2") 0.8% (1/4")	ASTM D 570
Toxicity	99 (solid colors) 66 (patterned colors)	Pittsburgh Protocol Test("LC50"Test)
Flammability	All colors (Class I and Class A)	ASTM E 84, NFPA 255 & UL 723
Flame Spread Index	<25	
Smoke Developed Index	<25	

† Approximate weight per square foot: 1/4" (6 mm) 2.2 lbs., 1/2" (12.3 mm) 4.4 lbs.

Shapes meet or exceed the ANSI Z124.3 and ANSI Z124.6 standards for plastic sinks and lavatories. NEMA results based on the NEMA LD 3-2000

2.3 ACCESSORIES

- A. Joint adhesive:
 - 1. Manufacturer’s standard one- or two-part adhesive kit to create inconspicuous, nonporous joints.
- B. Panel adhesive:
 - 1. Manufacturer’s standard neoprene-based panel adhesive complying with ANSI A136.1-1967, UL listed.
- C. Sealant:
 - 1. Manufacturer’s standard mildew-resistant, FDA-compliant, NSF 51-compliant (food zone — any type), UL-listed silicone sealant in colors matching components.

2.5 FINISHES

- A. Select from the manufacturer’s standard color chart.
 - 1. Color: To be selected from manufacturer’s standard colors
- B. Finish:
 - 1. Provide surfaces with a uniform finish.
 - a. Semigloss; gloss range of 20–50.

PART 3 — EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with fabricator present for compliance with requirements for installation tolerances, and other conditions affecting performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.
 - 1. Provide product in the largest pieces available.
 - 2. Form field joints using manufacturer’s recommended adhesive, with joints inconspicuous in finished work.
 - a. Exposed joints/seams shall not be allowed.
 - 3. Reinforce field joints with solid surface strips extending a minimum of 1 inch on either side of the seam with the strip being the same thickness as the top.
 - 4. Cut and finish component edges with clean, sharp returns.
 - 5. Rout radii and contours to template.
 - 6. Carefully dress joints smooth, remove surface scratches and clean entire surface.

3.3 REPAIR

- A. Repair or replace damaged work, which cannot be repaired to architect’s satisfaction.

3.4 CLEANING AND PROTECTION

- A. Keep components clean during installation.
- B. Remove adhesives, sealants and other stains.

3.5 SCHEDULE

- B. Tub and shower walls surfaces:
 - 1. Surfaces of material adhesively joined with inconspicuous seams.

	Color	
a. Vertical Thickness _____	_____	_____
b. Inlay _____	_____	_____
c. Edge Details _____	_____	_____
d. Finish _____	_____	_____

SECTION 09700 – FIBERGLASS REINFORCED PANELS**1.00 - GENERAL**

1.01 DESCRIPTION

- A. Work included:
 - 1. Fiberglass Reinforced Panels (FRP)
 - 2. Moldings for panels
- B. Related work specified elsewhere:
 - 1. Gypsum Drywall – Section 09250

1.02 QUALITY ASSURANCE

- A. Manufacturer: An established firm manufacturing FRP building fabrications and to have been in business a minimum of 5 years.

1.03 SUBMITTALS

- A. Shop drawings: Submit and show layout of panels and dimensions.
- B. Samples: Submit 3 - 6"x 6" flat samples of product for Architect approval.

1.04 PROJECT CONDITIONS

- A. Field measurements: Prior to manufacturer, obtain field dimensions for verifications of shop drawing dimensions.
- B. Environmental: Building fully enclosed prior to installation with sufficient heat (70°F) and ventilation consistent with good working conditions for finish work.

1.05 PRODUCT HANDLING

- A. Delivery: Deliver materials in manufacturer's factory packages on strong pallets.
- B. Storage: Store materials lying flat, under cover and protected from the elements. Allow panels to acclimate to room temperature (70°F) for 48 hours before installation.

1.06 WARRANTY

- A. Prove a written guaranty stating that the FRP panels are free from defects or loosening from subsurface (other than by malicious cause) for a period of one (1) year from date of completion.

2.00 – PRODUCTS

2.01 MANUFACTURER

- A. Acceptable manufacturer: Marlite, 202 Harger St. Dover, OH. 330.343.6621.

2.02 MATERIALS

- A. Fiberglass Reinforced Panels: Marlite FRP Panels, 48"x 108" x .085".
 - 1. Surface: Pebbled, color as selected.
 - 2. Technical support:
 - a. Fire rating: Class A
 - b. ICBO: Report # ER-5489
 - c. USDA: Compliant for incidental food contact
- B. Trim: Extruded PVC with integral color to match panels.
 - 1. Inside Corner M 350
 - 2. Outside Corner Guard F 560 Stainless Steel
 - 3. Division M 365
 - 4. Edge M 370
- C. Adhesive: C-375 Marlite Construction Adhesive.
- D. Sealant: Marlite MS 250 Clear Silicone Sealant

3.00 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Subsurfaces: Inspect building, prior to commencement of work, to determine if subsurfaces are in proper condition to receive FRP . Advise Contractor and Architect if surfaces are not acceptable and must be corrected prior to installation.
- B. Commencement of work: Construed as acceptance of building conditions and subsurfaces.

3.02 PRELIMINARY

- A. Examination: Open cartons, carefully inspect all panels. Contact Marlite with questions or problems.
- B. Conditioning: Open panels and allow to acclimate for 48 hours prior to installation. Room temperature 70°F.

3.03 INSTALLATION

- A. Installation: Apply panels over a smooth, solid, flat, clean subsurface with adhesive without distortion. Install in accordance with manufacturer's installation instructions.
- B. Adjustments: Make any adjustments required to insure a firm installation, including re-fabrication of poorly fitted panels.
- C. Moldings: Install all moldings at panel divisions, interior and exterior corners and edges. Provide for 1/8" expansion joint to insure proper installation.

3.04 MAINTENANCE

- A. Wipe down panels using a damp cloth and mild soap solution or cleaner. Do not use abrasive cleaners.
- B. Refer to manufacturer's cleaning recommendations. Provide Owner with a copy for future care and maintenance.

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SECTION 09900 - PAINTING**1.00 GENERAL**

1.01 DESCRIPTION

- A. Work included: Furnish and install all painting and finishing work as shown on the drawings and/or specified
 - 2. It is the intent of these specifications that all surfaces whether particularly mentioned or not, be finished in the same manner as specified herein for similar work.
- B. Surfaces not to be finished, unless noted otherwise:
 - 1. Non-ferrous metal surfaces.
 - 2. Brick and stone veneer
 - 3. **Wood fence? Natural or stained?**
 - 4. Plumbing and electrical fixtures and trim.
 - 5. Factory finished materials with complete factory applied finish.
 - 6. Any surfaces specifically scheduled or noted as not to be painted.
- C. Definitions
 - 1. Terms "Paint" or "Finish", as used herein shall be considered to include all formulated finishes, such as sealers, primers, stains, enamels, acrylics, latexes, varnishes and emulsions.
 - 2. The word "provide" as used in this Section shall mean "Furnish and install or apply complete in place".

1.02 REQUIREMENTS OF REGULATORY AGENCIES

- A. Occupational Safety and Health and Pollution Regulations: Conform to the Federal and State requirements for painting work applicable to this project.
- B. Codes: Conform to any special local code requirements applicable to work in this Section.

1.03 QUALIFICATIONS

- A. Manufacturer and Materials: Kelly-Moore Paint Co.
- B. Substitutions: Not permitted unless approved by Architect.

1.04 COLOR REQUIREMENTS

- A. Colors: Architect will prepare and furnish the Contractor with a complete color schedule selected from paint manufacturer's standard colors. Architect reserves the right to select, allocate and vary colors on different surfaces throughout the building.
- 1.05 SUBMITTALS
- A. Materials List: Submit a complete materials list of all items proposed to be furnished and installed.
 - B. Technical Data:
 - 1. Submit manufacturer's specifications and other data required to demonstrate compliance with the specified requirements.
 - C. Samples: Prior to starting any painting work, prepare color samples, not less than 8" x 10" in size. Furnish additional samples as required until colors, finishes and textures are approved. Retain approved samples as the quality standard for final finishes.
- 1.06 PRODUCT HANDLING
- A. Delivery of Materials: Deliver paint materials to jobsite in sealed, original, labeled containers, each bearing manufacturer's name, type of paint, brand name, color designation and instructions for mixing and/or reducing. No jobsite tinting permitted on finish coats, except as approved by Architect.
 - B. Storage of Materials: Adequate storage facilities are to be made available at jobsite. Store paint materials at a minimum ambient temperature of 45° F. in a well ventilated and heated designated area.
 - C. Fire Hazard and Safety: Take all necessary precautionary measures to prevent fire hazards and spontaneous combustion.
 - D. Toxic Materials: Where toxic materials, and both toxic and explosive solvents are used, take appropriate precautions, as a regular procedure, conforming to the manufacturer's recommendations therefor, and to the requirements of the applicable safety regulatory agencies. In applying acid etch coating or solutions to metals, concrete, plaster, and toxic materials to copper, provide ventilation and take protective measures to conform to requirements of safety regulatory agencies.
- 1.07 ENVIRONMENTAL CONDITIONS
- A. Temperatures:
 - 1. Except as noted hereinafter, do not paint when temperatures on the surface and of the air in the vicinity of the painting work are below plus 40°F. or below those temperatures recommended by manufacturer for the material type used. Minimum temperatures for latex finishes, not be less than 50°F. for exterior work unless specifically approved by Architect.
 - B. Lighting: No not proceed with work unless adequate lighting is available.
 - C. Ventilation: Provide adequate, continuous ventilation as required for the various specified materials used in the spaces scheduled but in no case for a time less than that recommended by the paint manufacturer for drying.
- 1.08 PROTECTION

- A. General: Adequately protect other surfaces from paint and damage caused by this work. At no cost to Owner, repair any damage caused by failure to provide suitable protection but not any damage caused by other trades.
- B. Drop Cloths: Provide sufficient drop cloths, shields and protective equipment to prevent spray of drippings from fouling surfaces not being painted and, in particular, surfaces within the paint storage and preparation areas.
- C. Removal of Flammable Rubbish: Place cotton waste, cloths and material which may constitute a fire hazard in closed metal containers and remove daily from site.
- D. Removal of Hardware and Miscellaneous Items:
 - 1. Remove electrical outlet and switch plates, mechanical diffusers, escutcheons, surface hardware, fittings and fastenings prior to starting work.
 - 2. Store, clean and replace these items upon completion of work in each area. Use no solvent or abrasives to clean hardware that will remove the permanent lacquer finish normally used on some of these items.

2.00 PRODUCTS

2.01 GENERAL

- A. Primers and succeeding coats of any given system shall be from the same manufacturer. Materials not specifically specified and required for the work such as linseed oil, shellac, thinners or other materials, of a quality not less than required by applicable Federal or State Specification Standards, and as manufactured by approved firms.

2.02 MATERIALS

- A. Manufacturer's materials: Specified by brand names to establish a standard of quality or by performance requirements and general description of product. The Architect will consider substitutions for brand names of products specified. The Architect reserves the right to reject any materials which, in his opinion, will not produce work specified herein. Deliver only accepted and approved materials.
- B. List of Materials: Not less than 15 days before beginning work, submit a complete list in triplicate, of all materials proposed for use, together with manufacturer's specifications. Paint materials and products subject to Architect's approval.
- C. Unsuitability of specified products: No claim by the contractor concerning the unsuitability of any material specified or his inability to produce first class work with same will be entertained unless such claim is made in writing to the Architect before the work is started.
- D. Color and life of film: Colors of all surfaces finished under this Section shall, at the end of one year, have remained free from serious fading and variations, if any, shall be uniform. All materials shall have their original adherence at the end of one year, and there shall be no evidence of blisters, running, peeling, scaling, chalking, streaks or stains at the end of this period. Washing with alkali-free soap and water shall remove surface dirt without producing any deteriorating effects.

2.03 MIXING

- A. General: Furnish paints ready-mixed.

3.00 EXECUTION

3.01 INSPECTION

- A. Examine all subsurfaces to receive painting work: Report to Architect, any conditions which would prove detrimental to the work.
- B. Commencement of work: Construed as acceptance of subsurfaces.

3.02 PREPARATION

- A. General: Do not start painting until surfaces to be painted are in proper condition in every respect. Surfaces that cannot be properly prepared for finishing shall not be painted until they are rectified, unless instructed otherwise by Architect.
- B. Surfaces to be painted: Clean, free of dirt, dust, loose paint, check paint, chalking, rust, scale, oil, grease, mildew, chemicals and any other substance which might interfere with functioning of painting system. All surfaces to be painted shall be in proper condition to accept, and assure proper adhesion and functioning of particular painting system or coating specified.
- C. Steel and ferrous metal: Solvent clean to remove dirt, oil and grease, before applying materials. Remove rust and scale by wire brushing or sanding clean before painting. Clean and apply primer to bare metal.
- D. Wood: Sand and dust clean.

3.03 WORKMANSHIP AND APPLICATION

- A. Do not perform painting work under conditions which jeopardize appearance or quality of painting or finishing in any way. Architect shall have right to reject all material or work that is, in his opinion, unsatisfactory, and reserves right at all times to replace either or both at expense of contractor.
- B. Apply each coat of paint at proper consistency and brush evenly, free of brush marks, sags, runs, and with no evidence of poor workmanship. Exercise care to avoid lapping of paint on adjacent surfaces. Paint sharply cut to line. Ensure all coats are thoroughly dry before applying succeeding coats. Sand surfaces between coats as necessary to produce a smooth finish. Finished paint surfaces free from defects or blemishes.
- C. Do not paint in areas that are not free from dust, dirt and rubble.
- D. Painting shall include all exposed surfaces of every member. Parts to be painted, inaccessible after installation, shall be painted before installation. Priming shall include all sides, edges and cut ends.
- E. Provide additional coat at no extra expense to Owner, where coverage is incomplete or not uniform.
- F. Prime coats and finish coats for any one paint system shall be the products of the same manufacturer.

- G. Apply putty, caulk or spackle after the surface is primed and the primer is dry.
- H. Remove hardware, hardware accessories, plates, lighting fixtures and similar items in place prior to painting. Replace upon completion of work.
- I. Wash metal surfaces with mineral spirits to remove dirt, oil and grease, before applying materials. Remove rust and scale by wire brushing or sanding clean before painting. Clean and touch-up shop coats of paint that have become damaged.
- J. Finish door top, bottom and edges same as face surfaces.
- K. Finish manufactured items, to match adjacent wall and ceiling surfaces, unless otherwise directed.
- L. Apply all coatings without reduction except as specifically required by label directions or required to be reduced by this specification. In such cases, reduction shall be the minimum permitted.
- M. Apply all finishes in accordance with manufacturer's latest specifications, instructions and recommendations.

3.04 CLEANING

- A. On completion of the work, carefully clean all glass, hardware, etc. and remove all misplaced paint and stain spots or spills and leave work in an acceptable condition.
- B. Touch-up and restore finish where damaged.

3.05 PAINT SCHEDULE

Paint schedule is based on Kelly Moore products, unless otherwise noted.

- A. Exterior:
 - 1. Plaster or Concrete
 - 1 coat 220 Exterior Primer
 - 2 coats 1240 Acry-Shield Acrylic Flat Finish
 - 2. Wood:
 - 1 coat 220 Exterior Primer
 - 2 coats 1240 Acry-Shield Acrylic Flat Finish
 - 3. Wood Fencing:
 - 1 coat XXX Stain
 - 2 coats XXX Polyurethane sealer
 - 4. Steel:
 - 1 coat, 1725 Kel-Guard Acrylic Metal Primer (omit if shop primed)
 - 2 coats, 1250 Acry-Lustre Acrylic Semi-Gloss Finish
 - 5. Galvanized Steel:
 - 1 coat, 1722 Kel-Guard Galvanized Iron Primer
 - 2 coats 1250 Acry-Lustre Acrylic Semi-Gloss Finish
- B. Interiors:

1. Gypsum Drywall:
1 coat, 970 Acry-Plex Hi-Hide Vinyl Wall Sealer
1 intermediate coat, 1615 Latex Eggshell Stipple
1 coat, 1610 Sat-N-Sheen Latex Wall & Trim Finish

3. Wood – Painted:
1 coat, 985 Flo-Cote Enamel Undercoat
2 coats, 1630 Kel-Cote Alkyd Semi-Gloss Enamel

4. Steel:
1 coat, 1625 Kel-Guard Acrylic Metal Primer (omit if shop primed)
2 coats, 1650 Acry-Plex Latex Semi-Gloss Enamel

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SECTION 10050 - MISCELLANEOUS BUILDING SPECIALTIES**1.00 GENERAL**

1.01 DESCRIPTION

- A. Work included: Furnish and install all miscellaneous building specialties as shown and/or specified, including:
1. Fire extinguishers
 2. Entry Mats
 3. Rapid entry keybox
 4. Wall mounted TV monitor mounting brackets

1.02 SUBMITTALS

- A. Shop drawings: Prior to fabrication, submit shop drawings for approval of all items specified showing sizes of members, methods of construction and mounting techniques.
- B. Brochures: In the case of manufactured items, submit manufacturer's brochures or product literature for approval prior to purchase. Literature shall include all necessary information, sizes, gages, etc., for determining compliance with specifications.

1.03 MEASUREMENTS

- A. Field measurements: Verify all dimensions by taking field measurements, proper fit and attachment of all items is required.

1.04 PRODUCT HANDLING

- A. Delivery: Deliver manufacturer's materials in the original packages bearing manufacturer's name and brand.
- B. Storage: Store materials in dry protected areas. Protect from rusting and other damage. Remove any damaged items from the site and replace at no cost to the Owner.

2.00 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. General: All materials and equipment new and the best of their respective kinds, free from defects and of brand and quality specified or as approved.
- B. Anchorage devices: Furnish and install all anchorage devices as required to secure all items to the construction, as detailed or as necessary to install the item and its appurtenances, complete. Provide anchorage in ample time when required to be built-up by other trades.

2.02 FIRE EXTINGUISHERS

- A. Fire Extinguisher: ABC Multi-Purpose Dry Chemical, Potter-Roemer No. 3005, 5 lb., UL 2A:10B:C, 15 1/4" x 4" dia.

- B. Cabinet: 20 ga. box, 20 ga. tublar steel door with 20 ga. frame, continuous steel hinge (brass pin). Bubble-Type, Potter-Roemer No. 1770, recessed, clear polycarbonate bubble, powder-coated red finish door and frame, box white finish.

2.02 ENTRY MATS

- A. Mat: Heavy-Duty Rubber Entrance Mats: Pawling LT-50 Dura-Tile, 12"x 12" tile, 100% recycled rubber, muted gray earth tone. Glue down installation.
- B. Frame: Recessed level bed, MRF-1005, Solid Aluminum Architectural Bronze.

2.04 RAPID ENTRY KEYBOX

- A. Keybox: Knox-Box # 3270 recessed, hinged door, UL listed tamper switches, box and lock UL listed. (Knox Co. Irvine CA. 800.552.5669) or SupraSafe equal.
- B. Order form: Obtain from Fire Department and with authorized signature.
- C. Placement: Recessed, 6 ft to top of box, adjacent to each entry (2).
- D. Accessories:
 1. Fire alert decal, one per Keybox.
 2. Key tags, colored tags with hooks.

2.05 TV MONITOR MOUNTING SYSTEMS

- A. TV Monitor Mount: Mounting Dream® UL Certified MD2296 TV Wall Mount Bracket with Full Motion Dual Articulating Arm for 42-70 Inch LED, LCD and Plasma TVs up to VESA 600x400mm. Weight limit: 100 lbs. With Tilt, Swivel, and Rotation Adjustment
- B. Accessories: 6 ft HDMI Cable and Bubble Level.
- C. Contractor to provide in wall 4x blocking at height and width in the wall to accommodate mounting the monitor mount.
- D. Approximate TV sizes (TV's to be supplied by the District)
 - Day Room one 65-70"
 - Dorms: six 28-32"

3.00 EXECUTION

3.01 CONDITION OF SURFACES

- A. Prior to installation, inspect all subsurfaces and structure to which building specialty items are applied or installed. Report in writing to Contractor with a copy to Architect, any conditions which may prove detrimental to this work.
- B. Commencement of work shall be construed as acceptance of building conditions and structure.

3.02 COORDINATION

Coordinate work and cooperate with any other trades whose work relates to building specialty items in any way.

3.03 INSTALLATION

Install all items specified herein true, square, plumb, accurately fitted and in accordance with manufacturer's directions.

3.04 CLEAN-UP

On completion of work, remove all excess material, equipment, debris and cuttings; dispose of same away from premises. Leave work in clean, acceptable condition.

* * * * *

SECTION 10155 - TOILET COMPARTMENTS**1.00 GENERAL**

1.01 DESCRIPTION

- A. Work included:
 - 1. Toilet compartments as shown.
- B. Related work specified elsewhere:
 - 1. Toilet Room accessories - Section 10800

1.02 SUBMITTALS

- A. Samples: Submit 3 samples of manufacturer's standard colors for selection.
- B. Shop drawings: Submit for approval prior to fabrication.

1.03 STANDARDS

- A. Toilet compartments: Conform to applicable requirements of Americans with Disabilities Act (ADA), American National Standards Institute (ANSI), American Society of Testing and Materials (ASTM)

1.04 FIELD MEASUREMENTS

- A. Prior to fabrication, verify all dimensions shown on drawings by taking field measurements; proper fit and attachment of all parts is required.

2.00 PRODUCTS

2.01 TOILET COMPARTMENTS

- A. Type: Floor Anchored/Overhead Braced, Solid Phenolic Partitions, Bradely Series 400, Sentinel.
- B. Materials: Doors and stiles, 3/4" thick. Panels 1/2" thick. Solid phenolic core with multiple resin impregnated kraft, color and clear Melamine surface sheets fused at high temperature and pressure. Black edges.
- C. Hardware:
 - 1. Material: 18-8, type 304 stainless steel, satin finish.
 - 2. Hinges: 3 stainless steel hinges, self lubricating Dupont "Delrin" cams, adjustable. Attach to door and stile bt theft-resistant one-way stainless steel machine screws into factory installed threaded metal inserts.
 - 3. Doors: Supply with coat hook, bumper, stop, keeper and concealed latch with emergency access. At accessible compartment inside and outside face, install a loop or U-shaped handle immediately below the latch. Latch must be flip-over style, sliding or other hardware not requiring tight grasping or twisting. ADA compliance.

4. Mounting brackets: 18 gage stainless steel. Secure to wall with anchoring and/or expansion shields.
 5. Stile shoes: One piece, 4" high Type 304 22 gauge stainless steel, satin finish.
 6. Screws: Vandal-resistant, Pin-in-Head Torx screws for all hardware.
- E. Floor Anchored Overhead Braced: Provide headrail to bridge all components and brace the end of freestanding pilasters to the wall.
1. Headrail: Anodized aluminum, satin finish, contoured to provide anti-grip features.
- F. Color: As selected from manufacturer's standard colors.

2.02 URINAL SCREENS

- A. Type: Solid Phenolic Partitions, Bradley Phenloic 400 Series, Sentinel .Post-to-Ceiling Screens. Panels 17" wide x 48" high solid core construction partitions. Post 1 3/4" sq. x full height, satin finish aluminum,.

3.00 EXECUTION

3.01 COORDINATION

- A. Coordinate with other trades whose work related to toilet compartments for placing of required backing and furring to insure proper locations.

3.02 INSTALLATION

- A. Install partitions in accordance with manufacturer's directions, with doors and hardware operating smoothly.
- B. Erect doors and side panels in a sturdy, substantial manner, straight, true and plumb with all horizontal lines level and partitions or pilaster fitted rigidly to wall and floor.
- C. Approximately 1" clearance at walls. Conceal all evidence of drilling, cutting and fitting in finished work. Uniform clearance at vertical edges of doors from top to bottom, 3/16" maximum. Doors out-of-wind not acceptable. Adjust hardware and leave in working order.

3.03 CLEANING

- A. Clean finished surfaces and leave free of imperfections.

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SECTION 10420 - SIGNAGE

1.00 GENERAL

1.01 DESCRIPTION

- A. Work included: Building Signs for:
 - 1. Building name number
 - 2. Lighted building address number
 - 3. Entry signage
 - 4. Toilet Rooms
 - 5. All other Rooms
- B. Related work specified elsewhere:

1.02 STANDARDS

- A. Signage: Conform to applicable requirements of:
 - 1. California Building Code, Chapter 11
 - 2. American National Standards Institute, ANSI A117.1-1986

1.03 SUBMITTALS

- A. Samples: Submit for each sign component for selection of color, pattern and texture.
- B. Shop drawings: Submit showing type, layout, anchorage and installation.

1.04 DELIVERY, STORAGE AND PROTECTION

- A. Delivery: Schedule to minimize job storage.
- B. Storage: Store in a clean dry place out of way of construction.
- C. Protection: Protect from damage and moisture.

1.05 JOB CONDITIONS

- A. Field measurements: Take prior to preparation of shop drawings and fabrication to ensure proper fit.

2.00 PRODUCTS

2.01 BUILDING SIGNS

- A. Metal letters: Aluminum, alloy 5052, flat cut metal, finish anodized Medium Bronze. Erected with flush mounting studs. Style, Helvetica, upper case and lower case as shown. Furnish full size spacing and drilling template. (Gemini Inc., 1-800-538-8377).
 - 1. Building Sign to read: "LifeMoves". Upper case letters, 1'-6" high x 2" depth

2. Building number sign to read: "1580" mounted as shown on the drawings. 8" high x 2" depth
3. Installation: At Maple Street concrete entry porch wall slab

2.02 TOILET ROOMS

- A. Manufacturer and Type: Best Sign Systems, Standard Word & Picture (WP) signs, "MP" plastic, raised symbols. Type style, Helvetica Standard Medium. Grade 2 Braille for ADA compliance.
- B. Mounting: Vinyl foam tape 1/16".
- C. Door mounted: "Men's Toilet/Shower", "Women's Toilet/Shower", "Men's ADA Shower", "Women's ADA Shower"
- D. First Floor ADA toilet wall at lockset side of door: 6" x 8" Pictogram. Unisex, similar WP288RB, wheelchair symbol. Door mounted 12" circle with 12" triangle superimposed Unisex symbols, wheelchair symbol and copy, Unisex.
- E. Colors: White letters, Braille and symbols, background blue.
- F. Mounting height: 60" from finish floor to center line of sign.

2.03 ALL OTHER ROOMS

- A. Plaque material: 3-ply melamine plastic laminate, 2 color, scratch resistant, non-static, fire retardant, washable with non-glare surface and brown phenolic core painted a contrasting color after artwork has been carved into surface. Thickness, 1/8".
- B. Style: Helvetica.
- B. Room numbers: 1 1/2" high, raised 1/32", sans serif. Grade 2 Braille at the right side of number.
 - a. Numbers in accordance with room numbers on architectural floor plans i.e. 101, 201 etc. Place number signs at all rooms on wall at lockset side of door. Mounting height, 60" from finish floor to center line of sign.
- D. Room names: 1" high, raised 1/32". Grade 2 Braille under the name. Place name sign at all rooms on wall at lockset side of door. Top edge of sign 2" below number sign.
- E. Margins: Sides, 1"; top and bottom, 1/2".
- F. Corners: Square.
- G. Mounting: Vinyl foam tape and silicone seal.

2.04 BUILDING ENTRYS

- A. Entry doors: Plastic sign displaying the international symbol of accessibility. Place on right hand door sidelight, 60" above floor to center line of sign.

3.00 EXECUTION

3.01 CONDITION OF SURFACES

- A. Subsurfaces: Prior to installation, inspect subsurfaces to which signs will be applied. Report to Contactor, copy to Architect any conditions that would be detrimental to this work.
- B. Commencement of work: Construed as acceptance of building conditions.

3.02 INSTALLATION

- A. Signs: Install level, plumb and at heights indicated with surfaces free from distortion or other defects in appearance.

3.03 CLEANING AND PROTECTION

- A. Cleaning: After installation, clean soiled sign surfaces in accordance with manufacturer's directions.
- B. Protection: Protect signs from damage until completion of building.

SECTION 10800 - TOILET ROOM ACCESSORIES**1.00 GENERAL****1.01 DESCRIPTION**

- A. Work included:
 - 1. Soap dispensers.
 - 2. Paper towel dispensers.
 - 3. Waste receptacles.
 - 4. Toilet seat cover dispensers.
 - 5. Toilet paper dispensers
 - 6. Mirrors.
 - 7. Shower rods and curtains.
 - 8. Folding shower seats.
 - 9. Grab bars.
 - 10. Hooks.
 - 11. Napkin/Tampon vendor
 - 12. Napkin/Tampon disposal

- B. Related work specified elsewhere:
 - 1. Section 061000 - Rough Carpentry, coordination with blocking.
 - 2. Section 092000 - Plaster and Gypsum Board, coordination with blocking.
 - 3. Section 093000 - Tiling, coordination with layout and installation.
 - 4. Section 102113 - Toilet Compartments, coordination with accessories.

1.02 SUBMITTALS

- A. Product Data: Submit for approval manufacturer's brochures including all necessary information, sizes, gage, etc.

1.03 FIELD MEASUREMENTS

- A. Prior to purchase, verify all dimensions shown on by taking field measurements; proper fit and attachment of all parts is required.

1.04 DELIVERY AND STORAGE

- A. Deliver and store materials in dry, protected areas. Keep free of corrosion or other damage. Replace any damaged parts at no cost to Owner

1.05 WARRANTY

- A. Manufacturer's Warranty for Washroom Accessories: Manufacturer's standard 1 year warranty for materials and workmanship.

2.00 -PRODUCTS

2.01- MANUFACTURER

- A. Basis of Design: Bradley Washroom Equipment, Inc., www.bobrick.com.
 - 1. Location of Manufacturer: United States.

- B. Automatic Counter-Mounted Soap Dispensers:
 - 1. Basis of Design: Bobrick Model 6324 Countertop-Mounted Foam Soap Dispenser. Dispenses bulk all-purpose foaming hand soaps.
 - 2. Liquid Soap Dispenser.
 - a. Dispenses bulk all-purpose liquid hand soaps.
 - b. Volume of soap dispensed is field-adjustable.
 - 3. Foam Soap Dispenser.
 - a. Dispenses bulk foaming liquid hand soaps. Operation: When hand is placed under soap spout for approximately 1 second, spout will dispense field-adjustable amount of soap.

- C. Surface-Mounted Paper-Towel Dispensers:
 - 1. Basis of Design: Bradley Model 250-15.
 - a. Latching: Tumbler lock keyed like other units
 - b. Capacity: 400 C-fold or 525 multifold towels 3-1/8 inches to 3-13/16 inches (79 mm to 97 mm) deep.
 - 2. Overall dimensions: 11"W x 15 5/16"H x 4"D.
 - 3. Door: 18-8, Type 304, 22 gauge (0.8mm) stainless steel with satin finish.
 - 4. Cabinet: All-welded, 18-8, Type 304, 22 gauge (0.8mm) stainless steel with satin finish on exposed surfaces.
 - 5. Cabinet Back: Formed to recess mounting slots to prevent mounting screw heads from snagging towels.
 - 6. Hinge: Full-length stainless steel piano-hinge.
 - 7. Mounting kit (#899-027) available through Bradley
 - 8. Towel Dispensing: Hemmed towel tray opening dispenses towels without tearing.
 - 9. Filling: Door swings down for loading towels into cabinet.
 - 10. Refill Indication: Two slots on each side of cabinet indicate refill time.

- D. Floor-Standing Waste Receptacles:
 - 1. Basis of Design: Bradley Model 377-36-37.
 - a. Top: Open-top, no cover.
 - b. Capacity: 21 gallons (79.5 L).
 - 2. Receptacle: 22 gauge (0.8mm), Type 400 stainless steel with satin finish; equipped with vinyl bumper strip and rubber feet and hooks to attach optional removable liner.

3. Cover: None
- E. Circular Waste Chute for Countertops:
1. Basis of Design: Bradley Model P10-696.
 2. Circular Waste Chute: Type 300, 24 gauge (0.6mm) stainless steel with bright polish finish on exposed surfaces; designed for installation in 5-5/8 inch (140mm) +/- 1/16 inch (1.5mm) diameter hole in any countertop.
- F. Toilet Paper Dispensers, Recessed, Double roll
1. Basis of Design: Bradley Classic Model 5402
 2. Materials: 18-8, Type 304 stainless steel with satin finish.
 3. Anti-theft spindle
- G. Toilet Paper Dispensers, Combi-unit wall mounted recessed
1. Basis of Design: Bradley Classic Model 5922
 2. Materials: 18-8, Type 304 stainless steel with satin finish.
 3. Two paper roll
 4. Allows grab bar clearance
- H. Surface-Mounted Toilet Seat Cover Dispensers:
1. Basis of Design: Bradley Classic Model 584.
 - a. Latching: Tumbler lock keyed like other units
 2. Materials: 18-8, Type 304 stainless steel with satin finish.
 3. Construction: All-welded, 22 gauge (0.8 mm); with beveled opening.
 4. Filling: Concealed opening in bottom for filling.
 5. Capacity: 500 single-fold or half-fold toilet seat covers
- I. Stainless Steel, Welded, Angle Frame Mirrors:
1. Basis of Design: Bradley Model 7805-1836
 - a. Overall Size: 18 inches (610 mm) W x 36 inches (914 mm)
 2. Angle Frame:
 - a. Materials: Type 304 stainless steel angle 3/4 inch x 3/4 inch (19 x 19 mm), with satin finish with vertical grain on exposed surfaces.
 - b. Construction: One-piece, roll-formed construction with continuous integral stiffener.
 - c. Design: Beveled design on front of angle to hold mirror tightly against frame; prevents exposure to sharp edges.
 - d. Corners: Heliarc welded, ground, and polished smooth.
 3. Mirror:
 - a. No. 1 quality, 1/4 inch (6 mm) float/plate glass.
 - b. Edges: Protected with plastic filler strips.
 - c. Back of Mirror: Protected by full-size, shock-absorbing, water-resistant, non-abrasive 3/16 inch (5 mm) thick polyethylene padding.
 4. Mounting: Removable, galvanized steel back with integral horizontal hanging brackets located at top and bottom for mounting on Concealed one-piece rectangular wall hanger(s); galvanized steel back fastened to frame with Concealed screws to permit glass replacement; attachment by rivets or tabs is not acceptable; Concealed Phillips head locking setscrews secure mirror to wall hanger in bottom of frame.

- J. Shower Curtain Hooks:
1. Basis of Design: Bradley Part No. 9540 Shower Curtain Hook.
 2. Materials: 18-8, Type 304, 0.09 inch (2 mm) diameter stainless steel with nickel plated brass rollers
 3. Operation: Can be used with 1 inch and 1-1/4 inch (25 and 32 mm) diameter rods.
- K. Vinyl Shower Curtains:
1. Product: Bradley Part No. 9533
 - a. Width: 42 inch (1065 mm), requires 7 hooks (not included).
 - b. Width: 72 inch (1829 mm) requires 12 hooks (not included).
 2. Curtain: Opaque, matte white, 6 gauge thick vinyl containing antibacterial and flame-retardant agents; hemmed bottom and sides.
 3. Grommets: Nickel-plated brass, along top edge every 6 inches (150 mm).
 4. Height: 72 inch (1830 mm).
- L. Shower Curtain Rods With Concealed Mounting:
1. Basis of Design: Bradley Model 9538x36 or 9536x72
 - a. Length: 36 inch (915 mm) or 72 inch.
 2. Curtain Rod: 18-8, Type 304, 20 gauge (1.0 mm) stainless steel tubing with satin finish.
 3. Outside Diameter: 1 inch (25 mm).
 4. Flanges: 1-3/8 inch (35 mm) in diameter, chrome-plated plastic with bright polish finish, mount on concealed wall brackets.
 5. Mounting: Concealed aluminum brackets.
- M. Folding Shower/Dressing Seat
1. Basis of Design: Bradley Model 9562
 - a. Compact design constructed of durable, water resistant, ivory colored, 1/2" thick solid phenolic.
 - b. Seat: 28.5" wide, projects 15" from wall when folded down
 - c. Frame and mounting bracket are 304 stainless steel and self-locking mechanism
 - d. Supports up to 400 pounds
- N. Stainless Steel Grab Bars: Horizontal, with snap flange covers:
1. Basis of Design: Bradley Model 812-2 Grab Bar for Toilet Compartment/Tub/Shower.
 - a. Finish: Safety grip finish.
 - b. Size: 36 inch and 42 inch x 54 inch (1067 mm x 1372 mm).
 2. Compliance: Accessibility guidelines (including ADAAG) for structural strength.
 - a. Capacity: Designed to support 1000 lbs (408 kg) in compliant installations.
 3. Description: Clearance between grab bar and finished wall is 1-1/2 inches (38 mm).
 4. Grab Bar Materials: 18-8, Type 304, stainless steel tubing with satin finish.
 5. Grab Bar Construction: 18 gauge (1.2 mm), ends heliarc welded to flanges.

6. Outside Diameter: 1-1/2 inch (38 mm).
 7. Mounting Flanges: Concealed, 18-8, Type 304, 1/8 inch (3 mm) thick, stainless steel plate.
 - a. End Flanges: 2 inches x 3-1/8 inches (50 mm x 80 mm) with two holes for attachment to wall.
 - b. Intermediate Flanges: 2-5/8 inches x 3-1/8 inches (65 mm x 80 mm) wide x 3-1/8 inch (80 mm) diameter.
 8. Snap Flange Covers: 18-8, Type 304, 22 gauge (0.8 mm) drawn stainless steel with satin finish, 3-1/4 inch (85 mm) diameter x 1/2 inches (13 mm) deep; snap over mounting flange to conceal mounting screws.
- O. Heavy-Duty Clothes Hooks:
1. Basis of Design: Bradley Model SA-36 .
 - a. Mounting: Concealed; secured to concealed wall plate with three stainless steel setscrews.
 - b. Wall Plates: 12 gauge (2.8 mm) case hardened steel
 2. Projection from Wall: 3-7/16 inch (87 mm).
 3. Hook and Flange: One-piece brass casting with satin nickel-plated finish.
 4. Capacity: Designed to support maximum 300 lbs (136 kg) downward in compliant installations.
- P. Napkin/Tampon Vendor
1. Basis of Design: Bradley Model 4017-10
 2. Satin Finish Stainless Steel
 3. Semi-Recessed (recesses 4"; projects 2¾")
 4. Vendor Capacity: 30 napkins & 28 tampons
- Q. Napkin/Tampon Disposal
1. Basis of Design: Bradley Model 4722-15
 2. Satin Finish Stainless Steel
 3. Surfaced mounted
 4. Keyed like other accessories

3.00 - EXECUTION

3.01 COORDINATION

- A. Coordinate with other trades whose work is related to toilet accessories for placement of required backing, cutting and furring to insure proper locations.

3.02 INSTALLATION

- A. Install in accordance with the manufacturer's directions.

3.03 CLEANING

- A. Clean exposed surfaces using materials and methods recommended by manufacturer, protect as necessary to prevent damage during remainder of construction period.

* * * * *

SECTION 11400 – FOOD SERVICE EQUIPMENT**1.00 - GENERAL**

1.01 DESCRIPTION

- A. Work included:
 - 1. Work tables
 - 2. Food service equipment
- B. Related work specified elsewhere:
 - 1. Plumbing – Section 15401
 - 2. Electrical – Section 16010 and 16050

1.02 STANDARDS

- A. NSF/ANSI 2 Food Equipment.
- B. Sheet Metal and Air Conditioning Contractor's National Association (SMACNA) Food Service Equipment Fabrication and Installation Guidelines.

1.03 SUBMITTALS

- A. Submit in accordance with Section 01300 Submittals:
 - 1. Shop Drawings: Showing dimensions, constructions and method of anchorage.
 - 2. Warranty: As required for review by Architect.

1.04 WARRANTY

- A. Warranty: Provide per Section 01750 Project Close Out.
 - 1. Work Table: One (1) year from date of completion.

2.00 - PRODUCTS

2.01 FOOD SERVICE EQUIPMENT

- A. Work Tables: Flat top, open base style.
 - 1. Top: 16 gage stainless steel Type 304. 34" width, 2" square edges. Reinforce with 3 hat channels secured to top with structural adhesive and weld studs. Gussets welded to support hat channels. Sound deadened. Entire top polished to a satin finish.
 - 2. Leg stretchers: 1-5/8" dia. tubular stainless steel, back and sides. Front to back stretchers bolted to legs, left to right stretcher welded to legs.
 - 3. Legs: 1-5/8" dia. tubular stainless steel. 1" adjustable stainless steel bullet feet. Stainless gussets.

4. Stainless Steel worktable w/ casters, approx 14" x 30" John Boos
5. Work Table: s.s base & shelf w/ maple top (custom) 36" x 108", 1-3/4" maple top, cut top for #21 undermount s.s. sink. John Boos SNS17A
 - a. Prep-Sink, undermount, single hole 16-3/4" x 22-1/2"
ELKAY ECTSRAD25226BG
 - b. Prep-Sink Faucet, 5-1/4" gooseneck, single hole, single lever. Chicago Faucet, 350-E35-317XKABCP
6. Work Table: s.s. base & shelf w/ maple top 36" x 96", 1-3/4" maple top John Boos SNS17

B. All other equipment: as scheduled and shown.

1. Wolf/Vulcan MSA Series 60" Griddle MSA60, 30" deep
2. Wolf/Vulcan Challenger Series 60" range C60SS-6B24CBN
3. Frymaster MJ45-2
4. Three compartment sink: Elkay 12" Standard Series Sinks 3C18x18-2-18X
 - a. Pre-Rinse Faucet, wall mount, 90 series, 1 gpm Spray w/ 12" swing spout
Chicago Faucet, 510-GC613AL12ABC
5. Hobart Advansys Dishwasher Model: AM15VL
6. (2) BRUTE 32g, 27" High Trash - Recycle barrels, 1-grey, 1-blue model H-1045
7. (2) BRUTE dolly model: H-2630
8. (2) Prince EST108, 108" Steam Table, 8 well, electric Enclosed body, sneeze guard, casters, tray rail
9. Norlake Kold Locker Walk-Ins77 Series 6'x8' with floor & chrome shelves (1) Freezer, (1) Refrigerator
10. Shelving. chrome, wire shelves on casters
11. Ventilation Hood (See Mechanical plans) CaptiveAire

3.00 - EXECUTION

3.01 COORDINATION

- A. Coordinate plumbing connections to ensure proper source, size and location.
- B. Coordinate electrical requirements for electrically operated motors to ensure proper power source, conduit and wiring.

3.02 INSTALLATION

- A. General: Install equipment plumb, level and true. Attach to wall or floor with anchors of size and type as required.
- B. Work table: Install in accordance with approved shop drawings.
- C. Existing equipment: Remove from existing Kitchen and reinstall in this Kitchen.

3.03 CLEANING AND PROTECTING

- A. After completing installation of equipment, repair damaged finishes.
- B. Clean and adjust equipment as required to produce ready-for-use condition.
- C. Protect equipment from damage during remainder of construction period.

SECTION 15010
MECHANICAL – GENERAL PROVISIONS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section specifies the Division 15 Work coordination requirements with general work provisions.

1.02 DESCRIPTION OF REQUIREMENTS

- A. Provide finished work, tested and ready for operation including apparatus, appliances, materials, and work. Provide incidental accessories necessary to make work complete and ready for operation without additional expense to the Owner.
- B. Before beginning work or ordering materials, consult Architect for clarification of discrepancies between, or questionable intent, of the Contract Documents.
- C. Contractor shall visit the site and field survey the existing conditions prior to bid. Any site conditions which may cause significant deviation from the design drawings shall be brought to the attention of the Owner's representative for clarification.
- D. Substitution of Equipment Items
 - 1. Where Contractor proposes to substitute an equipment item different from that shown on Drawings, provide any redesign, including Drawings, of structure, partitions, foundations, ductwork piping, wiring controls or any other part of mechanical, electrical, or architectural layout required.
 - 2. Submit Drawings and details of redesign required due to substitution of equipment items to Architect for approval.
 - 3. Provide ductwork, piping, structural supports and related calculations, insulation, controllers, motors, starters, equipment, electrical wiring and conduit, and any other additional components required by approved substituted system, at no additional cost to the Owner. To be paid by contractor.
 - 4. Expense for Architect/Engineer review shall be additional service and shall be approved by the Owner, to be paid by the Contractor.

1.03 DRAWINGS AND SPECIFICATIONS SUBMITTALS

- A. Where a conflict exists between Drawings and Specifications, promptly notify Architect for interpretation and resolution.

1.04 COORDINATION SHOP DRAWINGS

- A. General: Prepare and submit for review coordination drawings where work by separate

entities requires fabrication of products and materials which must accurately interface or for which space provided is limited.

- B. General Contractor will oversee preparation of coordination drawings, assign priority space and bring to the attention of the Architect any conflicts or interferences of an unresolved nature found during preparation of coordination drawings. Expedite conflict or interferences and submit solutions/recommendations for approval review.
- C. After completion of coordination shop drawings, submit copies to architect for records and provide at the job site for reference.

1.05 WARRANTY

- A. Coordinate warranty requirements with Section 01780 – Closeout Submittals.
- B. Provide manufacturer's written warranties covering defects in material and workmanship of products and equipment utilized for the project.
- C. Warranties shall be for a period of 1 year from the date of substantial completion.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.01 TRADE COORDINATION

- A. General:
 - 1. Refer to Section 01310 Project Coordination and paragraph 1.3, for coordination drawing requirements.
 - 2. Refer to Section 01630 - Product Substitution Procedures and paragraph 1.2.C for substitution requirements.
 - 3. Verify the location of the various building components and items to be installed by other trades.
 - 4. Coordinate work sequence and schedule for a minimum of interference with work of other trades.
 - 5. Ascertain temporary opening sizes and locations necessary for admission of mechanical equipment and coordinate requirements with work of other Divisions.
 - 6. Should conditions require revisions to space to suit the design of equipment proposed for installation, submit detailed shop drawings showing revisions before proceeding with work.
 - 7. Obtain written consent from Architect before decreasing sizes or changing installation.

8. Changes to work, which become necessary due to failure to coordinate work, shall be done at the installer's expense.
 9. Submit conflicts regarding space requirements to Architect for resolution.
- B. Visiting the Premises:
1. Visit premises prior to bid and become thoroughly familiar with the general layout of the building site and the location of existing utilities to which connections are to be made.
 - a. Check grades, ditches, pavements, and other conditions which might affect utility installations before ordering material or starting work.
 2. Verify measurements at the project prior to fabrication.
 - a. Where sequence of measuring before fabrication would delay Project, request Owner's authorization proceed with fabrication allowing ample tolerances and providing offsets to accommodate as-built conditions.
- C. Access to Mechanical Equipment:
1. Work of this article is limited to access of mechanical equipment through walls and inaccessible ceilings, and does not include access within mechanical equipment systems (see individual work Sections of Division 15).
 2. Ceiling access doors: No less than 12 by 12 inches;
 3. Wall access doors: Size to suit equipment but not less than 12 by 12 inches.
 4. Provide access doors in inaccessible ceilings and walls to gain access to all dampers, fire dampers, smoke and smoke/fire dampers terminal units, coils, filters, valves, air vents, control devices, and other similar devices requiring periodic observation, adjustment, service or replacement.
- D. Excavating for Mechanical Work:
1. The work of this article is defined to include excavating and backfilling necessary for installation of mechanical work. Coordinate work of this article with other work in the same area.
 - a. Comply with applicable provisions of Division 2 Sections and specific requirements of individual Sections within Division 15. (Requirements of individual Sections shall supersede requirements of Division 2.)
 - b. Each installer shall excavate, backfill, compact, and remove excess dirt as required.
 - c. Place exterior underground water-bearing pipe (including drainage lines) a minimum of 2' 6" below grade (measured to top of pipe) or below frost line, whichever is greater.
 2. Support pipe directly on undisturbed soil.

- a. Compact previously disturbed subsoil to provide adequate and uniform support.
3. Do not backfill or encase underground piping until testing has been completed and accepted.
- E. Fasteners for Mechanical Work:
 1. Provide anchor bolts, sleeves, templates, and other materials incidental to equipment installation on concrete base/pad.
 - a. Anchor bolts shall be hook type, coordinate diameter with the equipment base plate holes.
 - b. Bolts and nuts shall be ASTM A 107, of a hexagon form, ASA B 1.1 Coarse Thread, Class 1 Fit. Exposed bolt-thread projection above top of nut shall not exceed 1/4 inch after placement and leveling of equipment base plate.
 2. Provide steel shims and nonshrink grouting as necessary to ensure accurate leveling of base plates. Scarify, clean, and wet concrete base and/or pad surfaces to assure bond.
 3. Non-shrink grout shall be Sonneborn Ferrolith G or SonogROUT.

3.2 MECHANICAL PROCEDURES

- A. Testing Requirements:
 1. Arrange for testing of installed systems in accordance with requirements of authorities having jurisdiction and the requirements of Division 15.
 - a. Testing procedures shall include provision of labor, materials, instruments, and power necessary for successful completion.
 - b. Test duration shall be per the authority having jurisdiction.
 2. Specific Requirements:
 - a. No piping or ductwork is to be insulated closed up, furred in or covered before testing. Pressure test piping before connecting to equipment. Subject no piping, equipment, or accessories to testing beyond rated pressures.
 - b. Drain water used for testing from system after tests are complete. Work required to repair or replace damage caused by freezing of water left in system shall be done at Contractor's expense.
 - c. Repair or replace defective work and repeat tests until particular system and component parts thereof receive approval of regulating authority.
 - d. Make final tests in presence of appropriate inspector.

- B. Substitutions: Refer to Section 01630 - Product Substitution Procedures and paragraph 1.2.C.
- C. Submittals:
 - 1. Submit shop drawings, brochures, and schedules as defined by individual technical Sections of Specifications.
 - 2. Submit manufacturer's printed installation instructions for products and install in accordance with requirements of Section 01300 Submittal Procedures, and as defined by individual technical Sections of the Specifications.
- D. Codes, Fees, and Related Costs:
 - 1. Comply with applicable codes, rules, regulations, and building and safety laws relating to construction, public health and safety.
 - 2. Provide all labor, materials, services, apparatus, and Drawings (in addition to Contract Documents) to comply with applicable laws, ordinances, rules, and regulations.

3.03 MECHANICAL GENERAL EQUIPMENT PROVISIONS

- A. Material and Equipment: All material and equipment shall be new.
 - 1. Provide materials and equipment that are standard products of a reputable manufacturer regularly engaged in the manufacture thereof.
 - 2. Install material and equipment in accordance with manufacturer's recommendations.

3.04 SEALING AND PENETRATING

- A. Fire rated: Provide UL tested assembly for all penetrations through fire rated floors and walls.

3.05 START-UP PROVISIONS FOR MECHANICAL WORK

- A. General: Major equipment (such as boilers, chillers) start-up shall be performed by the equipment manufacturer or authorized representative.
- B. Adjusting and Aligning Equipment: Adjust all equipment. Check all motors for proper rotation.
- C. Cleaning: Remove tools, scaffolding, surplus materials, barricades, temporary walks, debris, and rubbish from the Project promptly upon completion of the work of each Section. Leave the area of operations completely clean and free of these items.
- D. Operation by Owner:
 - 1. Owner may require operation of certain systems or parts thereof, prior to Final Acceptance.

2. Operation is not to be construed as acceptance of work.
- E. Instructions of Owner's Personnel:
1. Prior to acceptance of work, provide necessary qualified personnel to operate each system and fully instruct Owner's personnel.
 2. During operating period, fully instruct Owner's Representative in complete operation, adjustment, care, and maintenance of each respective system and piece of equipment.
- F. Instruction, Operating, and Maintenance Manuals: Comply with requirements of Section 01740 – Closeout Submittals. Prior to completion of installation and final inspection of work, furnish to Architect 4 copies of complete Instruction Manual, bound in booklet form and indexed for each respective Mechanical Specification Section. Manuals shall contain the following:
1. List of equipment with manufacturer's name, model number, local representative, service facilities, and normal channel of supply for each item.
 2. Manufacturer's literature describing each item of equipment with detailed parts list.
 3. Name, address, and phone number of contractors involved in work under this Division.
 4. Individual equipment warranties.
 5. Record as built shop drawings. Mark-up shop drawings and not acceptable

END OF SECTION

SECTION 15060
PIPE AND PIPE FITTINGS – GENERAL

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes piping materials and installation requirements for various services.

1.02 QUALITY ASSURANCE

- A. Welding materials and labor shall comply with ASME Code and applicable state labor regulations.
- B. Welders shall be fully qualified and certified by a state approved welding bureau.
- C. Provide Domestic water drainage, and vent piping per each applicable building code.
- D. Provide Gas piping per local utility company requirements.
- E. Provide Oil piping per NFPA 30 Flammable and Combustible Liquids Code.

1.03 DRAWINGS

- A. Accompanying Drawings are intended for Contractor's guidance.
 - 1. Anticipate and coordinate minor changes in position of piping to meet job conditions.
 - 2. Promptly communicate to Architect changes affecting accessibility to or clearance about equipment or accessories.
 - 3. Refer to Division 1 and Section 15010 - Mechanical General Provisions for coordination drawing requirements.

1.05 PIPING DIAGRAMS

- A. Construction Documents may include piping diagrams as a part of the working Drawings.
 - 1. These piping diagrams are not for the purpose of giving physical dimensions or locations but rather to show all required piping accessories necessary to make clear the interconnections, by the piping, of the various units of the process.

1.06 PIPE LENGTHS

- A. Where possible, utilize longest available commercial standard piping lengths to minimize number of piping joints.
- B. Accurately cut pipe to field measurements to permit placement without forcing or springing, except for cold springing of expansion loop legs

2.01 GENERAL

A. Piping shall comply with material specification Sections listed in the following schedule:

PIPING SERVICE SCHEDULE

Service	Maximum Service Pressure	Maximum Service Temp.	Material	Specification Reference Sec. and Article
Soil, waste and vent aboveground	Gravity Flow	140°F	Cast iron	
Soil, waste and vent, underground	Gravity Flow	140°F	Cast iron	
Storm drainage inside building, above or underground	Gravity Flow	100°F	Cast iron	
Equipment drains or overflows	10 psi	100°F	Type M drawn copper	
Heating water 4" and larger	125 psi	250°F	Black steel, Schedule 40 or Type L drawn copper or Thinwall *	15064, 2.1 15070, 2.1
Heating water 3" and smaller	125 psi	250°F	Type L drawn copper	15070, 2.1
Domestic water, water aboveground	125 psi	250°F	Type L drawn copper.	15070, 2.1
Domestic water, water underground	125 psi	250°F	Type K annealed copper. Wrapped.	15070, 2.1
Trap primer lines, soft water underground	125 psi	250°F	Type K annealed copper. Wrapped.	15070, 2.1
Generator Exhaust	125 psi	1200°F	Black steel, Schedule 40,	15066, 2.1
Natural gas, aboveground	125 psi	250°F	Black steel, Schedule 40	15064, 2.1

PART 3 – EXECUTION

3.01 PIPING INSTALLATION

- A. Run piping straight and parallel with adjacent walls.
- B. Piping located on roofs shall be mounted on curbs or other pipe supports.

3.02 PREPARATION

- A. Ream pipes and tubes to full inside diameter. Clean off scale and dirt, inside and outside,

before assembly. Remove welding slag or other foreign material from piping.

3.03 CONNECTIONS

- A. Use full-cut standard taper pipe threads. Make up joints using Teflon® tape or nontoxic joint compound as related to the piping system involved. Apply to male threads only.
- B. Joints for plain end pipe shall have clamp-type mechanical fasteners and gaskets
- C. Make connections to equipment and branch mains with unions or flanges.
- D. Provide non-conducting type connections wherever joining dissimilar metals in all systems and at equipment connections. Brass adapters and valves are acceptable.

3.04 ROUTE AND GRADES

- A. Route piping in orderly manner and maintain proper grades. Group piping whenever practical at common elevations. Install concealed pipes close to building structure to keep furring to a minimum.
- B. Expansion, Contraction and Bending:
 - 1. Install piping with provisions for expansion and contraction.
 - a. Provide expansion loops, swing joints, and/or expansion joints as required.
 - 2. Do not spring or force piping during installation.
 - 3. Do not bend piping without use of pipe bending machine.
- C. Slope fuel oil (diesel oil) and gasoline piping down toward tank 1 inch per ten feet.
- D. Provide manual air vents at all high points in heating water, chilled water and cooling tower water piping.
 - a. ¼ inch copper tube.

3.06 CLEANING AND TESTING

- A. Perform testing procedure in the presence of the authorities having jurisdiction.
- B. Complete and test pipe rough-in before insulation or other finish work is applied. Covering of work before acceptance is prohibited.
- C. Do not test relief valves, pressure-reducing valves, valves, or equipment beyond its rated capacity.
- D. Drainage Piping Systems (Waste, Vent and Storm Drain):
 - 1. Flush pipe with clear water to remove dirt and debris.
 - 2. Pressure test complete system with water in a manner acceptable to the authorities having jurisdiction.

- E. Domestic Water Piping System:
 - 1. Flush pipe free of dirt and debris with fresh water.
 - 2. Pressure test complete system in a manner acceptable to the authorities having jurisdiction.

- F. Heating Water Piping System:
 - 1. Flush entire system with fresh water by circulation and periodically clean strainers. Continue flushing until strainers show no visible sediment, then drain system.
 - 2. Pressure test with water at 1-1/2 times the working pressure, but not less than 100 psi, for 3 hours with no decay in pressure. Visually inspect joints for leaks, repair or replace, and retest.

END OF SECTION

**SECTION 15100
VALVES AND COCKS**

PART 1 - GENERAL

1.01 SUMMARY

This Section includes valves and cocks normally required in all plumbing, and hydronic systems.

1.02 SUBMITTALS

Comply with provisions of Section 01300 - Submittal Requirements.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Gate, Globe, Angle and Check Valve Manufacturers:

1. Milwaukee
2. Watts
3. Red & White Nibco
4. Metraflex
5. Danfoss
6. Victaulic
7. Flomatic
8. Other manufacturers equal to the above.

2.02 VALVE CONNECTIONS

Provide valves compatible with adjoining piping pipe joints. Valve shall be the full size of the pipe in which they are installed.

2.03 GATE VALVES: Watts FBVS-3 or equal.

2.04 CHECK VALVES: Flomatic or equal.

2.05 BALL VALVE: Watts FBVS-3 or equal.

2.06 BUTTERFLY VALVE

A. Butterfly Valves: May be used in lieu of gate valves except for direct buried pipe.

1. 2 -1/2 inches and larger: MSS-SP 67, flange lug type (for end of line service) or grooved end rated 200 psi working pressure at 200°F.
2. Body: Cast iron, ASTM A126, Class B. Malleable iron, ASTM A47 electro-plated, or ductile iron, ASTM A536, Grade 65-45-12 electro-plated.
3. Trim: Bronze, aluminum bronze, or 300 series stainless steel disc, bronze bearings, 316 stainless steel shaft and manufacturer's recommended resilient seat. Resilient

seat shall be field replaceable, and fully line the body to completely isolate the body from the product. A phosphate coated steel shaft or stem is acceptable, if the stem is completely isolated from the product.

4. Actuators: Field interchangeable. Valves for balancing service shall have adjustable memory stop to limit open position.
5. 6 inches and smaller: Lever actuator with minimum of seven locking positions, except where chain wheel is required.
6. 8 inches and larger: Enclosed worm gear with handwheel, and where required, chain-wheel operator.

2.07 STRAINER: Metraflex or equal

2.08 Suction Diffusers: Specified in Section 15160 - PUMPS.

2.09 BALANCING VALVE

- A. Circuit Setter Valve: A dual purpose flow balancing valve and adjustable flow meter, with bronze or cast iron body, Bell & Gossett # Circuit Setter, Taco, or equal.
- B. Water Flow Balancing Valves: For flow regulation and shut-off. Valves shall be one of the following type:
 1. Butterfly valve as specified herein.
 2. Ball valve as specified herein.

2.10 TRIPLE DUTY VALVE:

Contractors option for use at pump discharge in lieu of check valve and balancing/ shut-off valve. Triple duty valve is a non-slam check valve with spring-loaded weighted disc and a calibrated adjustment feature permitting regulation of pump discharge flow and shut-off. Unit shall be installed on discharge side of pump in a horizontal or vertical position with the stem up. Unit shall be cast iron body construction suitable for maximum working pressure of 175 psi and maximum operating temperature of 300°F, bronze disc and seat, stainless steel stem and spring. Bell & Gossett or Taco.

2.11 BACKFLOW PREVENTER ASSEMBLY

- A. Assembly shall consist of two independently operating, spring loaded, "Y" pattern check valves and one hydraulically dependent differential relief valve. All bronze material, 175 psi working pressure.
- B. Relief valve shall be removable seat ring. Check valve and relief valve maybe serviced without removing the valve body to the line. Shut off valves and test cocks shall be ported ball valves.
- C. Manufacturer: FEBCO, WATTS, or equal.

2.12 AIR VENTS

- A. Provide and install manual air vents, Crane 88, Lunkenheimer 906-BS, or equal, in all hot water heating and chilled-water cooling systems at locations shown on drawings, at high points, and other points necessary to free the piping system of air.

- B. Use automatic-type air vent valves only where specifically shown on the drawings; Hoffman, Armstrong 1-AV, or equal.

2.13 GAUGE COCKS

Provide a gauge cock at each gauge connection to service main.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Provide valves with stems upright or horizontal. Valve stem position must be arranged to allow access for maintenance. No valve shall be installed with stem pointing down.
- B. Provide gate, ball or butterfly valves for shutoff service and isolating service, and to isolate equipment.
- C. Provide vertical check valves where applicable in discharge of chilled water, condenser water, heating water, and domestic water pumps.
- D. Provide horizontal check valves where vertical check valves are not compatible with piping arrangements.
- E. Do not use horizontal check valves in vertical applications.
- F. Provide drain valves at main shutoff valves and low points of piping and apparatus

END OF SECTION

SECTION 15140
SUPPORTS, ANCHORS AND SEALS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes supports, anchors and seals.
- B. This Section includes seismic bracing for seismic zone 4.

1.02 QUALITY ASSURANCE

- A. Hangers and supports to be constructed and applied according to the following standards:
 - 1. Manufacturer's Standardization Society MSS SP-58, SP-69.
 - 2. Power Piping Code, ANSI B31.
 - 3. Duct Hangers: Provide hangers as required per SMACNA Standards for ductwork pressure classification.
 - 4. NFPA standards for Fire Protection System piping.
- B. Fire protection piping supports and seismic bracing, refer to Section 15310 - SPRINKLER SYSTEM.
- C. All conditions which involve thermal and/or building expansion and contraction shall be taken in consideration and identified in the as-built documents.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Pipe Hangers: Grinnell, Fee & Mason, Elcen, Tube-Turn, F& S, Pipe Shields and Tolco or equal.
- B. Sleeves: RK Industries

2.02 SEISMIC RESTRAINTS

- A. General
 - 1. Capable of safely accepting indicated external forces without failure.
 - 2. Maintain equipment, piping and ducts in a captive position.
- B. Criteria: Design for seismic forces herein before specified.

- C. Bracing System: One of the following methods as most applicable for each brace.
 - 1. Complete system of factory fabricated components.
 - 2. Complete system of job fabricated components.
 - 3. Miscellaneous metal structural shapes.

2.03 ANCHORS, INSERTS AND FASTENERS

All anchors and inserts shall be installed according to the SMACNA standards.

2.04 PIPE HANGERS AND SUPPORTS

- A. Hangers all sizes: Adjustable J hangers.
- B. Multiple or Trapeze Hangers: Steel channels or angles and hanger rods, sized to support load.
- C. Vertical Support: Steel riser clamp.
- D. Provide copper-plated hangers and supports for copper piping or provide isolator between hanger or support and piping.
- E. Provide angles or channels to span joists and distribute load.
- F. Do not use wire for support purposes.

2.05 PIPE ISOLATORS

Provide each hanger or clamp for uninsulated piping with a pipe isolating material similar to Superstrut S-716 or felt to isolate sound vibration and electrolysis. Isolators are not required for waste, vent, gas, and downspout piping.

2.06 HANGER RODS

Provide steel hanger rods, appropriately threaded. Provide connection points with jamb nuts or double nuts.

2.07 DUCT HANGERS AND SUPPORTS FOR NON-SEISMIC BRACING APPLICATIONS

- A. Per SMACNA Standards.
- B. Provide galvanized steel angles, channels, stays, rods, etc., for duct support. Do not use raw steel.

2.08 DUCT HANGERS AND SUPPORTS FOR SEISMIC BRACING APPLICATION

Per SMACNA standards.

2.09 FLASHING

Steel Flashing: 26 gauge galvanized steel.

2.10 SLEEVES

- A. Sleeves for Pipes Passing through Floors: 26 gauge, galvanized sheet metal tube with welded longitudinal joints.
- B. All pipes and ducts passing through fire-rated walls and floors shall be UL listed fire-rated assemblies. Refer to Division 7 for fire-rated sealants. Pipe insulation carried through the penetration shall comply with the UL system requirement, but shall not be less than required in Specification Section 15250, Piping and Equipment Insulation.
- C. Open voids and cavities occurring in pipe sleeves passing through rated walls and floors shall be completely sealed with UL classified Sealant installed in strict accordance with the manufacturer's recommendations.
- D. Size sleeves large enough to allow for movement due to expansion and to provide for continuous insulation.
- E. All pipes and ducts passing through fire-rated walls and floors shall be UL listed fire-rated assemblies. Refer to Division 7 for fire-rated sealants. Pipe insulation carried through the penetration shall comply with the UL system requirement, but shall not be less than required in Specification Section 15250, Piping and Equipment Insulation.
- F. Open voids and cavities occurring in pipe sleeves passing through rated walls and floors shall be completely sealed with UL classified Dow Corning Fire Stop Sealant No. 2000 installed in strict accordance with the manufacturer's recommendations.
- G. Sleeves for Ducts: Form with galvanized steel.
- H. Size sleeves large enough to allow for movement due to expansion and to provide for continuous insulation.

PART 3 - EXECUTION

3.01 INSERTS AND DRILL-IN ANCHORS

- A. Use inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams wherever practicable.
- B. Set inserts in position in advance of concrete work.
- C. Where concrete slabs form finished ceiling, finish inserts flush with slab surface.
- D. Locate expansion shields in concrete beams a minimum of 6 inches above bottom of beam.
- E. Use hangers which are vertically adjustable after piping is erected.

3.02 PIPE HANGERS AND SUPPORTS

- A. Support horizontal steel and copper piping where pipes are not seismically braced per the Uniform Plumbing Code.
- B. Support piping joined with grooved couplings per coupling manufacturer's installation guidelines.
- C. Where pipes are seismically braced, support and brace pipes per the City of Oakland requirements.
- D. Support piping per the Uniform Plumbing Code.
- E. Support vertical piping at every other floor. Support vertical soil pipe at each floor at joint.
- F. Where several pipes can be installed in parallel and at same elevation, provide multiple individual hangers or trapeze hangers.
- G. Provide supports and miscellaneous metal such as steel plates, brackets, metal framing, bolts, nuts and etc. Where exposed to weather material shall be hot dipped galvanized.
- H. Vertical piping shall be supported top and bottom. Equipment shall not be used to support piping.
- I. Provide miscellaneous steel members, beam, brackets, etc. for support of work in this Division, unless specifically included in other Division.
- J. Use felt pad vibration isolators, padding or felt lined hangers for copper tubing.
- K. Hanger rod sizes and hanger spacing shall be per Uniform Plumbing Code.

3.03 DUCT HANGERS AND SUPPORTS

- A. Where ducts are not seismically braced, use duct hangers, supports, and installation per SMACNA Standards.
- B. Where ducts are seismically braced, use duct hangers, supports and installation per NUSIG or SMACNA.
- C. Specific details shown on Drawings take precedence over SMACNA requirements.

3.04 FLASHING

- A. Flash and counterflash where mechanical equipment passes through weather or waterproofed walls, floors, and roofs.
- B. Flash vent and soil pipes with sheet metal flashing.

3.05 SLEEVES

- A. Set sleeves in position in advance of concrete work.
- B. Adequately sleeve pipe passing through concrete or masonry walls or concrete slabs to

receive both pipe and insulation pertaining thereto.

- C. At masonry walls, install sleeves on pipes as they are being hung, ready for proper placement in wall as wall is being constructed.
- D. Where sleeves have been inadvertently omitted in concrete floors, provide requisite pipe opening by using properly sized diamond core drills after coordination with Structural Engineer.

3.06 SEISMIC RESTRAINTS

- A. Install seismic restraints for pipes, flues, ducts and equipment in accordance with the above listed codes and guidelines.
- B. Design and install restraints to prevent permanent displacement in any direction caused by lateral motion, overturning, or uplift.
- C. Make no rigid connections between equipment, pipes and ducts and building structure that degrade noise and vibration isolation systems.

3.07 SEISMIC BRACING INSTALLATION

- A. Piping and Ductwork:
 - 1. Install all bracing and restraints per referenced "Guidelines".
 - 2. Provide floor support and bracing of pipe connection risers to equipment.
- B. Flexibly Supported Piping and Ducts: Install to allow normal operation of systems without transmitting vibrations to building structure.
- C. Rigidly Mounted Equipment:
 - 1. Secure to floor as required to prevent horizontal motion and overturning.
 - 2. Secure to walls or other equipment to prevent overturning.

END OF SECTION

SECTION 15325 SPRINKLER SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

This section includes wet pipe sprinkler systems for buildings and structures.

1.02 DEFINITIONS

- A. Working plans as used in this Section refer to documents (including drawings and calculations) prepared pursuant to requirements in NFPA 13 for obtaining approval of authority having jurisdiction.
- B. Other definitions for fire protection systems are included in referenced NFPA standards.

1.03 SYSTEM PERFORMANCE REQUIREMENTS

- A. System performance requirements are as follows:
 - 1. Sprinkler System Occupancy Hazard Classifications as follows:
 - a. Offices: Light Hazard.
 - b. Garage Area: Ordinary Hazard Group 1.
 - c. General Storage Areas: Ordinary Hazard Group 1.
 - d. Electrical Equipment Rooms: Ordinary Hazard Group 1.
 - c. Mechanical Rooms: Ordinary Hazard Group 2.
 - 2. Minimum Density Requirements for Automatic Sprinkler System Hydraulic Design as follows:
 - a. Light Hazard Occupancy: 0.10 GPM over 1500 sq. ft. area.
 - b. Ordinary Hazard, Group 1 Occupancy: 0.15 GPM over 1500 sq. ft. area.
 - c. Ordinary Hazard, Group 2 Occupancy: 0.20 GPM over 1500 sq. ft. area.
- B. Components and Installation: Capable of producing piping systems with the following minimum working pressure ratings except where indicated otherwise.
 - 1. Sprinkler Systems: 175 psig.

1.04 SYSTEM DESCRIPTION AND OPERATTON

- A. Wet-Pipe Sprinkler System: System with automatic sprinklers attached to piping system containing water and connected to water supply so that water discharges immediately from sprinklers when they are opened by fire.
- B. Sprinkler System Protection Limits: All spaces within areas indicated. Include closets, toilet and locker room areas, each landing of each stair, and special applications areas.

1. Exception: Areas with other fire extinguishing systems and areas indicated to be without sprinkler protection.
2. Exception: Light-hazard occupancy, dwelling unit bathrooms 55 sq. ft. and less and closets 24 sq. ft. and less that also comply with other NFPA 13 requirements.

1.05 SUBMITTALS

- A. General: Submit the following to the Engineer:
 1. Bid proposal containing three (6) copies of manufacturer's product sheets including the following:
 - a. Certified performance curves of selected models indicating operating point, rated capacities, motor data, sound levels generated by equipment, weights (shipping, installed, and operating), furnished specialties and accessories.
 - b. The attached Appendix "A" completely filled out where indicated and submitted with the bid.
 - c. Maintenance data on fire protection equipment for inclusion in Operating and Maintenance Manual.
- B. Product data for fire protection system components. Include the following:
 1. Valves.
 2. Specialty valves, accessories, and devices.
 3. Alarm devices. Include electrical data.
 4. Fire department connections.
 5. Sprinklers, escutcheons, and guards.
- C. Sprinkler system drawings identified as "working plans" and prepared according to NFPA 13 and NFPA 13D that have been approved by authority having jurisdiction. Include system hydraulic calculations where applicable.
- D. Test reports and certificates as described in NFPA 13. Include "Contractor's Material & Test Certificate for Aboveground Piping" and "Contractor's Material & Test Certificate for Underground Piping."
- E. Maintenance data for each type of fire protection specialty specified, for inclusion in "Operating and Maintenance Manual" specified in Division I Section "Project Closeout."
- F. 2 copies of NFPA 13A "Recommended Practice for the Inspection, Testing and Maintenance of Sprinkler Systems." Deliver to Owner's maintenance personnel.
- G. 2 copies of NFPA 25 "Standard for Inspection, Testing and Maintenance of Water Based Fire Protection Systems." Deliver to Owner's maintenance personnel.

- H. If submittals do not provide sufficient information, the Engineer may request additional information.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Firms regularly engaged in the manufacture of sprinkler and standpipe equipment, specialties, and accessories of types, materials and sizes required, are listed by product name and manufacturer in UL Fire Protection Equipment Directory and FM Approval Guide, and whose products have a record of successful in-service performance for not less than five (5) years.
- B. Codes and Standards: Comply with the provisions of the following:
1. Code Compliance: Components, assemblies and installation shall comply with the authority having jurisdiction.
 2. Hydraulic Institute Compliance: Design, manufacture, and install pumps in accordance with "Hydraulic Institute Standards"
 3. NEMA Compliance: Provide electric motors and electrical components that comply with applicable NEMA Standards.
 4. National Electrical Code Compliance: All electrical wiring and equipment shall be UL Listed and installed in compliance with NFPA 70 "National Electrical Code".
 5. AR pipe and fittings shall conform to the equipment manufacturer's specifications and limitations as approved by a national recognized testing laboratory.
 6. Certification and Tests: Provide the following documentation:
 - a. Certification: Upon completion of the installation, the installer shall complete the installation certification form certifying that the system has been installed in accordance with the approved plans and the manufacturer's listed installation and maintenance manual. Applicable portions of the certification form shall be provided to the authorities having jurisdiction, such as the owner, Fire Department, etc.
 - b. Tests: The installed system shall be subject to a performance test conducted by the installer and witnessed by a representative from the Fire Department for the purpose of determining - that performance of the installed system is in accordance with applicable sections of the Administrative Code. Tests shall also be witnessed by an Owner's representative unless waived. The Owner shall be given five (5) working days notification of such tests.
 - c. If the performance test fails or if there are any discrepancies between the system as installed and the approved plans which prevents certification, the installer will be required to make any necessary changes and retest in order to obtain certification, all at his own expense.

- d. Certified mill test reports on materials used shall be provided at time of delivery of items.
 - e. Reports on radiograph inspection or any other non-destructive test performed.
 - f. Hydrotest graph showing test pressure at various time intervals.
7. Single-Source Responsibility: Obtain system components from a single source manufacturer, with installer taking responsibility and accountability to answer and resolve problems as regards compatibility, installation, performance, and acceptance of hood fire extinguishing systems.
- C. Installer's Qualifications: Firms qualified to install and alter fire protection piping, equipment, specialties, and accessories, and repair and service equipment. A qualified firm is one that is experienced (minimum of 5 previous projects similar in size and scope to this Project) in such work, familiar with precautions required, and in compliance with the requirements of the authority having jurisdiction.
- Submit evidence of qualifications to the Architect upon request. Refer to Division I Section "Reference Standards and Definitions" for definition of "Installer."
- D. NFPA Standards: Equipment, specialties, accessories, installation, and testing complying with the following:
1. NFPA 13 "Standard for the Installation of Sprinkler Systems."
 2. NFPA 25 "Water based fire protection systems"
 3. NFPA 26 "Recommended Practice for the Supervision of Valves Controlling Water Supplies for Fire Protection."
 4. NFPA 70 "National Electrical Code."

1.07 ACCEPTANCE

- A. No work shall be done by manufacturer prior to the Engineer's approval of certified shop drawings.
- B. Design Criteria: The construction documents indicate sizes, connections, and rated capacities of fire protection equipment. Equipment having equal performance characteristics may be considered, provided deviations in dimensions, profiles and efficiencies do not change the design concept or intended performance as judged by the Engineer. Burden of proof for equality is on the proposer.
- C. Final acceptance will depend upon successful start-up and performance testing of equipment supplied by bidder. This shall not preclude any of the manufacturers warranty.
 1. Successful performance testing shall be considered as all purchased equipment meeting actual design and operating conditions or verifying that such will be met on a prorata basis from performance test results at the installation.

1.08 PREPARATION FOR SHIPMENT

- A. All surfaces shall be free of grease, dirt, and loose scale prior to painting. Protect flanges, pipe openings and nozzles.
- B. Equipment surfaces shall be given one coat of zinc-rich oxide primer and one finish coat of enamel paint. Manufacturer to supply one (1) gallon of touch-up paint.
- C. Open grooved or beveled end pipe connections shall be covered with plastic inserts. Open flanged pipe connections shall be covered with wooden or metal plate covers. A minimum of four (4) bolts shall be used to fasten the plate covers.
- D. The equipment shall not be shipped with any water in the tank, pumps or piping.

1.09 DELIVERY AND HANDLING

- A. Handle fire protection equipment carefully to prevent damage, breaking, denting and scoring.
- B. If damage to equipment is found upon receiving shipped product, responsibility for repair or replacement shall be determined by the F.O.B. (freight on board) point within the purchase contract.
- C. Manufacturer shall inform owner of delivery 72 hours before delivery to job site. Delivery shall be contingent upon the owner's ability to accept delivery.

1.10 WARRANTY

Provide written warranty, signed by manufacturer agreeing to replace or repair any inadequate parts or defective materials or workmanship within one (1) year of purchase. Warranty excludes removal, reinstallation and transportation costs. If manufacturer's warranty does not accommodate this specification, advise the Engineer of this change within the bid proposal.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with the minimum requirements listed within both the construction documents and this specification, provide the following:
 - 1. Specialty Valves, Water Motor Alarms, and Air-Pressure Maintenance Devices:
 - a. ASCOA Fire Systems, Figgie International Co.
 - b. Central Sprinkler Corp.
 - c. Firematic Sprinkler Devices, Inc.
 - d. Gem Sprinkler Co. Div., Grinnell Corp.
 - e. Globe Fire Sprinkler Corp.
 - f. Reliable Automatic Sprinkler Co., Inc.
 - g. Star Sprinkler Corp.
 - h. Viking Corp.

2. Waterflow Indicators and Supervisory Switches:
 - a. Gamewell Co.
 - b. Gem Sprinkler Co. Div., Grinnell Corp.
 - c. Potter Electric Signal Co.
 - d. Reliable Automatic Sprinkler Co., Inc.
 - e. System Sensor Div., Pittway Corp.
 - f. Victaulic Company of America.
 - g. Watts Regulator Co.
3. Fire Department Connections:
 - a. Badger-Powhatan, Figgie International Co.
 - b. Croker Div., Fire-End and Croker Corp.
 - c. Elkhart Brass Nffg. Co., Inc.
 - d. Firematic Sprinkler Devices, Inc.
 - e. Gem Sprinkler Co. Div., Grinnell Corp.
 - f. Guardian Fire Equipment, Inc.
 - g. Potter-Roemer Div., Smith Industries, Inc.
 - h. Reliable Automatic Sprinkler Co., Inc.
 - i. Sierra Fire Equipment Co.
4. Fire Protection Service Gate and Check Valves:
 - a. Gem Sprinkler Co. Div., Grinnell Corp.
 - b. Kennedy Valve Div., McWane, Inc.
 - c. Nibco, Inc.
 - d. Stockham Valves and Fittings, Inc.
 - e. Victaulic Company of America.
5. Grooved Couplings for Steel Piping:
 - a. Grinnell Supply Sales Co., Grinnell Corp.
 - b. Gustin-Bacon Div., Tyler Pipe Subsid., Tyler Corp.
 - c. Sprink-Line by Sprink, Inc.
 - d. Stockham Valves and Fittings, Inc.
 - e. Victaulic Company of America.
6. Press-Seal Fittings for Steel Piping:
7. Victaulic Company of America.

B. The decision as to an acceptable manufacturer rests solely with the Engineer.

2.02 PIPES AND TUBES

- A. Refer to Part 3 Articles "Sprinkler System Piping Applications" for identification of systems where pipe and fitting materials specified below are used.
- B. Steel Pipe: ASTM A 135, Schedule 10 through 5" sizes and NFPA 13 specified wall thickness

for 6" through 10" sizes, with plain ends, black steel, for rolled-groove and welded joints.

2.03 PIPE AND TUBE FITTINGS

Grooved-End Fittings for Steel Pipe: UL-listed and FM-approved, ASTM A 536, Grade 65-45-12 ductile iron or ASTM A 47 Grade 32510 malleable iron, with grooves or shoulders designed to accept grooved couplings.

2.04 JOINING MATERIALS

Couplings for Grooved-End Steel Pipe and Grooved-End Ferrous Fittings: UL 213, AWWA C606, ASTM A 536 ductile-iron or ASTM A 47 malleable-iron housing, with enamel finish. Include synthetic-rubber gasket with central-cavity, pressure-responsive design; ASTM A 183 carbon-steel bolts and nuts; and locking pin, toggle, or lugs to secure grooved pipe and fittings.

2.05 FIRE PROTECTION SERVICE VALVES

- A. General: UL-listed and FM-approved, with 175 psig non-shock minimum working pressure rating.
 - 1. Option: Valves for use with grooved piping may be grooved type.
- B. Gate Valves, 2" and Smaller: UL 262, cast-bronze, threaded ends, solid wedge, outside screw and yoke, rising stem.
- C. Indicating Valves, 2 1/2" and Smaller: Butterfly or ball type, bronze body with threaded ends, and integral indicating device.
 - 1. Indicator: Visual.
 - 2. Indicator: Electrical 115 volts a.c., prewired, single-circuit, supervisory switch.
- D. Gate Valves, 2 1/2" and Larger: UL 262, iron body, bronze mounted, taper wedge, outside screw and yoke, rising stem. Include replaceable, bronze, wedge facing rings and flanged ends.
- E. Swing Check Valves, 2 1/2" and Larger: UL 312, cast-iron body and bolted cap, with bronze disc or cast-iron disc with bronze disc ring and flanged ends.
- F. Butterfly Check Valves, 4" and Larger: UL 213, split-clapper style, cast-iron body with rubber seal, bronze alloy discs, stainless-steel spring and hinge pin.

2.06 SPECIALTY VALVES

- A. Alarm Check Valves: UL 193, 175 psig working pressure, designed for horizontal or vertical installation, with cast-iron flanged inlet and outlet, bronze grooved seat with O-ring seals, and single-hinge pin and latch design. Include trim sets for bypass, drain, electric sprinkler alarm switch, pressure gauges, precision retarding chamber, and fill line attachment with strainer.
 - 1. Option: Grooved-end connections for use with grooved-end piping.

- B. Alarm Check Valves: UL 193, 175 psig working pressure, designed for horizontal or vertical installation, with cast-iron flanged inlet and outlet, bronze grooved seat with O-ring seals, and single-hinge pin and latch design. Provide trim sets for bypass, drain, electric sprinkler alarm switch, pressure gauges, drip cup assembly piped without valves separate from main drain line, and fill line attachment with strainer.
 - 1. Option: Grooved-end connections for use with grooved-end piping.
- C. Detector Check Valves: UL 213, galvanized cast-iron body, bolted cover with air bleed device for access to internal parts, and flanged ends; designed for 175 psig working pressure. Include 1-piece bronze disc with bronze bushings, pivot, and replaceable seat. Include threaded bypass taps in the inlet and outlet for bypass meter connection. Set valve to allow minimal water flow through bypass meter when major water flow is required.

2.07 SPRINKLERS

- A. Automatic Sprinklers: With heat-responsive element conforming to UL 199.
- B. Sprinkler types and categories are as indicated and as required by application. Furnish automatic sprinklers with nominal 1/2" orifice for "Ordinary" temperature classification rating except where otherwise indicated and required by application.
- C. Sprinkler types, features, and options include:
 - 1. Coated, painted, or plated sprinklers.
 - 2. Concealed ceiling sprinklers, including cover plate.
 - 3. Flush ceiling sprinklers, including escutcheon.
 - 4. Pendant sprinklers.
 - 5. Recessed sprinklers, including escutcheon.
 - 6. Sidewall sprinklers.
- D. Sprinkler Finishes: Chrome-plated, bronze, and painted.
- E. Special Coatings: Wax, lead, and corrosion-resistant paint.
- F. Sprinkler Escutcheons: Materials, types, and finishes for following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.
 - 1. Ceiling Mounting: Chrome-plated steel, 1-piece, flat.
 - 2. Sidewall Mounting: Chrome-plated steel, 1-piece, flat.
- G. Sprinkler Guards: Wire-cage type, including fastening device for attaching to sprinkler.

2.08 SPECIALTY SPRINKLER FITTINGS

- A. Specialty Fittings: UL-Listed and FM-approved, made of steel, ductile iron, or other materials compatible with system materials and applications where used.
- B. Press-Seal Fittings: UL 213, carbon-steel housing with butylene O-rings and pipe stop, for

use with plain-end, Schedule 5 steel pipe.

- C. Locking-Lug Fittings: UL 213, ductile-iron body with locking-lug ends, for use with plain-end steel pipe.
- D. Mechanical-Cross Fittings: UL 213, ductile-iron housing with pressure-responsive gaskets, bolts, and threaded or locking-lug outlets.
- E. Drop-Nipple Fittings: UL 1474, with threaded inlet, threaded outlet, and seals; adjustable.
- F. Sprinkler Alarm Test Fittings: Ductile-iron housing with 1-1/2" inlet and outlet, integral test valves, combination orifice and sight glass, and threaded or locking lug ends.

2.09 ALARM DEVICES

- A. Alarm Devices: Types and sizes that will match piping and equipment connections.
- B. Waterflow Indicators: UL 346, electrical-supervision type, vane-type waterflow detector, rated to 250 psig, and designed for horizontal or vertical installation. Include 2 SPDT (single-pole, double-throw) circuit switches to provide isolated alarm and auxiliary contacts, 7 ampere, 125 volts a.c. and 0.25 ampere, 24 volts d.c.; complete with factory-set, field-adjustable retard element to prevent false signals and tamper-proof cover that sends a signal when cover is removed.
- C. Supervisory Switches: UL 753, for valves, electrical-supervision type, SPDT (single-pole, double-throw), normally closed contacts, designed to signal controlled valve in other than full open position.

2.10 PRESSURE GAUGES

Pressure Gauges: UL 393, 31/2" to 41/2" diameter dial with dial range of 0-250 psig.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine walls and partitions for suitable thickness, fire and smoke rated construction, framing for cabinets, and other conditions where cabinets are to be installed.
- B. Do not proceed until unsatisfactory conditions have been corrected.

3.02 SPRINKLER SYSTEM PIPING APPLICATIONS

- A. Refer to Part 2 of this Section for detailed specifications on pipe and fittings products listed below. Use pipe, tube, fittings, and joining methods according to the following applications. Piping may be joined with flanges instead of indicated joints. Use grooved-end fittings with grooved couplings that are made by the same manufacturer and that comply with listing when used together for grooved coupling joints.
 - 1. Option: Mechanical-"T" bolted-branch-outlet fittings, instead of fitting types specified, may be used for branch connections.

- B. Sizes 2" and Smaller: ASTM A 53, A 135, or A 795; Schedule 40 steel pipe with robed-groove ends, grooved-end steel pipe fittings, and grooved-coupling joints.
- C. Sizes 2-1/2" to 6": ASTM A 135 or A 795, Schedule 10 steel pipe with rolled groove ends, grooved-end steel pipe fittings, and grooved-coupling joints.

3.03 VALVE APPLICATIONS

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 - 1. Shutoff Duty: Use ball, or butterfly valves.
 - 2. Throttling Duty: Use globe, ball, or butterfly valves.

3.04 JOINT CONSTRUCTION

- A. Grooved-End Pipe and Grooved-End Fitting Joints: Use grooved-end fittings and grooved couplings that are made by the same manufacturer and that are fisted for use together. Groove pipe and assemble joints with grooved coupling, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.
 - 1. Groove Type: Rolled.
- B. Dissimilar Materials Piping Joints: Make joints using adapters compatible with both piping materials.

3.05 WATER SUPPLY CONNECTION

- A. Connect fire protection piping to water supply piping of size and in location indicated.
- B. Install shutoff valve, check valve, pressure gauge, drain, and other accessories indicated at connection to water supply piping.
- C. Install shutoff valve, backflow preventer, pressure gauge, drain, and other accessories indicated at connection to water supply piping.

3.06 PIPING INSTALLATIONS

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation.
- B. Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate general location and arrangement of piping. Install piping as indicated, as far as practical.
 - 1. Deviations from approved "working plans" for sprinkler piping require written approval from authority with jurisdiction. File written approval with the Architect prior to deviating from approved "working plans."
- C. Use approved fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

- D. Install unions adjacent to each valve in pipes 2" and smaller. Unions are not required on flanged devices or in piping installations using grooved couplings.
- E. Install flanges or flange adapters on valves, apparatus, and equipment having 2-1/2" and larger connections.
- F. Install "Inspector's Test Connections" in sprinkler piping, complete with shutoff valve, sized and located according to NFPA 13.
- G. Install sprinkler piping with drains for complete system drainage.
- H. Install sprinkler zone control valves, test assemblies, and drain headers adjacent to standpipes when sprinkler piping is connected to standpipe.
- I. Install drain valves on standpipe systems, of sizes and in locations indicated.
- J. Install ball drip valves to drain piping between fire department connections and check valves, and where indicated. Drain to floor drain or outside building.
- K. Install alarm devices in piping systems.
- L. Hangers and Supports: Comply with NFPA 13. Install according to NFPA 13 and NFPA 14.
 - 1. Install hanger and support spacing and locations for steel piping joined with grooved mechanical couplings according to manufacturers written instructions for rigid systems.
 - 2. Earthquake Protection: Install piping according to NFPA 13 to protect from earthquake damage.
- M. Install pressure gauges on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gauges with connection not less than 1/4" and with soft metal seated globe valve, arranged for draining pipe between gauge and valve. Install gauges to permit removal, and install where they will not be subject to freezing.

3.07 SPECIALTY SPRINKLER FITTING INSTALLATIONS

Install specialty sprinkler fittings according to manufacturer's written instructions.

3.08 VALVE INSTALLATIONS

- A. Refer to Division 15 Section "Valves" for installation of general-duty valves. Install fire-protection specialty valves, trim, fittings, controls, and specialties according to NFPA 13 and NFPA 14, manufacturer's written instructions, and the authority having jurisdiction.
- B. Install check valve in each water supply connection. Install backflow preventers instead of check valves in potable water supply sources.
- C. Alarm Check Valves: Install valves in vertical position for proper direction of flow, including bypass check valve and retard chamber drain line connection.

3.09 SPRINKLER APPLICATIONS

- A. Rooms without Ceilings: Pendant sprinklers.
- B. Rooms with Suspended Ceilings: Recessed sprinklers.
- C. Wall Mounting: Sidewall sprinklers.
- D. Sprinkler Finishes: Use sprinklers with following finishes:
 - 1. Pendant, and Sidewall Sprinklers: Chrome-plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax-coated where exposed to acids, chemicals, or other corrosive fumes.
 - 2. Concealed Sprinklers: Rough brass, with factory-painted white cover plate.
 - 3. Flush Sprinklers: Bright chrome, with painted white escutcheon.
 - 4. Recessed Sprinklers: Bright chrome, with bright chrome escutcheon.
 - 5. Residential Sprinklers: Dull chrome.

3.10 SPRINKLER INSTALLATIONS

- A. Install sprinklers in patterns indicated.
- B. Install sprinklers in suspended ceilings in center of acoustical panels and tiles.
- C. Install sprinklers in suspended ceilings in center of narrow dimension of acoustical panels.
- D. Do not install pendant or sidewall, wet-type sprinklers in areas subject to freezing. Use dry-type sprinklers supplied from heated space.

3.11 CONNECTIONS

- A. Connect to specialty valves, specialties, fire department connections, and accessories.
- B. Connect water supplies to sprinkler systems.
- C. Electrical Connections: Power wiring is specified in Division 16.
- D. Connect alarm devices to fire alarm system.

3.12 FIELD QUALITY CONTROL

- A. Perform field acceptance tests of each fire protection system.
 - 1. Flush, test, and inspect sprinkler piping systems according to NFPA 13 Chapter "System Acceptance."

2. Flush, test, and inspect standpipe systems according to NFPA 14 Chapter "Tests and Inspection."
- B. Replace piping system components that do not pass test procedures specified. Then retest to demonstrate compliance. Repeat procedure until satisfactory results are obtained.
1. Report test results promptly and in writing to Architect.

3.13 CLEANING

Clean dirt and debris from sprinklers. Replace sprinklers having paint other than factory finish with new sprinklers. Cleaning and reuse of painted sprinklers is prohibited.

3.14 COMMISSIONING

- A. Starting Procedures: Follow manufacturer's written procedures. If no procedures are prescribed by manufacturer, proceed as follows:
1. Verify that specialty valves, trim, fittings, controls, and accessories have been installed correctly and operate correctly.
 2. Verify that specified tests of piping are complete.
 3. Check that damaged sprinklers and sprinklers with paint or coating not specified have been replaced with new, correct type of sprinklers.
 4. Check that sprinklers are correct type, have correct finish and temperature ratings, and have guards where required for applications.
 5. Fill wet-pipe sprinkler systems with water.
 6. Check for correct type and size hose valves.
 7. Energize circuits to electrical equipment and devices.
 8. Adjust operating controls and pressure settings.
- B. Coordinate with fire alarm system tests. Operate systems as required.

END OF SECTION

**SECTION 15400
PLUMBING SYSTEMS**

PART 1 - GENERAL

1.01 SUMMARY

This Section includes components required to provide complete and working plumbing systems.

1.02 SUBMITTALS

- A. Catalog data including manufacturer's literature and illustrations.
- B. Manufacturer's Specifications and Engineering Data.
- C. Shop Drawings:
 - 1. Dimensions.
 - 2. Plumbing Diagrams.
 - 3. Installation.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drains, Cleanouts, Shock Arresters, Interceptor:
 - 1. J.R. Smith
 - 2. Wade
 - 3. Zurn
 - 4. Josam
 - 5. MIFAB
 - 6. Or Equal
- B. Hose Bibbs:
 - 1. J.R. Smith
 - 2. Zurn
 - 3. Acorn
 - 4. MIFAB
 - 5. Or Equal
- C. Water Heaters:
 - 1. A.O. Smith
 - 2. Laars
 - 3. Peterson-Kelly
 - 4. Or Equal

E. Expansion Tanks

1. Amtrol
2. Wessels
3. Or Equal

2.02 FLOOR DRAINS- GENERAL

Wade 1100 STDS, Zurn ZRB-180, J.R. Smith or equal, cast iron body, plain bronze dome and clamping collar.

2.03 CLEANOUTS

- A. Wall Cleanouts: No hub, with round stainless steel access cover, Match pipe size, 4 inches maximum.
- B. Floor Cleanouts: Round scoriated bronze cover, Match pipe size, 4 inches maximum.
- C. Outside Grade Cleanouts: Match pipe size, 4 inches maximum. Provide concrete box with lid.

2.04 SHOCK ARRESTERS

Installation: Install where required by Code.

2.05 PLUMBING FIXTURES

A. General

1. Plumbing fixtures shall be roughed-in at the locations dimensioned on the architectural drawings. The amount and general placement only shall be as shown on the plumbing drawings.
2. All handicapped accessible fixtures and trims shall meet ADA and Title 24 requirements.

2.06 WATER HEATERS:

- A. The gas fired water heater shall be fully condensing type with seamless glass lined steel construction and foam insulated with storage tank and recovery indicated on schedules. The water heater shall be U.L. listed and shall exceed the minimum efficiency requirements of ASHRAE/IES for thermal efficiency. The tank shall be ASME stamped and approved for potable water use and shall be constructed to withstand 160 psi minimum working pressure. The complete heater shall be AGA listed and the installation shall be made in compliance with state and local codes and ordinances.
- B. Water heater shall be complete with factory installed A.G.A./ASME temperature & pressure relief valve. Unless otherwise noted on plans, relief pipe discharge shall be routed to a safe location outside the building and discharge downward not more than 24 inches nor less than

6 inches above ground or the flood level of the area receiving the discharge.

2.07 EXPANSION TANK:

- A. Expansion tank shall be approved for potable water application.
- B. 120 gallons and larger expansion tank shall meet ASME Code and shall bear ASME stamped.
- C. Expansion tank less than 120 gallons shall comply with IAPMO and shall bear IAPMO label.
- D. Expansion tank must be compatible with the intended application

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General:
 - 1. Install in strict accordance with manufacturer's instructions.
 - 2. Confirm final connections to equipment prior to performing work.
 - 3. Install gas piping in open or ventilated spaces. Pitch lines and provide drip legs for condensation collection points.
- B. Water Piping: Provide a gate valve and a hose bibb drain on water supply line where it enters building. Provide gate valves as indicated on Drawings. Provide dielectric unions with appropriate end connections for the pipe materials in which installed (screwed, soldered, or flanged), which effectively isolate dissimilar metals, prevent galvanic action, and stop corrosion.
- C. Waste and Vent Piping:
 - 1. Slope soil and waste lines inside and outside building in accordance with requirements of governing Plumbing Codes.
 - 2. Establish grade lines with surveyor's level. Verify location of sewer taps before start of Work and make necessary grade adjustments.
 - 3. Locate clean outs as required by Code.
 - 4. Bring exterior cleanouts up to grade; provide concrete box with cast iron cover over each exterior cleanout.
 - 5. Flush piping clean with water after installation.
 - 6. Extend water heater relief valve discharge lines full size to nearest available floor drain or to daylight as indicated on Drawings. Do not trap lines.
 - 7. Install trap primer for each floor drain and/or floor sink having a trap primer connection. Provide access panels.

3.02 TESTS

Complete and test pipe rough-in before insulation or other finish work is applied. Covering of work before acceptance is prohibited.

3.03 CLEANING AND TESTING

- A. Perform testing procedure in the presence of the authorities having jurisdiction.
- B. Complete and test pipe rough-in before insulation or other finish work is applied. Covering of work before acceptance is prohibited.
- C. Do not test relief valves, pressure-reducing valves, valves, or equipment beyond its rated capacity.
- D. Drainage Piping Systems:
 - 1. Flush pipe with clear water to remove dirt and debris.
 - 2. Test systems in accordance with Uniform Plumbing Code, or other applicable state or local codes pertaining thereto. Test pressure and acceptance criteria are specified within each plumbing code. Visually inspect joints for leaks; repair or replace as required and retest.

3.04 PIPING SYSTEM LEAK REPAIR

- A. Repair leaks which occur during the period of warranty, including any building damage or refinishing costs, at no cost to the owner.
- B. Repair leaks in threaded pipe by replacing the thread or the fitting or both. Any replacement piece shall be the same length as the piece removed.

END OF SECTION

SECTION 15780
PACKAGED AIR CONDITIONING UNITS

PART 1 - GENERAL

1.01 SUMMARY

This section includes outdoor units, heating coils, controls, and accessories for cooling and heating application.

1.02 QUALITY ASSURANCE

- A. Meet the requirements of UL.
- B. Performance certified under ARI Standard 320.
- C. Adhesives and insulation materials shall have a composite fire and smoke hazard rating per NFPA 90A and UL 181, manufacturer labeled accordingly.
- D. Units shall be products of manufacturer regularly engaged in production of such units and issuing complete catalog and computerized selection data on such products.

1.03 SUBMITTALS

- A. Provide submittals in accordance with provisions of Section 01300, SUBMITTALS.
- B. Submittals shall include the following:
 - 1. Dimensioned plan and elevation view Drawings.
 - 2. Marked selection nomograph or other form of selection calculation to indicate performance of proposed units. Data shall include:
 - a. Model number of unit.
 - b. Net sensible and total cooling and net heating capacity.
 - c. Voltage and power consumption in KW for each unit.
 - d. Fouling factor.
 - e. Physical Data with weights and dimensions
 - f. Accessories and options per drawing schedule
 - g. Recirculation air flow in cfm and external static pressure in inches water gauge.
 - h. Entering and leaving air temperatures, cooling in degrees F.
 - i. Starting amp draw.
 - j. Rated load amp draw.
 - k. Operating weight.
 - 3. Submit outline specification indicating materials and other pertinent information.
 - 4. Submit electrical data for all motors and controls. Data shall clearly indicate motor

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starting requirements.

5. Submit color chips of available finishes. Color selections for the unit shall be made by the Architect at time of submittal.
6. Submit Operating and Maintenance Manuals including schedule for lubrication and related servicing.

1.04 **WARRANTY**

As specified in Section 15010 - MECHANICAL GENERAL PROVISIONS except with a 4 year extended warranty covering the compressor/motor assembly.

PART 2 - PRODUCTS

2.01 **ACCEPTABLE MANUFACTURERS**

- A. Carrier – BASE BID
- B. Trane – ALTERNATE BID NO. 1
- C. York – ALTERNATE BID NO. 2
- D. Lennox – ALTERNATE BID NO. 3

2.02 **MOTORS AND CONTROLS**

- A. Motors: Provided with equipment. Refer to Section 15030 - ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT.
- B. Motor Starting Devices: Provided with equipment. Include voltage transformation as required for motors and controls.
- C. Power: A single electrical power feed will be brought to the unit.

2.03 **DESIGN REQUIREMENTS**

- A. General: Provide complete computer room units, combination chilled water and DX coil, factory assembled, piped, wired, and provided with specified components as scheduled. Refer to Drawings for performance requirements.
- B. Cabinet: Draw-through type, fully factory assembled and readily serviceable through the front, constructed of welded steel with exterior panels internally insulated with 1 inch thick, 1-1/2 pcf density fiberglass insulation. Provide panels with concealed fasteners for servicing unit internals. Condensate drain pan shall be 304 stainless steel.
- C. Heating Coil: Constructed of aluminum fins mechanically bonded to copper tubes with maximum face velocity of 500 fpm. Provide a solid-state control to modulate a 2 way valve in response to room conditions. Provide adjustable valve modulation from 0 to full travel for controlling dehumidification. Control valve shall be "Delta P" by Flow Control Industries".
- D. Condensate Pump System: Includes an integral float switch, pump, motor and reservoir. Provide leak detection for floor mounted units and condensate pan alarms for suspended units. Unit shall be UL labeled.

- E. Fan: Double width, double inlet, centrifugal type with heavy-duty steel shaft and self-aligning ball bearings having a minimum serviceability of 200,000 hours. Provide a 1750 rpm fan motor, mounted on an adjustable slide base, provided with a variable speed package sized for 200% of the fan motor horsepower.
- F. Circuit Breaker: Non-automatic, located in the high voltage side of the unit electrical panel, accessible from the outside of the panel with the front closed, to preclude internal access until switched to off position.
- G. Fire Stat: Mount in the electrical panel with the sensing element mounted in the return air. Immediately shuts the system down when high temperatures are detected.
- H. A microprocessor-based control system with LED numerical display shall provide observation of the following settable functions:
 - 1. Temperature setpoint, 65E - 85EF.
 - 2. Temperature sensitivity, +1E, "5EF in 0.1EF increments.
 - 3. Humidity setpoint, 40-60% RH.
 - 4. Humidity sensitivity, +1%, +10% RH in 0.1% increments.
 - 5. Humidifier flush rate.
- I. Normal operating modes of heating, cooling, humidification and dehumidification shall be indicated by colored LEDs on the unit-mounted display panel. The control system shall monitor unit operation and activate an audible and visual alarm in the event either of the following factory preset alarm conditions occurs:
 - 1. High temperature.
 - 2. Low temperature.
 - 3. High humidity.
 - 4. Low humidity.
 - 5. Change filters.
 - 6. Loss of air.
 - 7. Accessible local alarm.
- J. Temperature and Humidity Recorder:
 - 1. Provide a 7-day hour temperature and humidity recorder of the full scope, two pen, surface mounted type with 100 recording charts, one red and one blue bottle of recording ink. Recorder shall have a 110 volt, single phase, 60 cycle power supply.
- K. Disconnect Switch (Locking Type):
 - 1. The non-automatic molded case circuit breaker shall be mounted in the high voltage section of the electrical panel. The switch shall be accessible from the outside of the unit with the accent panel closed, and prevent access to the high voltage electrical components until switched to the "OFF" position.
- L. Flow Switch:

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1. The flow switch shall activate the alarm system should be chilled water supply be interrupted. The switch shall be factory mounted and wired.

PART 3 - EXECUTION

3.01 INSTALLATION

Install units as shown on the Drawings and in accordance with shop drawings and other applicable data provided by manufacturer.

3.02 START UP INSTRUCTION

- A. Provide appropriate services for the start up of units and instruction of Owner's operating personnel.
- B. Refer to Section 15995 - MECHANICAL SYSTEM COMMISSIONING requirements

END OF SECTION

SECTION 15800
TESTING, ADJUSTING AND AIR BALANCE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification sections, apply to Work of this Section.

1.2 WORK INCLUDED

- A. The Contractor shall furnish all labor, material and equipment called for in these Specifications and accompanying Drawings and shall install the system complete in every respect.
- B. Test, adjust, and balance the following mechanical systems:
1. Supply air systems, all pressure ranges;
 2. Return air systems;
 3. Exhaust air systems;
 4. Verify temperature control system operation.
 5. Economizer systems and outside air intakes
- C. Test systems for proper sound and vibration levels.
- D. This Section does not include:
1. Testing boilers and pressure vessels for compliance with safety codes;
 2. Specifications for materials for patching mechanical systems;
 3. Specifications for materials and installation of adjusting and balancing devices. If devices must be added to achieve proper adjusting and balancing, refer to the respective system sections for materials and installation requirements.
 4. Requirements and procedures for piping and ductwork systems leakage tests.
- E. Certified Reports:
1. Submit testing, adjusting, and balancing reports bearing the seal and signature of the Test and Balance Engineer.
 2. The reports shall be certified proof that the systems have been tested, adjusted, and balanced in accordance with the referenced standards; are an accurate representation of how the systems have been installed; are a true representation of how the systems are operating at the completion of the testing, adjusting, and balancing procedures; and are an accurate record of all final quantities measured, to establish normal operating values of the systems.
 3. Follow the procedures and format specified below.
- F. Report Format:
1. Report forms shall be those standard forms prepared by the referenced standard for each respective item and system to be tested, adjusted, and balanced.
 2. Bind report forms complete with schematic systems diagrams and other data in reinforced, vinyl, three-ring binders.
 3. Provide binding edge labels with the project identification and a title descriptive of the contents.
 4. Divide the contents of the binder into the below listed divisions, separated by divider tabs:
 - a. General Information and Summary
 - b. Air Systems
 - c. Temperature Control Systems
 - d. Special Systems
 - e. Sound and Vibration Systems
- G. Report Contents: Provide the following minimum information, forms and data:
1. General Information and Summary:
 - a. Inside cover sheet to identify testing, adjusting, and balancing agency, Contractor, Owner, Architect, Engineer, and Project.
 - b. Include addresses, and contact names and telephone numbers.

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- c. Also include a certification sheet containing the seal and name address, telephone number, and signature of the Certified Test and Balance Engineer.
 - d. Include in this division a listing of the instrumentations used for the procedures along with the proof of calibration.
- H. The remainder of the report shall contain the appropriate forms containing as a minimum, the information indicated on the standard report forms prepared by the AABC and NEBB, for each respective item and system. Prepare a schematic diagram for each item of equipment and system to accompany each respective report form.

1.3 TEST AND BALANCE ENGINEER'S QUALIFICATIONS

- A. A Professional Engineer (either on the installer's staff or an independent consultant), registered in the State in which the services are to be performed, and having at least 3-years of successful testing, adjusting, and balancing experience on projects with testing and balancing requirements similar to those required for this project.

1.4 CODES AND STANDARDS

- A. NEBB: "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."
- B. AABC: "National Standards For Total System Balance".
- C. ASHRAE: ASHRAE Handbook, 1984 Systems Volume, Chapter 37, Testing, Adjusting, and Balancing.

PART 2 - PRODUCTS

2.1 SYSTEMS OPERATION

- A. Systems shall be fully operational prior to beginning procedures.

PART 3 - EXECUTION

- A. Test, adjust, and balance the air systems before steam and refrigerant systems.
- B. Test, adjust and balance air conditioning systems during summer season and heating systems during winter season, including at least a period of operation at outside conditions within 5 deg. F wet bulb temperature of maximum summer design condition, and within 10 deg. F dry bulb temperature of minimum winter design condition. Take final temperature readings during seasonal operation.
- C. Before operating air systems, perform these steps:
 - 1. Walk the system from the system air handling equipment to terminal units to determine variations of installation from design.
 - 2. Check filters for cleanliness.
 - 3. Check dampers (both volume and fire) for correct and locked position, and temperature control for completeness of installation before starting fans.
 - 4. Prepare report test sheets for both fans and outlets. Obtain manufacturer's outlet factors and recommended procedures for testing. Prepare a summation of required outlet volumes to permit a crosscheck with required fan volumes.
 - 5. Determine best locations in main and branch ductwork for most accurate duct traverses.
 - 6. Place outlet dampers in the full open position.
 - 7. Prepare schematic diagrams of system "as-built" ductwork and piping layouts to facilitate reporting.
 - 8. Lubricate all motors and bearings.
 - 9. Check fan belt tension.
 - 10. Check fan rotation.

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- D. Provide all required instrumentation to obtain proper measurements, calibrated to the tolerances specified in the referenced standards. Instruments shall be properly maintained and protected against damage.
- E. Provide instruments meeting the specifications of the referenced standards.
- F. Use only those instruments that have the maximum field measuring accuracy and are best suited to the function being measured.
- G. Apply instrument as recommended by the manufacturer.
- H. Use instruments with minimum scale and maximum subdivisions and with scale ranges proper for the value being measured.
- I. When averaging values, take a sufficient quantity of readings, which will result in a repeatability error of less than 5 percent. When measuring a single point, repeat readings until 2 consecutive identical values are obtained.
- J. Take all reading with the eye at the level of the indicated value to prevent parallax.
- K. Use pulsation dampeners where necessary to eliminate error involved in estimating average of rapidly fluctuation readings.
- L. Take measurements in the system where best suited to the task.
- M. Perform testing and balancing procedures on each system identified, in accordance with the detailed procedures outlined in the referenced standards.
- N. Cut insulation, ductwork, and piping for installation of test probes to the minimum extent necessary to allow adequate performance of procedures.
- O. Patch insulation, ductwork, and housings, using materials identical to those removed.
- P. Seal ducts and piping, and test for and repair leaks.
- Q. Seal insulation to re-establish integrity of the vapor barrier.
- R. Mark equipment settings, including damper control positions, valve indicators, fan speed control levers, and similar controls and devices, to show final settings. Mark with paint or other suitable, permanent identification materials.
- S. Retest, adjust, and balance systems subsequent to significant system modifications, and resubmit test results.
- T. Test and adjust mechanical systems for sound and vibration in accordance with the detailed instructions of the referenced standards.
- U. Record all data obtained during testing, adjusting, and balancing in accordance with, and on the forms recommended by the referenced standards.
- V. Prepare report of recommendations for correcting unsatisfactory mechanical performances when system cannot be successfully balanced.

END OF SECTION

SECTION 16010
ELECTRICAL

PART I - GENERAL

1.01 INCORPORATED DOCUMENTS

- A. All portions of the General Conditions, Supplementary General Conditions, Division I, and Addenda etc., issued relating to same are a part of this Section and shall apply as though repeated herein.

- B. Except as modified by the requirements herein, the electrical system shall conform to the applicable requirements of the following codes, regulations, standards and rules. Nothing contained herein shall be construed as permitting work that is contrary to these requirements.
 - 1. The latest rules and regulations of the State Fire Marshal, Federal and all applicable City, State laws or regulations; National Electrical Code and latest accepted standards of I.E.E.E., A.S.A., N.E.M.A., and U.L.
 - 2. Wherever the Specifications or Drawings call for material, workmanship arrangement or construction of a superior quality than is required by the above rules and regulations, the Specifications take precedence. Should there be any direct conflict between the rules and regulations and this Specification, the rules and regulations govern.
 - 3. Provide, without any extra charge, any additional material and labor when required by the compliance with these rules and regulations, though the work be not mentioned in these particular Specifications or shown on the Architectural Drawings. No change orders will be allowed for any misinterpretation of the requirements of these documents.
 - 4. Comply with the manufacturer's instructions in all cases where the manufacturers of equipment used in the Contract furnish information and/or instruction not shown in the Specifications.
 - 5. Comply with all rules and requirements of the utility companies providing electric, telephone, and cable television services.

- C. Definitions:

In order to achieve simplicity in these specifications and drawings repetitive words and phrases not contributing to clarity have been omitted.

- 1. "Listed": Equipment is "listed" if of a kind mentioned in a list which:

- a. Is published by a nationally recognized laboratory that makes periodic inspection of production of such equipment.
 - b. States that such equipment meets nationally recognized standards or has been tested and found safe for use in a specified manner.
2. "Labeled": Equipment is labeled if:
- a. It embodies a valid label, symbol, or other identifying mark of a nationally recognized testing laboratory such as Underwriters Laboratories, Inc.
 - b. The laboratory makes periodic inspections of the production of such equipment.
 - c. The labeling indicates compliance with nationally recognized standards or tests to determine safe use in a specified manner.
3. "Certified": Equipment is "certified" if:
- a. Equipment has been tested and found by a nationally recognized testing laboratory to meet nationally recognized standards or to be safe for use in a specified manner.
 - b. Production is periodically inspected by a nationally recognized testing laboratory.
 - c. It bears a label, tag, or other record of certification.
4. "Nationally Recognized Testing Laboratory": A testing laboratory that is approved, in accordance with regulations, by the Secretary of Labor.
5. "The Contractor": Refers to the prime Contractor.
6. "The Architect": Refers to the Professional Architect - in this case CJW Architecture
7. "The Owner": Refers to the legally registered owner of the project.
8. "The Engineer": Refers to the Professional Electrical Engineer in this case TANTECH ENGINEERS, INC.
9. "Provide": Construed to mean furnish (supply), install and connect complete and ready for safe and regular operation or particular work referred to unless

otherwise noted.

10. "Furnish": Construed to mean purchase, procure, acquire and deliver complete with related accessories to project site.
11. "Install": Construed to mean to physically erect and mount the item(s) with related accessories in-place.
12. "Connect": Construed to mean make final electrical connections for a complete operating piece of equipment with related accessories.
13. "As directed": As told by the Owner or their authorized representative.
14. "Work": Labor, materials, equipment, apparatus, controls, accessories, and other items required for proper and complete installation.
15. "Wiring": Raceway, fittings, wire, boxes and related items.
16. "Concealed": Embedded in or below masonry or other construction, installed in furred spaces, within partitions, above suspended ceilings, in trenches, or in enclosures.
17. "Exposed": Not installed underground or "concealed" as defined above.
18. "Indicated", "shown", or "noted": As indicated, shown or noted on drawings or specifications.
19. "Utility Companies": Construed to mean either the electric utility company (Pacific Gas and Electric) or the telephone utility company (AT&T).

1.02 DESCRIPTION

- A. Work included in this Section: It is the intention of this Specification to provide to the Electrical Contractor the necessary information to construct a total and complete electrical system for the intended building(s) and sitework. The Electrical Contractor shall construct and install a complete in-place and operating electrical system, as set forth in this Specification including, but not limited to these major items:

1. Utilities.
 - a. Immediate contact and follow up coordination with power, and telephone companies for on-site distribution and services to meet schedule.
 - b. Primary raceway from existing PG&E splice box to transformer pad.
 - c. Secondary raceways complete from transformer pad to main

- switchboard.
- d. Power metering provisions as required by Pacific Gas and Electric.
 - e. Telephone distribution raceway system per AT&T requirement. Main service conduit from property line to telephone backboard. Empty conduits with nylon pull cords.
 - f. Coordinate all underground raceway routing so as to be compatible with existing easement restrictions and to mate with those provided by utility companies.
2. Trenching and backfill for power and telephone utilities and underground branch circuits.
 3. Exterior lighting: Provide and install lighting fixtures and lamps for exterior lighting. Provide required time switches, photocell and relays to complete the controls as shown on the drawings.
 4. Detector check valve and PIV conduit system to building sprinkler riser location.
 5. Parking lot light canopy lights, rear security lights and other building lighting. Provide required time switches, photocell, and relays to complete the controls as shown on the drawings.
 6. Main switchboard, house panel, lighting controls, branch circuits, and complete grounding systems.
 7. Junction box at each tenant sign location.
 8. Furnish and install all boxes, conduit and wiring for a complete in-place and operable power and lighting system as noted on drawings.
 9. Excavation and backfill as required by the work under this section.
 10. Cutting, patching, and caulking for electrical penetrations.
 12. Hangers, supports and concrete work as required.
 13. Coordination with all other trades and work under other sections.
 14. Testing of all electrical systems, equipment and conductors.
 15. Touch-up of factory painted electrical equipment.

16. Furnish submittals for review - including shop drawings, and product data.
17. Furnish complete operating/maintenance manual and record drawing (As-Built) reproducibles.
18. All work and material for complete, in-place and operable systems.

1.03 WORK NOT INCLUDED UNDER THIS SECTION:

- A. Telephone cable and their installation.
- B. Primary and secondary utility cable connections at each end by utility company. Primary and secondary cable by utility company.
- C. Furnishing and installation of illumination signs and their transformers.
- D. Transformer pad by General Contractor.
- E. Parking lot luminaire concrete bases by General Contractor.

1.04 RELATED WORK SPECIFIED IN OTHER SECTIONS:

- A. Access doors for electrical, by General Contractor.
- B. Painting except for factory finished items or touch up on factory finished items.
- C. Project record documents: Division 1.

1.05 UTILITY COMPANY REQUIREMENTS:

- A. Perform all work for electric power, public, telephone and cable television services in accordance with requirements of the respective serving utility company.
- B. Verify service locations and all other service requirements prior to starting work. Except for work specifically excluded from contract, provide all work required by the utility companies to render utility services to the buildings, including, but not limited to, trenches, conduits, pullboxes, concrete encasements, terminal cabinets, backboards, and grounding. (Note: Concrete encasements, if required, are a part of this Section.)

1.06 LICENSES, PERMITS, FEES AND CHARGES:

Obtain and pay for all licenses, inspection fees, and permits and pay for all fees and charges connected with the work of this Section.

1.07 INSPECTIONS, TESTS AND CERTIFICATES:

Arrange and pay for all inspections, tests and certificates required for completion and approval of the work.

1.08 SAFETY:

In accordance with generally accepted construction practices and general contractor specific safety procedures, the Contractor will be solely and completely responsible for conditions of the job site, including safety of all persons and property during performance of the work. This requirement will be applied continuously and not be limited to normal working hours.

The Engineer's review of the Contractor's performance does not include review of the Contractor's safety measures in, on or near the job site or connected in any way with the safety performance of the work of this Section.

1.09 EXAMINATION OF SITE:

Examine the site premises and all related plans and specifications prior to bidding, to determine the conditions under which the work is to be performed. No allowances will be made for extra expense incurred due to failure to examine the premises or to discover site conditions that affect the work.

1.10 CONFERENCE WITH OWNER:

Confer with Owner's representative to confirm exact locations, mounting heights and arrangements of all finish work prior to roughing-in. Minor relocations and rearrangements of the work requested at this time shall be included at no additional cost to Owner.

1.11 QUALIFICATIONS OF WORKMEN:

Use only qualified thoroughly trained workmen for the work of this Section. In acceptance or rejection of the finished work, no allowances will be made by Owner for lack of skill on the part of the workmen.

1.12 QUALITY ASSURANCE:

A. Acceptable Manufacturers: Where multiple listing occurs, the Contractor may select equal products of any one of the manufacturers named. Acceptance of manufacturers proposed to be used, but not named, shall be obtained in accordance with requirements of Division No. 1 and this Section 1.13.

1. Material and equipment shall be UL listed, labeled or certified where such standards have been established. Equipment and material covered by UL will be accepted provided equipment and material is listed, labeled, certified

or otherwise determined to meet safety requirements of a nationally recognized testing laboratory. Equipment of a class which no nationally recognized testing laboratory accepts, certifies, lists, labels, or determines to be safe will be considered, if inspected or tested in accordance with national industrial standards, such as NEMA, IPCEA or ANSI. Evidence of compliance shall include certified test reports and definitive shop drawings.

2. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in manufacturing of such items, for which replacement parts shall be available. Items not meeting this requirement, but which otherwise meets technical specifications, and merits of which can be established through reliable test reports or physical examination of representative samples, will be considered.
 3. When more than one unit of the same class of equipment or material is required, such units shall be the products of a single manufacturer.
 4. Main switchboards and panelboards shall be the unit responsibility of one manufacturer. Manufacturer of these equipment assemblies shall be the same current manufacturer of the major electrical components such as fused switches, circuit breakers, Manufacturer of equipment assemblies, which include components made by other equipment manufacturers other than those components mentioned above shall assume complete responsibility for final assembled unit. Components shall be compatible with each other and with total assembly for intended service. Similar constituent parts shall be product of a single manufacturer.
- B. Acceptance tests as herein specified are defined as those tests and inspections required to determine that equipment involved may be energized for final operation tests. Final acceptance will not only depend on equipment dependability, as determined by subject tests, but will also depend on complete operational tests on electrical equipment to show that equipment will perform functions for which it was designed. These specifications intend that workmanship, methods, inspections, and materials used in erection and installation of subject equipment shall conform with accepted engineering practices, IEEE Standards, the NEC, and, more specifically, these specifications for electrical work and manufacturer's instructions.
- C. Demonstration of Complete Electrical Systems:
1. Provide owner with certification of inspection and approval of an active member of International Association of Electrical Inspector's of work completed and included in this Section. Contractor shall be responsible for notifying inspector when work reaches inspection stage.
 2. Contractor shall be responsible for notifying local authority having jurisdiction

in order that local inspection may be carried out at the proper stage.

1.13 SUBMITTALS:

A. The following submission items shall be delivered to the Architect for review. These items must be presented in a timely manner and this prescribed sequence in order to insure an orderly transfer of information and review time and cause no delay in the work of this Section or in the work of any other Contractor. Refer to Supplementary Conditions for number of copies to be submitted.

1. Material list.
2. Shop drawings, product data, and samples.
3. Shop drawings (including fixture submittal) and material list shall be submitted complete in one submittal concurring with bid documents. Subsequent review time for incomplete submittals or submittals not conforming to bid documents shall be paid for by the Contractor.
4. Operation/Maintenance Manual within 30 days after substantial completion, submit to Owner.
5. Record drawings within 30 days after completion of the project. All corrections, changes and final acceptance within the next 30 days. Incomplete or incorrect record drawings shall be grounds for withholding final payment.

B. Material Product List:

1. Submit a list of material with manufacturer's names that are intended to be used on this project. This submittal shall be made within the time set forth in Paragraph "A".
2. The list shall include, but not be limited to these major items:
 - a. Wire.
 - b. Conduit/Raceway.
 - c. Fittings.
 - d. Switchboards/Panelboards.
 - e. Relays/Time Switches/Wiring Devices.
 - f. Lighting fixtures and lamps.
 - g. Custom made equipment.
 - h. Fabricated equipment.
3. Contractor's Options:
 - a. For products specified only by reference standard, select any product

meeting that standard.

- b. For products specified by naming several products or manufacturer's, select any one of the products or manufacturers named, which complies with the specifications.
- c. For products specified by naming one or more products or manufacturers and "or equal", contractor must submit a request as for substitutions for any product or manufacturer not specifically named.
- d. For products specified by naming only one product and manufacturer, there is no option.

4. Substitutions:

- a. For a period of 30 days after Contract Date, Architect will consider written requests from Contractor for substitution of products in accordance with Division 1.
- b. Submit a separate request for each product, supported with complete data, with drawings and samples as appropriate, including:
 - 1) Comparison of the qualities of the proposed substitution with that specified.
 - 2) Changes required in other elements of the work because of the substitution.
 - 3) Effect on the construction schedule.
 - 4) Cost data comparing the proposed substitution with the product specified.
 - 5) Any required license fees or royalties.
 - 6) Availability of maintenance service, and source of replacement materials.
- c. Architect and Owner shall be the judge of the acceptability of the proposed substitution.

5. Contractor's Representation: A request for a substitution constitutes a representation that the Contractor:

- a. Has investigated the proposed product and determined that it is

equal to or superior in all respects to that specified.

- b. Will provide the same warranties or bonds for the substitution as for the product specified.
- c. Will coordinate the installation of an accepted substitution into the Work, and make such other changes as may be required to make the Work complete in all respects, including any impact on structure and work of other trades.
- d. Provide purchase orders and delivery dates of major electrical equipment and fixtures, when requested by Architect.

C. Shop Drawings:

- 1. Shop Drawings are drawings, diagrams, schedules and other data specifically prepared for the work by the Contractor or any Subcontractor, manufacturer, supplier or distributor to illustrate some portion of the work in this Section.
- 2. Identify details on Shop Drawings by reference to sheet and detail numbers of Contract Drawings and/or specific reference Sections and paragraphs of the Specifications.
- 3. This submittal shall be made within the time set forth in Paragraph "A".
- 4. Submit all shop drawings and/or equipment cuts (in one submittal, per contract) for the following:
 - a. Switchboards.
 - b. Panelboards.
 - c. Custom made equipment.
 - d. Contactors and/or relays.
 - e. Lighting fixtures and lamps.
 - f. Fabricated equipment.
 - g. Time switches and wiring devices.

Submittal shall have INDEXED FLYLEAF showing equipment and catalog numbers; leaving sufficient space for comments and rubber stamp. SUBMITTALS NOT SUBMITTED WITH A COMPLETE INDEXED FLYLEAF WILL NOT BE REVIEWED.

- 5. Submit detailed layout of electrical switchboard, landlord panel, and

telephone cabinets in respect to location on buildings with switchboard submittal. Special consideration shall be given to doors, etc.

D. Product Data:

1. Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate a material, product or system for some portion of the work in this Section.
2. Standard schematic drawings shall be modified to delete information which is not applicable and shall be supplemented to provide additional information where so required.
3. Manufacturers catalog sheets, brochures, diagrams, schedules, performance charts, illustrations and other standard descriptive data shall:
 - a. Have each copy clearly marked to identify pertinent materials, products, models, finishes, etc.
 - b. Show clearly all standard options included.
 - c. Show dimensions and clearances required.
 - d. Show performance characteristics and capacities.
 - e. Show wiring diagrams and controls and necessary rough-in requirements for utility services and connections. (Where applicable.)
4. Identify each item of Product Data by reference to sheet and detail numbers of Contract Drawings and/or specific reference to Sections and Paragraphs of this Specification.
5. Where Product Data, as submitted, contains extraneous information, unmarked options, or is incomplete, it shall be returned to the Contractor without review.
6. This submittal shall be made within the time set forth in Paragraph "A".

E. Samples:

1. Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.
2. Where samples are required of materials that inherently show a range of size, color or finish, submit samples in sufficient quantity to show this range.
3. Samples shall be tagged or otherwise clearly identified as to pertinent information illustrated and specific relationship to the work, and shall show

the name and address of the subcontractor or agency submitting them, the date, the name of the Work for which they are intended.

4. Unless the Architect determines that samples must be retained for reference purposes, samples will be returned when so requested by the Contractor, carriage collect. No sample shall be incorporated into the Work unless specific approval is given by the Architect.
5. Charges for submission of samples and for their return shall be borne by the Contractor.

F. Contractor Responsibilities:

1. Review Shop Drawings, Product Data and Samples prior to submission to the Architect. Stamp and date upon completion of review.
2. Determine and verify:
 - a. Field measurements.
 - b. Field construction criteria.
 - c. Catalog numbers and similar data.
 - d. Conformance with Specifications.
3. Coordinate each submittal with requirements of the Work and of the Contract Documents.
4. Notify the Architect in writing, at time of submission, of any deviations in the submittals from requirements of the Contract Documents.
5. Begin no fabrication or work which requires submittals until return of submittals with Engineers stamp annotated with either "accepted as submitted" or "accepted as noted".

G. Resubmission Requirements:

1. Make any corrections or changes in the submittals required by the Architect and re-submit (refer to 1.13.A.3).
2. Shop Drawings and/or Product Data:
 - a. Revise initial drawings or data, and re-submit as specified for the initial submittal.
 - b. Indicate any changes that have been made other than those requested by the Architect.

3. Samples: Submit new samples as required for initial submittal.

H. Operating/Maintenance Manual:

Retain until completion of the work all portable and detachable portions of the installation such as: Instruction books, wiring and connection diagrams, service manuals, keys, catalog sheets, etc. Upon completion of the installation, and as a condition of its acceptance, compile a manual and deliver two (2) copies to the Owner. The manual shall contain:

1. Identification, readable from outside the cover, stating: "Electrical Installation, Title of Project, by.....(name of)Company".
 2. Typewritten index near front of manual, furnishing immediate information as to location of the manual of all emergency data for the installation.
 3. Complete instructions regarding the operations and maintenance of all equipment involved.
 4. Complete nomenclature of all replaceable parts, their part numbers, current cost, and name and address of the nearest vendor or replacement parts.
 5. Copy of all guarantees and warranties issued on the installation.
- I. Record Drawings: Provide and maintain from the start of electrical construction a complete set of electrical contract drawings to be used solely for annotating the as installed condition. The following information is required to be drawn upon said drawings on a daily basis:
1. The exact field measurements describing location of all buried conduits, fixtures, stub-outs shall be shown with dimensions located to permanent above ground objects.
 2. All changes, revisions and deviations from the original drawings and Specifications.
 3. Exact location, sizes and kinds of materials noted if different than that which is shown on the originals.

The record drawing set of Contract Drawings shall be used only for this purpose; separate from the drawings normally used in the construction process.

The drawings will be kept on a daily basis; failure to do so will be grounds for withholding final payment. The drawings shall be available at all times for inspectors at the job site.

At the completion of the project the Architect shall provide one set of reproducible

electrical drawings (or the original tracings) on which this information from the field drawings shall be transferred. All drafting work shall be neat, legible, to scale, done at the Contractor's expense to the satisfaction of the Architect.

These permanent reproducibles and the field drawings shall be delivered to the Owner within 30 days after completion of project prior to receipt of final acceptance and payment.

1.14 GUARANTEE:

- A. All work done and materials installed under these plans and Specifications shall be repaired or replaced as may be necessary for any defective work, material or part which may show itself within one (1) year of the date of final payment if, in the opinion of the Architect, said defect is due to imperfections of workmanship or material. This guarantee must be submitted in writing and accepted by the Architect before the date of final payment. On failure to comply with the above guarantee within a reasonable time after notification is given, Owner may proceed to have the repairs made at the Contractor's expense.
- B. Nothing in the above paragraph shall be construed to contradict the requirements of the General Conditions, Supplementary General Conditions and Addenda etc. issued by the Architect relating to this project's guarantees.

1.15 DRAWINGS:

- A. All scaled and figured dimensions are approximate and given for estimate purposes only. Before proceeding with any work, carefully check and verify all dimensions and sizes.
- B. So far as possible the work has been indicated on the contract drawings in such positions to suit and accommodate the work of other trades, but the work as indicated is largely diagrammatic and is shown primarily for clarity. Contractor is responsible for the correct placing of his work and the proper location and connection of his work in relation to the work of other trades. Branch circuit and signal system "home runs" are generally indicated by arrow. Continue all circuits to respective panel or terminate as if routing was shown in its entirety.
- C. When apparatus and equipment have been indicated on the drawings, dimensions have been taken from typical equipment of the class indicated. Carefully check the drawings to see that the equipment will fit into the space provided.
- D. Where equipment is furnished by others, verify dimensions and the correct locations of this equipment before proceeding with the roughing-in of connections.

- E. Be responsible for any cooperative work that must be altered due to lack of proper supervision or failure to make proper provision in time. Such changes shall be directly supervised by the Architect and made to his satisfaction at no cost to Owner.

PART 2 - PRODUCTS

2.01 RACEWAYS AND FITTINGS:

- A. Usage: (Applies to telephone and CATV systems raceways where required).
1. Interior - Exposed
 - a. Higher than 8 feet above finish floor: EMT, rigid steel or rigid aluminum.
 - b. Lower than 8 feet above finish floor: rigid steel or protected EMT.
 2. Interior - Concealed:
 - a. Above floor slab: EMT, rigid steel, rigid aluminum.
 - b. In or below floor slab: PVC, or wrapped rigid steel.
 3. Stub-ups: coated or wrapped rigid steel. PVC is permitted if encased in concrete.
 4. Exterior - Exposed: Rigid steel. Aluminum where permitted by the Engineer.
 5. Exterior - below grade: PVC or other utility approved raceway for utility runs. (Material must be specifically approved by utility company).
- B. Materials: All bends in raceway over 1" in diameter shall be factory made.
1. Rigid Metallic: Full weight with threaded fittings conforming to industry standards. Rigid conduit in contact with earth or in concrete slabs must be PVC coated or have two wrappings of Pabco wrapping.
 - a. Steel Conduit: Protected inside and outside by galvanizing or sherardizing. By Triangle, National Walker, Clifton, General Electric, Rome or Republic. Stub-ups shall be coated with two coats of asphaltum base paint or PVC coating (cover exposed threads and couplings).
 - b. Aluminum conduit and fittings: Shall conform to industry standards. Fittings and same material as conduit. By Reynolds or Kaiser.

2. Electric metallic tubing (EMT): Protected inside and outside by galvanizing or sherardizing. 4" diameter maximum. Same manufacturers as for rigid steel conduit.
 3. Couplings and Connectors: 1-1/4" and smaller shall be setscrew or threaded compression type, 1-1/2" and larger shall be compression type. Connectors must have insulated throats. All fittings by: Duro, Thomas & Betts, or Steel City.
 4. Flexible conduit: National Flexsteel or American Brass. Where exposed to weather use American Brass. "Sealtite" type UA, complete with waterproof fittings. Provide ground wire unless UL approved for ground continuity. Flexible conduit shall be limited to 6'-0" lengths for fixture connection and 4'-0" lengths for HVAC connection.
 5. PVC conduit: Schedule 40 polyvinylchloride high (density) impact type two with factory-made bends, couplings and fittings, as manufactured by Carlon or Certaintee. 90 degree bends and stub-ups must be encased in concrete or rigid galvanized steel elbows must be used. Use of PVC is subject to local code authority having jurisdiction.
- C. Raceway Supports and Fasteners:
1. Individual raceway: Fastened with one-hole malleable straps or pipe-hangers and 3/8" rod. B-Line or Unistrut.
 2. Multiple raceway runs: Unistrut or Kindorf trapeze bar channels suspended by 3/8" steel rods. Fasten conduit to trapeze with clamps. Use patented hangers where applicable.
- D. Wire and Cable:
1. Manufacturers: General Cable, Rome, Southwire, Triangle PWC, General Electric Wire and Cable.
 2. Conductors: Soft-drawn copper with 600 volt insulation: #12 AWG minimum. (Use #10 AWG minimum for branch circuit runs over 100'). All wire and cable shall be copper. No aluminum will be allowed. (No substitutions of use of copper).
 3. Insulation types:
 - a. #8 AWG and smaller THWN, THHN or XHHW as required. Stranded for #8 and larger. Stranded may be used for #10 and smaller. Use THHN where permitted in raceways with more than 6 conductors for derating purposes unless a larger wire is indicated and the use of

THHN is not necessary.

- b. #6 AWG or larger - XHHW, THWN, THHN or as noted.
 - c. Within fluorescent fixtures - Standard 90 degree C. type RHH, THHN, FEP, XHHW, or TFFN.
 - d. Underground - THWN or XHHW 600 volt or THHW/THWN rated for wet location.
 - e. Fixture outlet connection 75 degrees C. (unless fixture is approved to 60 degrees C. wires in outlet).
- E. Taps, Splices and Terminators:
- 1. General:
 - a. Keep conductor splices to minimum and splice only in junction boxes.
 - b. Install splices and taps which have mechanical strength and insulation rating equivalent-or-better than conductor.
 - c. Use splice and tap conductors which are compatible with conductor material.
 - 2. Manufacturers: Panduit, Burndy, Ideal, 3M, O-Z/Gedney, Thomas and Betts.
 - 3. In-Line Splices:
 - a. Spring type wire nuts, nylon insulated: #6 AWG and smaller, lighting and receptacle branch circuits. Pre-twist conductors prior to twisting on the nut, 4 turns minimum.
 - b. Long barrel butt splice type copper compression: #4 and larger, lighting and receptacle around circuit. Panduit SCS/SCL, Ideal CSL, 3M Scotchlok.
 - c. Split-bolt taped connections not acceptable.
 - 4. Insulation:
 - a. Splicing insulation: Scotch Brand #33 electrical tape.

All splices in boxes in contact with earth shall be Scotch Scotchcast; or for in line splicing, Scotch PST Cold Shrink Connection Insulators.

- b. Undergrade splices for power cables shall be moisture proof and installed with the following Scotch Cast Kits, 3M Company.
 - 1) Branch circuits #10 to #6 gauge, Scotchlok Connector Seal Packs #3576, #3577 or #3578.
 - c. Undergrade splices for communication cables, etc., shall be installed in accordance with manufacturer's recommendations and be moisture proof.
5. Ground rods where required, 1" diameter by 10 feet long by Copperweld.
- F. Wiring Devices: Ivory color throughout.
- 1. Receptacles: Pass & Seymour #5362-I-20 amp-125 volt, duplex or equal by Hubbell or General Electric.
- G. Plates:
- 1. On cast boxes: Aluminum plates with rounded or beveled edges. Crouse Hinds.
 - 2. Watertight plates: Shall be gasketed with threaded hub and mating threaded watertight plug housing. Crouse Hinds or Appleton.
- H. Outlet Boxes:
- 1. Galvanized pressed steel to suit the device or outlet, as manufactured by Steel City, Bowers, Raco or Appleton. No box shall be smaller than 4" square or octagon. Those containing 1" conduit and larger shall be 4 11/16" square minimum. Multiple gang boxes shall be 2 1/8" deep minimum.
 - 2. Concealed boxes: Where outlet boxes occur in gypsum board or plastered walls or ceilings, use flush plaster rings.
 - 3. Wall and ceiling fixture hangers: Use 3/8" galvanized studs for clamping the boxes into position and supporting the fixture.
- I. Junction and Pull Boxes: Use standard outlet boxes where possible. If not possible, use code-gauge, sheet steel box with screwed-on cover to suit. Paint one (1) coat primer and two (2) coats of ASA #49 gray baked enamel. Attach junction box covers with cadmium-plated machine screws at 6" o.c. maximum.
- J. Disconnect Switches:

1. Heavy-duty, quick-make/quick-break, 250-600 volt, horsepower rated with fuses, if required.
2. Enclosures: Indoor - NEMA 1, Outdoor - NEMA 3R, both front operated with provisions for padlocking.
3. Manufacturers: General Electric, Square D, or ITE-SIEMEMS.
4. Provide with fuses where local requirements dictate; i.e. A/C units, etc.
5. Dual Rated Switches: All switches having dual ratings (higher rating when used with dual-element fuses) shall have ratings indicated on a metal plate riveted or otherwise permanently fastened to the enclosure.

K. Fuses:

1. All fuses shall be thermal cartridge type, rated electrically with short-circuit interruption characteristics to suit the application, by Bussman or Gould-Shawmut. UL Labeled: Required for particular use required.
2. Motor fuses shall be horsepower rated "Fusetron", sized in accordance with NEC 430-57.
3. Refer to Switchboard for additional fuse requirements.

L. Relays and Contactors:

Relays and contactors to be magnetically held (unless otherwise noted) in NEMA One or one enclosure as noted, by ASCO, Square D or Westinghouse. Contacts to be rated for load and type of load. Noisy relays and contactors shall be replaced. Where several relays install a cabinet or provide behind separate hinged cover in panelboard.

M. Time Switches:

1. Provide photo initiated 7-day calendar dial; with reserve time feature, indoor case, 120-volt motor, three pole, single throw time switch. The time switch to function in order to prevent energization of the lighting for preset periods each day, time switch dial to permit different "OFF" settings for each day of the week. Time switch to function within plus or minus 15 minutes of selected time. When permitted by the time switch, the photo control to operate the internal solenoid thus energizing the three poles whenever the natural lighting falls below 3 foot candles outside.
2. When installed in panelboard time switches shall be behind separate hinged cover.
3. Remotely install photoelectric control cell in appropriate outside location and have cadmium sulphide hermetically sealed cell. A built-in 15-second time delay shall be provided to prevent false switching due to lightning. The sealed cell behind an adjustable window for settings activation at various exterior illumination levels.
4. All time switches and photo cell to be manufactured by Paragon Electric Company, Tork or approved equal.

N. Telephone Backboards:

Telephone backboards to be ¾" plywood with duplex receptacle and 1#6 copper ground.

2.02 METERING SERVICE SWITCHBOARD(S):

- A. The components of the assembly shall be designed, manufactured, tested in accordance with the latest applicable standards of the IEEE, ANSI, NEMA, Alameda Power and Telecom, EUSER and latest requirements of the National Electrical Code.
- B. Applicable section(s) and components shall bear the UL seal and/or label. As to enclosure, bussing, wiring, clearances and devices.

- C. Equipment shall be as manufactured by General Electric, ITE-SIEMENS, Square D, IEM, Westinghouse or Challenger Division with Westinghouse devices.
- D. The total assembled metering service switchboard shall be interior type as noted metal-enclosed, dead front, floor standing sections assembled to form a mechanically sound electrically coordinated unit consisting of the following features:
1. Underground pull section, main over current device(s), commercial meter socket(s) and individual overcurrent devices.
 2. Underground pull section, main device, and meter sockets shall be sealable (seals provided by Utility Company).
 3. Main horizontal cross bus shall extend for full length of switchboards sections served (three phase and neutral). The bus shall be silverplated copper or tin plated aluminum, 100% rated for the main over current device with provisions for future extension. The current density of the copper bus bars shall not exceed 1000 Amperes per square inch cross-section and for aluminum bus not to exceed 750 Amperes per square inch.
 4. The main over current device(s) shall be individually mounted construction, main break switch and fuse Class RK1 up through 600 amps, 601 amps and above shall be bolted pressure switch with Class L fuses, unless otherwise shown on drawings.
 - a. Bussing and equipment shall be braced to withstand stresses resulting from maximum short-circuit amps available.
 5. Grouped metering of combination meter sockets and tenant main devices per 35-inch sections based upon General Electric. All metering sockets prewired at factory.
 - a. The grouped metering shall be braced for 50,000 amps symmetrical minimum.
 - b. The individual tenant main circuit devices shall have sufficient interrupting capacity and properly coordinate with the available fault current at the Utility Company transformer through the main device in this switchboard assembly.
 - c. The switchboards shall be designed for overhead entry of tenant and panel service conduits.
 6. The switchboard assembly completely self-supporting, of the required number of vertical sections bolted together to form one continuous

switchboard 90 inches high. Sides, top and rear cover shall be code gauge steel bolted to the structure. The frame structural member shall be die-formed 12-gauge steel bolted together and reinforced at the external corners with rugged gussets internal and external to the structural members. The switchboard frame is to be suitable for use as floor sills in indoor installations.

- a. After fabrication, each component shall be sanded smooth to remove all rough edges, scratches, and irregularities, and then shall be immersed in a suitable cleaning and rust inhabiting phosphatizing solution. A hard, oven-baked gray, ANSI #49 or #61, enamel shall be applied.
- E. Submit shop drawings concurrently to Architect and Alameda Power and Telecom representative for their metering department to review all metering service switchboards.
- F. Engraved nameplates: Secure each with two cadmium plated screws.
1. 3/8-inch white letters on black phenolic background. Secure each with two cadmium plated screws.
 2. Main device(s), each switchboard device and panelboard shall be labeled. Provide tenant address adjacent to each meter socket and each main overcurrent device.
 3. All sections shall have a nameplate with white lettering on red background. "WARNING: REPLACE ONLY WITH CURRENT LIMITING FUSES AS ORIGINALLY INSTALLED." Provide minimum 3/8-inch lettering. Mount not over 54 inches high.
- G. Spare Fuses and Cabinet:
1. Provide one complete set of (3 each) spare fuses (at each switchboard location) in a steel cabinet for each size used in that switchboard and elsewhere in the same building. Install cabinet adjacent to switchboard, with Single Line Diagram inside cabinet door. (Where exterior-in weatherproof lockable cabinet.)
 2. Engraved nameplates: Secure each with two cadmium plated screws.
 - a. Label door "SPARE FUSES FOR SWITCHBOARD". White letters on black background. Center label on exterior of cabinet door.
 - b. Below the above label, attach "WARNING - REPLACE

SWITCHBOARD FUSES WITH CURRENT LIMITING FUSES AS ORIGINALLY INSTALLED". 3/8-inch white letters on red phenolic background. Secure with four cadmium plated screws.

2.03 ELECTRICAL DISTRIBUTION SYSTEM:

A. Branch Circuit Panels:

1. Enclosures: Single door, dead front of code gauge steel with trim and door of 12 gauge stretcher-leveled steel. Flush trims shall have no exposed hardware. Enclosures shall be 20" wide (minimum) x 5 - 3/4" deep (maximum), unless otherwise noted. Where flush enclosures are deeper than wall, provide frame to seat trim flush. Refer to panel schedules for exact type. Switchboard and panels must be by same manufacturer.
 - a. Finish with one coat rust resistant primer, one coat gray enamel inside and out. Panels and adjacent cabinets or pull boxes, etc., shall be the same color.
 - b. Enclosures shall be lockable NEMA ONE or NEMA 3R enclosure as noted with flush type combination latch (all locks keyed the same), and two keys shall be furnished with each lock.
 - c. Install 6" x 8" typewritten directory behind glass or plastic on inside of enclosure door showing circuit number and complete as-built description of all outlets controlled by each circuit breaker. Arrange directory to match actual circuit breaker arrangement within panel, i.e., 2,4,6 on left side, etc., on schedule.
 - d. Engraved nameplates: All panels, cabinets, safety switches, starters, time switches, relays, meter sockets and other apparatus used for operation and control of circuits, appliances and equipment shall be identified in white letters on a black background.
2. Busses: Bus capacities as noted drawings. Busses shall be made of 98% (or better) conductivity copper bars sized for current density of 1000 amp/square inch of cross section area (or equivalent ampacity tin plated aluminum).
3. Branch circuit breakers:
 - a. Molded case, quicklag bolt-on quick-make/quick break thermal magnetic, with on and off, tripped positions.
 - b. Breaker identification: Provide a permanently fixed number of each circuit breaker either engraved or stamped in the panel front or

snapped into the body of the circuit breaker. Stick-on numbers are not acceptable.

- c. Engraved nameplates: All panels, cabinets, safety switches, starters, time switches, relays and other apparatus used for operation and control of circuits, appliances and equipment shall be identified in white letters on a black background.
 - d. Provide lock off provisions on breakers as required by Code. If handle ties and provision for lock-offs are not compatible, install multiple pole breakers for the applicable circuit breakers.
 - e. Molded case circuit breakers installed in the panelboards shall meet the requirements of NEC Article 384-16(c) with regards to the limits of loading in a panelboard.
4. Panelboards shall conform to the latest revisions of the following standards:
- a. National Electric Code.
 - b. UL 67.
 - c. NEMA PB-1.

2.04 LIGHTING FIXTURES AND LAMPS:

A. General:

- 1. All fixtures shall be furnished completely wired and assembled, with all required fittings and accessories, including ballasts. All UL approved.
- 2. Fixtures shall be constructed of materials of appropriate gauge and quality to prevent sag, distortion, twist, light leaks, unsatisfactory door operation, etc., throughout the life of the fixtures.
- 3. Lamp compartment interiors and exposed metal surfaces shall be bonderized or phosphatized with a painted finish of first quality, high reflectance baked-on white enamel, unless otherwise noted.

B. Ballasts:

CBM approved, UL labeled, high power factor, high frequency electronic quietest sound rating available for the particular ballast type and voltage with built-in automatic resetting thermal protector equal to Class P. Exterior fixtures shall be zero degree (Universal SLH or Advance Mark III).

C. Lamps: By General Electric, Sylvania or Phillips.

High pressure sodium shall be GE-Lucolox.

Metal halide shall be Sylvania or approved equal.

Fluorescent lamps shall be cool white unless otherwise noted.

Incandescent lamps shall be inside frosted, 130 volts.

D. Exterior Fixtures:

Shall be of non-ferrous material or an approved epoxy coated steel. Gasket exterior fixtures with an lens or diffuser "bug-tight". Provide necessary UL labels required by local inspector (damp, wet, etc.).

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS:

Prior to the work of this Section, carefully inspect the installed work of other trades and verify that all such work is complete to the point where this installation may commence. Verify that the completed electrical installation will be in strict accordance with all pertinent codes and regulations, will conform with the manufacturer's recommendations for installation of the electrical items involved, and will conform with the original design. In the event of discrepancy, immediately notify the Architect and proceed as directed.

3.02 COORDINATION:

- A. Coordinate the installation of electrical materials with the schedules for work of other trades, and properly locate and size all openings, chases, cutting sleeves, etc., sufficiently in advance to prevent delay of the work.
- B. Existing site conditions, locations and services and all requirements of the serving utilities shall be coordinated with the drawings and specifications. These conditions and requirements shall be included under this Section of the work.
- C. Install equipment to avoid obstructions, preserve headroom and to keep openings and passageways clear and maintain Title 24 handicap luminaries. Keep conduits within furring lines established on the Architectural drawings unless shown exposed.

Provide sleeves and chases where conduits pass through floors or walls. Should additional openings or spaces be required, locate and arrange in time to avoid unnecessary cutting.

- D. Become thoroughly familiar with the architectural, structural, plumbing and mechanical drawings and adjust work to conform with the conditions shown on these drawings and with the work as installed by other trades. Obtain necessary

information from the other trades regarding the location of piping, ductwork, and equipment requiring electrical service so that the conduits, outlets and lighting fixtures can be properly located. No extra compensation allowed for extra work resulting from lack of coordination with others or failure to verify locations and measurements on the job. Repair all damages to premises due to untimely installation.

- E. Conflicts within or between the drawings and specifications shall be referred to the Architect for clarification before the work is installed. Contractor shall bear costs of delay due to unresolved conflicts.

3.03 GENERAL INSTALLATION REQUIREMENTS:

- A. Comply with the standards and the installation instructions of the manufacturers of all materials and equipment used, where dimensions or specific installation and operating instructions are not provided in the drawings or specifications. Conflicts between the manufacturer's recommendations and the drawings or specifications shall be brought to the attention of the Engineer prior to bid opening and resolved before the product is deemed acceptable.
- B. Circuiting: Branch circuit wiring and arrangements of home runs have been designed based upon information available. Deviations may be permitted if accepted by the Engineer.
- C. Excavation and backfill: Provide excavations of sufficient width for free working space and of ample size to permit pipes or equipment to be laid at proper elevation. Perform all excavating and trenching necessary for proper installation of the work. All trenching and backfilling done in strict accordance with the requirements of Earthwork Section. Remove or relocate all excess earth as directed.
- D. Supports: Fabricate supports for panelboards, lighting fixtures and other equipment of structural steel, or where applicable of structural systems such as "B-Line" or Unistrut.
- E. Painting: All equipment and conduit supports, fabricated of structural steel, shall receive a shop coat of "Pabco No. 7356 zinc-dust, zinc-oxide metal primer. After erection and welding is completed, all structural steel supports shall be given a touch-up coat of paint specified for shop painting. All welds, bolts and spots where shop coating is damaged or removed shall be touched up to match shop coat.
- F. Welding: Welding shall be done by the electric ARC process by welders which are fully qualified for this work. Where brackets are welded to structural steel, the prime coat of paint on the steel shall be scraped away from the area in which the welding is to be done.

3.04 STRUCTURAL FITTINGS:

- A. Provide the necessary sleeves, inserts, hangers, anchor bolts, and related structural items. Install at the proper time.
1. Openings: Openings have been indicated on the Architectural and Structural Drawings. Should any additional openings or holes be required for the work of this Section, the cost of same shall be the obligation of this Section.
 2. Location: This Contractor shall, at a time in advance of the Work, verify openings shown on the Architectural and Structural Drawings. If the work of this Section requires such, he shall furnish new instructions as to his requirements for these openings, subject to acceptance by the Architect.
 3. Cutting and Patching: All additional cutting, patching and reinforcement of construction of building, subject to acceptance by the Architect, shall be performed under the Section of the specifications covering the particular materials, and the cost of the same shall be an obligation of this Section.
 4. Sleeves for electrical conduits passing through walls or slabs shall be placed under the work of this Section before concrete is poured. Conduits passing through floor slabs at grade level will not require sleeves and shall be placed with tops of couplings at floor level.
 5. Equipment Supports for electrical facilities shall be fastened to the structure by inserts, anchor bolts, bolting to drilled and tapped structural members, or by welding to the structure. Welding shall be done by the electric arc method with fully competent welders. Supporting members shall be shop coated with a suitable accepted oxide primer. Surfaces damaged by erection shall be touched up with primer to match shop coat. Any drilling of structural members shall be accepted by the Architect.
 6. Flashing: Wherever conduits pass through the roof or outer walls, base flashing (minimum 16 gauge galvanized sheet metal) and counterflashing shall be provided under this Section. Such flashing shall be properly installed by skilled workmen, and shall include grouting, mastic or tar application, or other means to insure a permanent, waterproof, neat, and workmanlike installation. Insofar as possible, flashing shall comply with and be similar to requirements for flashing in the Mechanical Sections.
 7. Anchor Bolts and Inserts galvanized and of adequate size and strength for installation of electrical work and placed in forms before concrete is poured. Placement of bolts in bases by the General Contractor. Detail drawings, templates, and anchor bolts for bases furnished to the General Contractor in time to avoid delaying work schedules. Expansion shields only be used with specified acceptance of the Architect. Wooden or soft metal plugs not Acceptable.

3.05 INSTALLATION OF EQUIPMENT:

- A. Mount and attach all electrical equipment to structure in accordance with NECA standards. Securely fasten all equipment to withstand seismic acceleration. The main switchboard attached to the slab. Each panel bolted at each corner to structure.
- B. Maintain minimum clearances as required by code and the utility company.

3.06 INSTALLATION OF ELECTRICAL DISTRIBUTION SYSTEM:

- A. Installation of raceways and fittings:
 - 1. General:
 - a. Conceal all conduit in wall and ceiling spaces unless otherwise indicated on drawings. Provide sleeves and chases where raceways pass through floors or walls. Keep raceways within furring lines established on the drawings unless shown exposed. Avoid obstruction of openings, passageways and required clearances. Route conduits to avoid conflicts with ducts, piping, light fixtures, etc. Locate all additional openings and spaces required and coordinate in time to avoid unnecessary cutting.
 - b. Where conduit is allowed to be exposed, install parallel with, or at right angles to, structural members, walls, and lines of the building. Parallel raceways shall run straight and true with offsets uniform and symmetrical. Follow same routing criteria for cable with "J" hooks.
 - c. Ream all conduit after cutting.
 - d. All conduits shall clear hot water pipes by at least 3" perpendicular and 12" parallel.
 - e. Keep ends of all conduit closed with approved conduit seals during construction. Immediately prior to pulling cables, draw a swab through all conduits to force out water and foreign materials. Use conduit unions where union joints are required. Do not use running threads.
 - f. Where conduits are installed underground, or exposed to the weather, make all joints liquid-tight and gas-tight. Bury all exterior underground conduit to a depth of 2 feet below finished grade, and all conduit below interior concrete slab to a depth of 18" below finished floor. Solvent-weld all PVC joints watertight. PVC elbows

- must be concrete encased or be rigid galvanized steel elbows coated with two coats of an asphaltum base paint or a PVC coating. The coating or paint shall cover exposed threads and couplings.
- g. No wire pulled in conduit without insulated throat connectors or bushings being in-place.
 - h. Where conduit size is not shown, provide 1/2". Provide code-size conduit for number and size of wires shown or required, unless a larger size conduit is indicated on the drawings.
 - i. Provide telephone raceways with nylon pull cords, tag and label each pull cord.
 - j. No conduit installed in concrete floor slabs (3/4" and smaller may be placed in sand fill below slab; if larger, 12" below finished floor).
 - k. Electrical equipment ground continuity shall be maintained in all metallic conduit or a ground wire installed within the conduit.
 - l. All raceways under buildings shall have 3" of concrete cover, minimum. (This may be floor slab).
 - m. Provide in all empty raceways pull cords and so labeled.
2. Flexible conduit: Use flexible conduit between recessed fixtures and outlets and between motors and outlets. Flexible connection shall be of sufficient length to absorb vibration without transmitting to fixed conduit. (Install so that a portion of flexible conduit is horizontal).
3. Connections:
- a. Rigid aluminum conduit to rigid steel conduit: Coat threads of couplings with zinc-petroleum jelly compound, or zinc chromate (do not use red lead). All joints in rigid steel conduit shall be painted with rust-resistant paint.
 - b. Treat aluminum joints with anti-seize compound, (graphite and heavy cup grease). Cut with hack-saw only. Aluminum conduit shall not be installed in contact with earth or concrete but shall be completely enveloped in air.
 - c. Raceway termination at boxes and cabinets shall be secured with locknuts and insulated bushings.
 - d. Expansion or deflection fittings: OZ type DX where required at expansion, separation or vibration isolating joints. Refer to

Architectural & Structural Drawings where such joints in the structure occur.

4. Bends:

- a. Make field bends with hickey or power-bender without kinking raceway.
- b. Bends limited to less than 360 degrees per run. All bends in raceways over 1" in diameter shall be factory made.
- c. Telephone raceway bends shall have a radius greater than ten times trade diameter of the raceway and shall not have more than 180 degrees of bend without a pull box.

5. Penetrations:

- a. Sleeve and caulk all raceway penetrations through exterior walls or fittings with grout or non-hardening plastic. Pabco "Hydroseal".
- b. Roof penetrations shall be flashed with a 16 gauge galvanized sheet metal roof jack sealed completely at top of cone with caulking compound.
- c. Seal raceway penetrations of rated walls, floors and ceilings and conform with inspector's requirements.

B. System Neutral:

1. Use 600 volt insulated wire. Ground system neutral to the cold water main and concrete-encased electrode ground. Do not splice ground conductor. Install concrete-encased electrode ground per Paragraph E 250-81 (c) of currently enforced NEC. If concrete-encased electrode ground is not permitted, install 3 ground rods per NEC. Resistance to ground not to exceed 5 ohms.
2. The main service connection to the cold water must be visible, readily accessible from the ground floor.

C. Grounding:

1. All raceways, fixtures, devices, outlets, motors and equipment enclosures shall be permanently and effectively grounded, in accordance with NEC, California - Title 24 and local codes.
 - a. Connection of ground wires; Use ground clamps for connection to water pipe. For other ground connections use a weld by "Thermite"

of Cadweld or other method acceptable to local inspector. Ground connection points shall be accessible.

- b. Ground clamps and lugs per code and local requirements by T & B or Burndy.
- c. Where it is not possible to effectively ground panel boxes, the conduit shall be bonded around the boxes with #10 wire and grounding bushings.
- d. Ground gas and water piping per NEC 250-80.
- e. Equipment ground continuity shall be maintained. Use bonding jumpers at boxes and equipment enclosures, etc., including all feeders.

- 2. Receptacles bonded in accord with Article E250-74 of Title 24, State of California Administrative Code.
- 3. All ground wire copper only, color coded green.
- 4. All grounding shall be in strict compliance with City requirements.

D. Installation of Outlet and Junction Boxes:

- 1. Install boxes securely to the structure. Locate boxes so that box with its extension ring is flush with the finish surface.
- 2. Install junction and pull boxes in an accessible location as required for splicing, connections and pulling of wire.
- 3. Boxes shall be of size and type to accommodate structural conditions, size and number of raceways and conductors or cables entering and device or fixture for which required.
- 4. Install standard 4" octagon or square boxes at each ceiling or wall fixture.
- 5. Generally, outlets shall be mounted on adjustable bar hangers. In wood stud walls, outlets shall be mounted on 2" x 4" wood blocking.

E. Installation of Conductors and Wiring Devices:

- 1. Color Code:
 - a. Code all #8 AWG and smaller for its entire length and code all feeders as follows:

208/120 Volt System

Ground	Green or bare
Neutral	White
Phase A	Black
Phase B	Red
Phase C	Blue

- b. All conductors of the same phase shall have the same color throughout the installation.
 - c. The grounded conductor shall be identified by white or gray colored insulation.
2. Conductor tagging: Tag conductors at switches, receptacles, motor controls, panels, terminal cabinets and junction boxes with premarked plastic type, Brady "Quicklabels". Tag circuits to agree with panel directory circuit number. Tag circuits which pass through other devices, i.e., "E-12 Exterior Light Relay", etc.
3. Pulling of Conductors:
- a. Inspect and clean raceways as required, prior to pulling.
 - b. Use all means to avoid damage to conductor insulation and to electrical or mechanical properties of conductors.
 - c. Pull conductors in raceway directly from the reels in which they are delivered. (Do not allow conductors to touch ground while pulling).
 - d. Do not bend conductors to a radius smaller than that of the spool in which they are delivered.
 - e. Use approved grips. All wire smaller than #1 AWG shall be pulled by hand.
 - f. Pulling lubricant by "Ideal", yellow.
 - g. For PVC conduit, use nylon pull cord only.
4. Splicing:

Install conductors in one continuous section unless splices are shown on the drawings or approved by the Engineer. Make all splices electrically and mechanically secure with pressure type connectors. Insulate all splices with

a minimum of two half-lapped layers of electrical tape where insulation is required (not necessary for branch circuit splices above ground using insulated cap pressure connectors). Underground splices shall have resin encapsulation over compression connector and normal electrical insulation.

5. Install conductors in conduit, metal gutter raceways or pull boxes, unless otherwise called for.
6. All conductors of any one circuit shall be contained in one conduit.
7. Voltage drop shall be no more than 3 volts at any outlet. Install larger size wires than those indicated on the drawings, as required.
8. Home runs as shown on the drawings indicate their general direction. Continue all such home runs to the panel indicated.
9. All conductor terminations shall be torqued with a properly torqued wrench or screw driver. The torque values shall be those recommended by the Manufacturer of the lug, terminal or device. Submit a report at end of project indicating the recommended torque values of each type of termination together with a statement that the terminations have been torqued to that value.

F. Device Installation and Connections:

1. Set receptacle and other flush device plates with the vertical center line plumb and with all edges of the plate in contact with the finish surface.
2. Connect devices so that they are fully polarized.
3. Do not use white wire for a switch leg.
4. Wire connecting to relays, receptacles and other devices with binding screw terminals shall be looped around the binding screw or shall be fitted with lugs soldered to the wire.

3.07 INSTALLATION OF PHOTO CELLS:

Install photo cells 6" above roof through a flashed and caulked roof jack. Aim photo cells north. Critical setting required for photocell operation at different exterior footcandle levels.

3.08 FIXTURE INSTALLATION:

A. General:

1. Install fixtures, outlets and all necessary accessories, complete and ready for

service in accordance with the fixture schedule. Coordinate outlet and equipment locations and make adjustments as necessary.

2. Alignment: Install all fixtures straight and true with reference to adjacent walls. Align rows or individual fixtures so that their sides are parallel and in line.
 3. Provide all necessary seismic fixture supports as required by inspection agency.
- B. Fixture raceway: Fixtures used as a raceway shall conform to paragraph E410-26 of California Title 24. If necessary, additional raceway wire and outlets shall be furnished and installed at no extra cost to Owner.
- C. All fixtures shall be wired with type SSF-2. Fixture connections shall be made with "Scotch Loks" connectors, or approved equal.
- D. Fixture support: Install all lighting fixtures, so that the weight of the fixtures is supported, either directly or indirectly, by a sound and safe structural member of the building, using adequate number and type of fastenings to insure a safe installation. Screw fastenings and toggle bolts through ceiling material or wall paneling are not acceptable.
- E. Additional wood blocking or steel channels required to support fixtures shall be provided under this Section of the specifications.
1. Adequately support all fixtures.
 2. Surface fixtures shall be secured to mounting surface without gaps or voids.
 3. Trims of recessed fixtures shall be affixed tight to ceiling without gaps, voids, etc.
 4. Fixtures shall be installed straight, true and plumb.
 5. Recessed fixtures in rated ceilings shall have suitable mounting in a rated enclosure over the fixtures, rated ceiling enclosures shall be by others.
 6. Recessed fixtures installed in contact with insulation shall be U.L. labeled for this use and comply with NEC 410-65c.

3.09 IDENTIFICATION OF CIRCUITS AND EQUIPMENT:

- A. Panelboards, switchboards, time switches, relays, etc. shall be properly identified by means of descriptive nameplates or tags permanently attached to the apparatus or wiring.

- B. Nameplates shall be engraved laminated bakelite. Shop drawings with dimensions and format shall be submitted to the Architect before installation. Attachment to equipment shall be with escutcheon pins, rivets, self-tapping screws or machine screws. Self-adhering or adhesive backed nameplates shall not be used.
- C. Tags shall be attached to feeder wiring in conduits at every point where runs are broken or terminated, and shall include pull wires in empty conduits. Circuit, phase, and function shall be indicated. Branch circuits shall be tagged in panelboards Tags may be made of pressure sensitive plastic or embossed self-attached stainless steel or brass ribbon.
- D. Cardholders and cards shall be provided for circuit identification in panelboards. Cardholders shall consist of a metal frame retaining a clear plastic cover permanently attached to the inside of panel door. List of circuits shall be typewritten on card. Circuit description shall include name or number of circuit, area, and connected load.
- E. Junction and Pull Boxes shall have covers stenciled with box number when shown on the drawings, or circuit numbers according to panel schedules. Data shall be lettered in an inconspicuous manner with a color contrasting to finish.

3.10 TELEPHONE SYSTEM INSTALLATION:

- A. Telephone service: Install all conduit and pull cords, telephone service entrance equipment, outlets and terminal boards as shown on the drawings and/or required by the utility for the public telephone system. Install access pull-boxes so that no conduit run is longer than 100 feet or contains more than two 90 degree elbows.

3.11 FIELD QUALITY CONTROL:

- A. General:

Arrange for and conduct all tests and reviews required by codes, ordinances and these specifications. Provide all equipment and personnel necessary to conduct the tests and reviews. Notify the Engineer four (4) working days in advance so that he may be present.

- B. Tests:

1. Cable Tests: Test all cable (not branch circuit wiring) as it is installed, after splicing and termination, with a Megger. Replace conductors for which measured resistance is below the minimum established by the NEC. Test all circuits for proper neutral connections.
2. Ground and short tests: Test for grounds and shorts at: Panels, individual branch circuits, feeders, transformers, and main switchboards.

3.12 CLEANING AND ADJUSTMENTS:

- A. Cleaning: Upon completion of the work of this section, thoroughly clean all exposed portions of electrical installation, removing all traces of soil, grease, oil, paint and other foreign matter using only the type cleaner recommended by the manufacturers.
 - 1. Equipment: For switchboards, panelboards, and similar items with factory finish, remove all plaster, rust, dirt, wire ends and other debris from inside equipment before installing front panels or trim. Clean and polish all finished surfaces. Parts with damage to factory finish shall be returned to the factory for refinishing.
 - 2. Fixtures: Clean fixtures, including diffusers and reflecting surfaces after painting is complete. Clean diffusers by methods recommended by the fixture manufacturers. Remove visible paper labels from fixtures. Fixtures must be clean at final review.
 - 3. Removal of rubbish: Remove from the site all packing cartons, scrap or surplus materials and other rubbish, incidental to the work under this section and leave the premises in a condition acceptable to the Architect. Insofar as possible, rubbish shall be removed as produced during the progress of the work.
- B. Adjustments:
 - 1. Adjust apparatus and equipment as required so that it operates in accordance with the requirements of this Section and with applicable manufacturer's instructions.
 - 2. Replace all noisy ballasts, relays, starters, etc. Verify with the Architect or Owner's representative.
 - 3. Check all lamps and replace those that are defective.

3.13 PROJECT COMPLETION:

- A. Prior to completion, thoroughly familiarize the Store Manager and shop with all aspects of operation and maintenance of the electrical systems.
- B. Submit the following in accordance with Supplementary Conditions:
 - 1. Certificates of inspection and approval when required by all authorities having jurisdiction.
 - 2. Voltage check report.

3. Operation/Maintenance Manual: Retain until completion of the work all portable and detachable portions of the installation such as: instruction books, wiring and connection diagrams, service manuals, keys, catalog sheets, etc. Upon completion of the installation and, as a condition of its acceptance, compile a Manual and deliver to Owner. The Manual shall contain:
 - a. Copy of all conductor termination torque values (Manufacturer's Recommendations) and statement that all terminations were made in compliance with these values.
 - b. Identification, readable from outside the cover, stating: "Electrical installation, by (name of) Company".
 - c. Typewritten index near front of Manual, furnishing immediate information as to location in the Manual of all emergency data for the installation.
 - d. Complete instructions regarding the operations and maintenance of all equipment involved.
 - e. Complete nomenclature of all replaceable parts, their part numbers, current cost and name and address of the nearest vendor of replacement parts.
 - f. Copy of all guarantees and warranties issued on the installation, showing all dates of expiration.
- C. Engineer's Final Review:
1. Arrange for the Engineer's final review. Before calling for final review, the various systems shall properly operate for a period of 48 continuous hours.
 2. If there are any discrepancies between the installation and the Plans, Specifications, Shop Drawings, details, etc., the Architect will notify the Contractor in writing. The Contractor shall make changes and adjustments to correct the installation. If discrepancies are major, the Contractor will arrange for a re-review.
 3. Any subsequent reviews after final review made necessary by the Contractor's failure to properly install or complete contract document requirements shall be paid for by the Contractor. The Owners' invoices to the Contractor shall include a charge of \$150 per hour, plus traveling time and expenses.

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END OF SECTION

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Section 16230

GENERATOR SYSTEM

PART 1 GENERAL

1.01 DESCRIPTION:

- A. Work included: Furnish and install all materials to make a complete installation of standby generator, as indicated on Drawings.
- B. Related work in other Sections:

Concrete for pads.

1.02 REFERENCES:

The Publications listed below are incorporated herein by reference and form a part of this specification.

National Fire Protection Association (NFPA) Publications:

No. 70 National Electric Code (NEC).

1.03 RELATED REQUIREMENTS:

- A. Requirements of GENERAL CONDITIONS and DIVISION NO. 1 apply to all work in this Section.
- B. This Section applies to all Sections of Division 16, "Electrical," of this Project Specification unless specified otherwise in this Section.

1.04 SUBMITTALS:

- A. Requirements in Section 01300 - SUBMITTALS and 16010 - ELECTRICAL BASIC MATERIALS AND METHODS.
- B. Submit the following:
 - 1. Generator.
 - 2. Test reports.
- C. Include electrical ratings, dimensions, mounting, material, required clearances, terminations, weight, temperature rise, wiring and connection diagrams, plan, front,

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side, and rear elevations, sectional views, accessories, and device nameplates data.

1.05 QUALITY ASSURANCE - TESTING

- A. The manufacturer and local representative shall be responsible for three separate tests: design prototype tests, final production tests, and site tests.

- B. Design Prototype Tests: Components of the emergency system such as the engine/generator set, transfer switch and accessories shall not be subjected to prototype tests since the tests are potentially damaging. Rather, similar design prototypes and preproduction models, which will not be sold, shall have been used for the tests. Prototype test programs shall include the requirements of NFPA 110 and the following:
 - 1. Maximum power (kW).
 - 2. Maximum motor starting (kVA) at 30% instantaneous voltage dip.
 - 3. Alternator temperature rise by embedded thermocouple and by resistance method per NEMA MG1-22.40 and 16.40.
 - 4. Governor speed regulation under steady state and transient conditions.
 - 5. Voltage regulation and generator transient response.
 - 6. Fuel consumption at 1/4, 1/2, 3/4, and full load.
 - 7. Harmonic analysis, voltage waveform deviation, and telephone influence factor.
 - 8. Three-phase short circuit tests.
 - 9. Alternator cooling air flow.
 - 10. Torsional analysis testing to verify that the generator set is free of harmful torsional stresses.
 - 11. Endurance testing.

- B. Final Production Tests: Each generator set shall be tested under varying loads with guards and exhaust system in place. Tests shall include:
 - 1. Single-step load pickup.
 - 2. Transient and steady state governing.

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3. Safety shutdown device testing.
 4. Voltage regulation.
 5. Rated power.
 6. Maximum power.
 7. Upon request, arrangements to either witness this test will be made, or a certified test record will be sent prior to shipment.
- D. Site Tests: An installation check, start-up, and building load test shall be performed by the manufacturer's local representative. The engineer, regular operators, and the maintenance staff shall be notified of the time and date of the site test. The tests shall include:
1. Fuel, lubricating oil, antifreeze shall be checked for conformity to the manufacturer's recommendations, under the environmental conditions present and expected.
 2. Accessories that normally function while the set is standing by shall be checked prior to cranking the engine. These shall include block heaters, battery charger, generator strip heaters, remote annunciator, etc.
 3. Start-up under test mode to check for exhaust leaks, path of exhaust gases outside the building, cooling air flow, movement during starting and stopping, vibration during running, normal and emergency line-to-line voltage, and phase rotation.
 4. Automatic start-up by means of simulated power outage to test remote-automatic starting, transfer of the load, and automatic shutdown. Prior to this test, all transfer switch timers shall be adjusted for proper system coordination. Engine coolant temperature, oil pressure, and battery charge level along with generator voltage, amperes, and frequency shall be monitored through the test. An external load bank shall be connected to the system if sufficient building load is unavailable to load the generator to the nameplate kW rating in steps of 10% to a total load of 100% for 15 minutes.

PART 2 - PRODUCTS

2.01 GENERAL:

- A. The equipment shall meet requirements of the National Electrical Code and all other NFPA Standards that are applicable. The engine generator set shall come complete with "CSA" approval label attached on the control panel.

B. Generator Set:

1. Complete with fuel tank, silencer, silencer piping between generator and silencer, battery charger, batteries, controls, cooling system, water heater, remote annunciator and vibration isolators approved for earthquake requirement.
2. Supplied to operate on #2 diesel fuel. The generator shall be rated to operate at a governed speed of 1800 RPM.
3. Designed for automatic operation and shall be furnished with all necessary apparatus and instruments for proper control of the engine and generator and for voltage regulation, as specified herein.

C. All equipment new of current production of a national firm, which manufactures the generator and control panel and assembles the standby engine generator set as a matched unit, and the manufacturer together with its authorized representative, shall have full responsibility for the performance of the generator set and its accessories.

D. Installation, labor and materials incidentals to installation are to be furnished as specified herein. The engine generator unit and its accessory equipment specified shall be furnished complete and ready for operation as soon as connections have been made to wiring, fuel, and exhaust systems.

E. The generator set shall include the capability of automatically controlling generator set operation. After starting, the unit will attain rated speed and voltage, and accept rated load. Generator set speed shall be controlled by the engine governor, while generator output voltage regulation shall be a function of the generator automatic voltage regulator. Manual adjustment of generator speed and voltage shall be provided, with the rheostat knobs to be installed inside the control panel and clearly labeled with a phenolic tag.

There shall be provisions for remote manual shutdown in the event of an emergency.

F. Manufacturers: Onan, Kohler, Cummins or approved equivalent.

2.02 RATING:

The generator set shall have a continuous standby rating at .8 power factor to produce 60Hz. 3-phase current at desired voltage and KVA. Suitable for continuous operation at that rating along with all its accessories, for the duration of any failure of the normal source.

2.03 GENERATOR:

- A. The Generator: 4-pole revolving field, with rotating brushless or static exciter.
- B. Solid state voltage regulator: Capable of maintaining voltage within +2% at any constant load from 0 to 100% of rating.
- C. Class F insulation system: As defined by NEMA and meet requirements for temperature rise specified in NEMA Standard MG1-22.40.
- D. On application of any load up to 100% of the rated load, the instantaneous voltage dip not to exceed 20% and recover to +2% of rated voltage within one second.
- E. Capable of sustaining at least 250% of rated current for at least 10 seconds under any possible phase-to-phase or phase-to-neutral short circuit condition.
- F. Equipped with a line current sensing output circuit breaker(s) to protect against any balanced or unbalanced overload condition, and equipped with the necessary time delay feature to not trip within the ten seconds specified above.

2.04 ENGINE:

The super charger engine operating on #2 Diesel fuel, 4 cycle and intercooled with water.

- A. Engine speed shall be governed by an electronic governor to maintain generator frequency within + 1% maximum from no load to full load generator output. Speed drop adjustable from isochronous to 5%. Belt-driven governors will not be considered.
- B. The cooling system designed to provide adequate cooling at rated load in ambient temperatures up to 100 degrees F (38 degrees C). The system to include engine mounted radiator, blower fan, water pump thermostat and radiator duct flange.
- C. Engine Equipment: The engine shall be equipped with air filters, fuel filters, and pressure gauge, lubricating oil cooler, filters, and pressure gauge, water pump and temperature gauge, service hour meter, flywheel and flywheel housing. Also included will be the necessary non-grounded sensing contacts as required for the alarm and safety functions specified.
- D. Fuel Priming Pump: A manual fuel-priming pump shall facilitate priming and bleeding air from the system.
- E. Fuel Lines: Flexible fuel lines between engine and fuel supply shall be provided by others.
- F. The generator shall be capable of withstanding a three phase load of 300% rated current for 10 seconds, and sustaining 150% of continuous load current for two minutes with field set for normal rated load excitation. The generator shall be sized

such that the overall rating of the engine generator set is limited only by the peak horsepower the engine can produce. Generator KVA rating will equal or exceed the peak engine BHP short time rating. The generator shall be close-coupled, drip-proof, single bearing salient pole, revolving field, and synchronous type with amortisseur windings in the pole faces of the rotating field. The rotor assembly shall be capable of demonstrating 130% overspeed capability at 170 C for two hours. Rotor dynamic, two-plane balance shall not exceed 0.002-inch peak-to-peak amplitude at operating speed. All rotating components shall be secured with SAE Grade 8 hardware

G. Batteries

1. Battery capacity shall be sufficient for five starts or 60 seconds of continuous cranking (whichever is greater) and shall be lead acid wet cell type storage batteries with explosion proof vent caps.
2. A separate battery system will be provided for control power circuits, including control of ten (10) fuel solenoid valves, all annunciator panels, horns, etc. This battery system will be charged by the same battery charger as the start batteries. Battery capacity to be sufficient for 90 minutes without charge.

H. Battery Charger

1. Provide one battery charger for the engine generator skid. Chargers to accept 120V input and provide 24V DC output. Charger to be sized such that it can provide 125% of the starting and control power required. The battery charger will be located off skid.
2. The charger shall employ a transistor controlled magnetic amplifier circuit to provide continuous taper charging and shall be completely automatic in operation. This charger shall maintain rated output voltage with ac line fluctuations of $\pm 10\%$. The battery shall not be discharged through the charger. The charger shall have:
 - a. Two ranges: Float at 2.25 V.P.C. and Equalize at 2.33 V.P.C. on nickel cadmium batteries.
 - b. Automatic ac. line compensation.
 - c. Automatic overload protection (current limiting).
 - d. Silicon diode full-wave rectifiers.
 - e. Automatic surge suppressers.
 - f. Five percent (5%) dc ammeter and dc voltmeter.

- g. Fused ac input and dc output.
 - h. 0 - 24 Hour Equalize Timer.
 - i. Low dc voltage alarm (processor driven).
 - j. High dc voltage alarm (processor driven).
- I. Generator Circuit Breaker:
- 1. The three-pole main line circuit breaker shall be provided to protect the generator against faults and provide a positive disconnect device at the generator output terminals. The breaker shall be UL listed with a shunt trip device connected to the generator safety shutdowns. The breaker shall be mounted on the generator in a guarded drip proof enclosure.
 - 2. The generator circuit breaker section will contain the following major items:
 - 3. The generator circuit breaker will be fabricated, shop tested, and furnished complete by the manufacturer.
 - 4. The circuit breaker shall be equipped with provisions for manual lockout and auxiliary contacts to enable circuit breaker open and circuit breaker closed indications.
 - 5. The generator circuit breaker will be rated for the maximum fault current that can be supplied by the generator.
 - 6. The breaker is to be equipped with a solid state overcurrent device with adjustable long time and short time overcurrent functions. The overcurrent device will include the specified ampere rating plug or equivalent. The trip unit will be equipped with the following settings:
 - a. Adjustable long time pickup and delay settings.
 - b. Adjustable short time pickup and delay settings
 - c. Adjustable instantaneous setting.
 - d. Adjustable ground fault pickup and delay settings, which will provide the ground fault alarm.
 - e. Full trip indication targets
- J. One (1) specified ampere frame molded case circuit breaker as described above.
- K. Provide relaying class current transformers for metering and input to the engine controls and instrumentation.
- L. Provide potential transformers with fuses for metering and input to the engine

controls and instrumentation

- M. Engine shall be equipped with the following:
1. 12 or 24V dc positive engagement solenoid shaft gear driven electric starting motor.
 2. 35-ampere automatic battery charging alternator.
 3. Pressure lubrication system with replacement element oil filter.
 4. Replaceable dry air cleaner.
 5. Gas proof seamless, stainless steel, flexible exhaust connection.
 6. Flexible fuel connection - oil drain extension.

2.05 CONTROLS:

- A. The generator set equipped with a vibration isolated mounted control panel that, in conjunction with an automatic transfer switch, shall provide a completely automatic standby system.
- B. Solid state design. Relays acceptable only for high current circuits. Circuitry of the plug-in design for quick replacement.
- C. The controls for remote 2-wire stop-start control and unit mounted 3 position test switch labeled Test-Off-Automatic.
1. Test position - The engine shall start and run regardless of the position of the remote starting contacts.
 2. Automatic position - The engine shall start when contacts in the remote control circuit close and stop when those contacts open.
 3. Off position - The engine shall not start even though the remote start contacts close.
- D. Cranking period controlled by a speed sensor that disengages the starting motor when the engine has started. Battery charging alternator or generator voltage may not be used for this signal.
- E. The starting system shall be designed for restarting in the event of a false engine start, by permitting the engine to complete stop and then re-engage the starter.
- F. Cranking cyler with individually adjustable (2 to 20 seconds) ON and OFF cranking periods.

- G. Overcranking protection designed to open the cranking circuit after 30-90 seconds if the engine fails to start.
- H. Circuitry to shut down the engine when signal for high coolant temperature, low oil pressure or over speed are received, with reset button and overcrank.
- I. Five (5) minute time delay to permit unloaded running of the standby set after transfer of the load to normal power.
- J. Alarm horn.
- K. Emergency stop switch.
- L. Indicating lights to signal:
 - 1. Three position switch "off" (flashing red).
 - 2. Emergency stop (red).
 - 3. High coolant temperature (red).
 - 4. Overspeed (red).
 - 5. Low oil pressure (red).
- M. Lamp test shall be an inherent of all door mounted visual indicators.
- N. System logic shall prevent restart after a shutdown due to an alarm condition until the fault is cleared, or is reset.
- O. A strobe light shall be provided for mounting outside the generator room, which will be actuated by all prealarms and shutdowns. This light will be reset when the alarm condition is reset.

2.06 INSTRUMENT PANEL:

A set mounted instrument panel shall include:

- A. Dual range AC voltmeter to read phase lead, 3-1/2-inch + 2% accuracy.
- B. Dual range AC Ammeter 3-1/2-inch + 2% accuracy.
- C. Voltmeter - ammeter phase selector switch.
- D. Lights to indicate high or low meter scale.

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- E. Direct reading pointer type frequency meter 3-1/2-inch + .3 HZ accuracy.
- F. Panel illuminating light.
- G. Battery charging voltmeter.
- H. Oil pressure gauge.
- I. Coolant temperature gauge.
- J. Running time meter.
- K. Plug-in voltage regulator with front panel voltage-adjusting rheostat.

2.07 ACCESSORIES:

- A. KIM or equal water jacket engine heater providing positive water circulation, and thermostatically controlled to operate within range of 120 degrees F, 120 volt, 750 watts, equipped with power cut-off-relay (as required by NFPA -110A).
- B. Special exhaust silencer Nelson Muffler special 400 level (or equal) -Advance Thermo Products. Mineral fiber 1" thick with aluminum nylon material on outside, with overall insulating blanket, flow velocity not to exceed 9000 feet/minute and reduce total engine exhaust noise 35 - 45 dB (A).
- C. Starting battery with rack and cables.
- D. Battery charger automatic float type rated 10 amp. The charger shall include a voltmeter, ammeter and crank disconnect relay. Kohler PAA-292864 or equal.
- E. Provide a sub base tank assembly with high and low level sensor and contacts to operate remote storage tank pump, fuel level gauge, locking cap. Tank is completely seam welded to form rupture basin. Tank is 16-gauge material and pressure tested to 5 psi. Containment to meet EPA requirements and be UL listed.
- F. Provide weatherproof housing for generators at exterior locations.
- G. Provide spark arrestor at exterior locations; Nelson or equivalent.
- H. Provide earthquake restraints, between frames and pad, type RJ, Cal Dyn or equivalent.

PART 3 - EXECUTION

3.01 INSTALLATION:

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Generator Set Mounting: The standby generator set shall be equipped with factory installed vibration isolators with earthquake restraints mounted between the set and fabricated steel base to prevent distortion of alignment between generator and engine when installed. Mount set on concrete pad.

3.02 TRAINING:

Provide the service of a competent, factory-trained engineer or technician authorized by the manufacturer of the equipment to technically instruct the Owner's Personnel on the operation and maintenance of the complete installed system. Any material found that requires further explanation shall be submitted with the manuals at the completion of the project. The time for this in service training shall not be less than four (4) hours and on the dates requested by the Owners.

3.03 WARRANTY AND MAINTENANCE:

- A. The emergency generator system shall be warranted for one FIVE YEARS or 2,000 hours, whichever occurs first, from the date of the site start-up.
- B. [Service Contract: The engine-generator distributor shall furnish factory trained personnel and maintain a 24-hour parts and service capability and show at time of submittal that they are regularly engaged in a maintenance contract program to semi-annually inspect and test run the engine to perform manufacturers recommended preventative maintenance service on the equipment furnished. This service contract shall include operation of the equipment under the simulated power failure conditions, adjustment of generator and transfer switch controls as required and certification in the Owner's maintenance log of repairs made and proper functioning of all engine and auxiliary systems. This service contract shall be provided at no additional charge to the Owner for a period of two years from date of start up of the generator set. At the Owner's option, the service contract shall be renewable on a year-to-year basis thereafter with costs being paid by the Owner.]

END OF SECTION

SECTION 16721

FIRE DETECTION AND ALARM

PART 1 - GENERAL

1.1 SUMMARY

- A. The scope covered by this section of the specifications includes the furnishing of all labor, equipment, materials, and performing all operations in connection with the installation of the Fire Alarm System as shown on the drawings, as hereinafter specified, and as directed by the Architect/Engineer.

1.2 RELATED DOCUMENTS

- A. General conditions of the Division 1 General Requirements shall apply the work specified in this section.
- B. Sections 260500 and 260519 apply to the work specified in this Section.

1.3 SYSTEMS DESCRIPTION

- A. System shall be a zoned, non-coded, continuous sounding, U.L. listed, electrically supervised system, fully installed, tested and left in first class operating condition.
- B. All fire alarm system devices to be "ADA" compliant.

1.4 QUALITY ASSURANCE

- A. Requirements of regulatory agencies:
 - 1. National Fire Protection Association (NFPA):
 - a. NFPA-70 National Electrical Code
 - b. NFPA-101 Life Safety Code
 - 2. Federal, state, and local codes and ordinances
 - 3. Underwriters' Laboratories, Inc. (UL)
- B. Reference Standards:
 - 1. National Fire Protection Association (NFPA)
 - a. NFPA-72A Local Protective Signaling Systems
 - b. NFPA-72B Auxiliary Signaling Systems
 - c. NFPA-72C Remote Station Systems
 - d. NFPA-72D Proprietary Signaling Systems
 - e. NFPA-72E Automatic Fire Detectors
 - 2. National Electrical Manufacturer's Association (NEMA)
- C. All equipment specified shall be U.L. listed and cross listed for use with the main fire alarm control panel and shall bear the same manufacturer's name on the main control panel as well as all the remote devices. Systems with equipment of various manufacturer's names is not acceptable.
- D. Equipment must be manufactured by a firm who has been actively manufacturing fire alarm systems for a minimum of ten (10) years.

1.5 MANUFACTURER'S SERVICES

- A. The following supervision of installation shall be provided by a trained service technician from the manufacturer of the fire alarm equipment. The technician shall be U.L. certified and have a minimum of two (2) years service experience in the fire alarm industry. The technician's name shall appear on the equipment submittals and a letter shall be sent to the project engineer. The manufacturer's service technician shall be responsible for the following items:
 - 1. Pre-installation visit to the job site to review equipment submittals and verify method by which the system should be wired.
 - 2. During job progress, make periodic job site visits to verify installation and wiring of system.
 - 3. Upon completion of wiring, final connections shall be made under the supervision of this technician, and final checkout and certification of the system.
 - 4. At the time of final checkout, technician shall give operational instructions to the owner and/or his representative on the system.
- B. All job site visits shall be dated and documented in writing and signed by the electrical contractor. Any discrepancy shall be noted on this document and a copy kept in the system job folder which shall be turned over to the project engineer any time during the project.

1.6 SUBMITTALS

- A. Submit the following in accordance with Division 1.
 - 1. Product data sheets and equipment description.
 - 2. Bill of materials listing all components and devices.
 - 3. System wiring and interconnection diagrams.
 - 4. Operating instructions and maintenance manuals detailing component and general system operating description.
 - 5. Battery backup calculations.

1.7 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Receive equipment at job site. Verify applicable components and quantity delivered.
- B. Handle equipment to prevent internal components' damage and breakage, as well as denting and scoring of enclosure finish.
- C. Do not install damaged equipment.
- D. Store equipment in a clean, dry space and protect from dirt, fumes, water, construction debris and physical damage.
- E. After installation, protect equipment from damage by work of other trades.

1.8 WARRANTIES

- A. The electrical contractor shall guarantee all wiring and equipment to be free from inherent and mechanical defects due to workmanship and materials used for a period of one (1) year from date of accepted installation.
- B. The fire alarm manufacturer, and not distributor or electrical contractor, shall furnish in writing a one (1) year warranty. Warranty shall list all equipment in the system and state that equipment to be free from inherent and mechanical defects due to workmanship and materials for a period of one (1) year from start up and beneficial use of system.
- C. Warranty service for the equipment shall be provided by the system supplier's factory trained representative during normal working hours, Monday through Friday, excluding holidays. Emergency service provided at times other than as stipulated above shall be available from the same source at additional cost to owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. The fire alarm system specified is manufactured by the Simplex Time Recorder Co. Catalog and model numbers are intended to establish the type and quality of equipment and system design as well as extract operating features required. The manufacturer's specification sheets of each item so listed shall be considered to be part of the specification and binding therein.
- B. Acceptable Substitute Manufacturers:
 - 1. Edwards
 - 2. Notifier
 - 3. Reliable Fire Equipment Company

2.2 DEVICES

- A. Alarm initiating devices shall be grouped in zones.
- B. Actuation of any alarm initiating device shall automatically cause the following operations when furnished as a part of this system:
 - 1. Activate audio-visual devices continuously.
 - 2. Indicate on the control panel the zone initiating the alarm.
 - 3. Indicate the zone of the reporting device on the remote annunciator.
 - 4. Transmit a signal to the local fire department (via leased telephone lines).
 - 5. Automatically control re-circulating fans.
- C. Fire Alarm Control Panel
 - 1. Shall be 400 Series, surface mounted where indicated on drawings with key operated, locked door and shatter-resistant viewing window.
 - 2. The panel shall use light emitting diodes (LED) throughout and shall include the following features:
 - a. Operator interface switches for alarm:
 - 1) Acknowledge/silence (with resound)
 - 2) Trouble acknowledge/silence (with resound)
 - 3) System reset
 - 4) Manual evacuation
 - 5) City disconnect
 - 6) Auxiliary one bypass (master fan disconnect).
 - 7) Auxiliary two bypass.
 - b. Visible LED indicators:
 - 1) AC power-on (green)
 - 2) Power trouble (yellow)
 - 3) System trouble (yellow)
 - 4) Earth ground trouble (yellow)
 - 5) City trouble (yellow)
 - 6) Alarm for each zone (red)
 - 7) Trouble for each zone (yellow)
 - 8) Signal circuit trouble for each circuit (yellow)
 - c. To accommodate and facilitate job site and future changes, the control panel shall be microprocessor based to allow custom field programming to meet specific applications and local code requirements. This on-site field programming shall provide for:
 - 1) Selective signaling
 - 2) Relay control
 - 3) Fan/damper cross zoning
 - 4) Timing functions
 - 5) Non-alarm monitoring
 - 6) Point sensing
 - 7) Elevator recall control

- 8) Zone coding (PNIS)
 - 9) Stage 1 and stage 2 alarm operations.
 - d. These features shall be dip-switch selectable in non-volatile memory:
 - 1) Desired signal circuit type of operation: march time code, temporal code, selective code, alarm silence inhibit (to prevent silencing of signals before the selected minimum time has expired), signal circuit cut out, manual evacuation.
 - 2) Waterflow/sprinkler supervisory operation (where applicable) on two (2) designated and distinct zones of the system.
 - 3) A supervisory audible and visible "valve tamper" signal indication at the fire alarm control panel and remote annunciator (for each water flow and main).
 - 4) Off site monitoring output capability for: reverse polarity, local energy, shunt trip, or a form C contact output.
 - 5) Alarm verification to reduce unwanted alarms in smoke detectors. This feature shall allow smoke detectors that have alarm verification while residing on the same zone with heat detectors and manual stations that do not have alarm verification.
 - 6) Functional system test capability which, when in the test mode, will enable any activated initiating device to report their individual resident zone at the control panel and audibly over the signal circuit via a zone code pattern for four (4) seconds and then automatically reset panel.
 - e. Metal oxide varistors (MOV's) shall be provided on the system power supply and municipal connection circuit to provide transient suppression protection to the control panel.
 - f. The zoning of fire alarm system shall be pre local fire prevention authorities having jurisdiction over this project.
- D. Standby Batteries
1. Furnish and install, as part of the Fire Alarm Control Panel, type 2081 series batteries, sealed rechargeable, lead calcium and capable of providing sixty (60) hours of complete fire alarm operation in the event of loss of commercial power.
 2. Batteries shall have low/no battery supervision and shall be kept fully charged by the control panel automatic charger. Charger shall be capable of recharging batteries to 70% capacity in 12 hours. Minimum battery size shall be 10 AH.
- E. Remote Annunciator
1. Furnish and install type remote unit, electrically supervised, with same number of zones and custom nomenclature as the main control panel. Panel to be flush mounted where shown on drawings, with rear illuminated high-brilliance LED's Lamp Test, and have all labeling protected from tampering. (Rub-on characters or stick-on labels shall not be acceptable). All zone data shall be transmitted from the Fire Alarm Control Panel to the Annunciator via one pair of #18AWG twisted shielded wires.
 2. Status Command Unit shall also contain a green "Power-On" LED, a visual trouble LED and audible trouble indicator, and contain the following control switches: trouble silence, system reset and manual evacuation. No additional wiring shall be required for these functions.
- F. Signal Initiating Devices: Furnish and install, where shown on the drawings, the following signal initiating devices.
1. Station: Furnish and install type 2099-9754 single action manual pull stations with raised white lettering and a smooth high gloss finish. The break-glass station shall have a hinged front with key lock. Stations which utilize screwdrivers, allen wrenches, or other commonly available tools shall not be accepted. Stations shall be keyed alike with the fire alarm control panel. When the station is operated, the handle shall lock in a protruding manner to facilitate quick visual identification of the activated station. Provide type 2099-9800 red wire guards where shown on drawings.
 2. Thermodetectors: Furnish and install white, low-profile, type 2098-9439 thermodetectors rated at 135 degree rate of rise and fixed temperature in all areas except where noted on the drawings, which shall be rated at 200 degrees fixed temperature.

3. Smoke Detectors: Furnish and install type 2098-9201, ceiling mounted, photoelectric smoke detectors. Detectors shall have a completely closed back to restrict entry of dust and air turbulence and 20 mesh to protect insect screen. Electrons of unit shall be shielded to protect against false alarms from E.M.E. and R.F.I. Unit shall contain a red LED which shall pulse to indicate power on and which shall glow continuously to indicate alarm. Detector shall have a magnetically operated functional test switch and be capable of being supplied with a remote alarm LED indicator. Unit shall have a separate mounting base with terminal strip for ease of wiring, changing, and cleaning. Remote Alarm Indicator shall be type 2098-9788 with red light emitting diode (LED) mounted on a single gang stainless steel plate.
 4. Duct Smoke Detectors: Furnish and install type 2098-9649 photoelectric duct smoke detector. Duct housing base assembly shall be provided with an auxiliary relay from Form C contacts, rated at 1 AMP. Necessary sample tubes shall be provided across the enter width of duct work. Provide remote duct detector test switch with LED for each unit mounted adjacent fire alarm control panel. Exact location of the remote duct smoke detector test switches to be coordinated and located as directed by the local governing authorities.
- G. Alarm Indication Devices: Furnish and install, where shown on the drawings, the following audible or audible/visual devices:
1. Audible Device: Furnish and install type 2901-9840 audible units, semi-flush mounted on 4" x 4" electrical outlet box.
 2. Visual Devices: Furnish and install type 4904-9501 visual only device, semi-flush mounted on 4" x 4" electrical outlet box with single gang mud ring. The side viewing white translucent lens shall have the word "FIRE" in red imprinted on it. Flash rate shall be 1 to 3 flashes per second with 100 candela flash intensity.
- H. Remote Devices: Furnish and install, where shown on the drawings, the following remote devices.
- I. Slave Fan Relays: Furnish and install type 2088-9011 fan relay with required contacts. Cabinet shall have key lock assembly the same as main control cabinet. Minimum contact rating shall be 10 AMP resistive.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine areas and conditions under which fire alarm system is to be installed and notify Engineer in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 POWER REQUIREMENTS

- A. Provide system power with 120 volt, 1 phase, 2 wire, 60 HZ on separate fuse with lock-out.

3.3 INSTALLATION

- A. Install wiring as specified in Section 16120. All wiring shall be color coded as follows and any wiring carrying 32 VAC, 50/60 HZ or greater, must be in conduits separate from those containing stations, detectors, or signal circuits.
1. Fire alarm control panel - 120 Volt, 2 #12 AWG.
 2. Alarm initiating devices - 2 #14 AWG per zone (1) brown, one (1) violet.
 3. Audio/visual devices - 2 #14 AWG per zone, one (1) red, one (1) black.
 4. Slave fan relay - 2 #14 AWG blue from fire alarm control to fan relay.
 5. Remote annunciator/graphic devices - 2 pairs #18 AWG twisted shielded. One pair for power, one pair for zone data transmission.
- B. Install conduit and wiring to telephone terminal cabinet for central station or municipal connections, and coordinate hookup with supplier of central station network systems.
- C. Adjustment and cleaning: Clean system equipment and enclosures of dirt and debris.

- D. Field Quality Control:
1. System shall test free from grounds, opens, and short circuits.
 2. Upon completion of installation of fire alarm equipment, electrical contractor shall provide to the Engineer a signed, written statement substantially in the form as follows:

"The undersigned having been engaged as the Electrical Contractor on the _____
Building confirms that the fire alarm equipment was installed in accordance with wiring diagrams,
instructions, and directions provided to us by the manufacturer."

END OF SECTION

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PART 1 - GENERAL

1.01 SUMMARY

Section includes equipment and performance criteria for furnishing all labor and materials for the installation and programming for Energy Management System for HVAC Systems utilizing wireless communication with cloud based servers.

1.02 RELATED SECTIONS:

- A. Division 01: General Requirements
- B. Section 23: Heating, Ventilating, and Air-Conditioning (HVAC)

1.03 SUBMITTALS:

- A. Shop Drawings and product data in accordance with the specifications.
- B. All shop drawings shall be prepared in AutoCAD 2000 or newer. In addition, Contractor shall provide drawings in electronic format with x-ref and layer information to other trades as required.
- C. All submittals shall be bound or in a three ring binder with a table of contents and related section tabs. Five (5) copies shall be submitted to the Architect or engineer for distribution and review.
- D. Shop drawings shall include basic floor plans depicting locations of all equipment and wiring, installed by others, to be controlled by system and locations of thermostats, gateways and other equipment provided under this section. Drawings shall also show location of electrical power, low voltage wiring and data ports, provided by others, required for proper installation of systems of this section.
- E. Submittal data shall contain manufacturer's data on all hardware and software products required by the specification.
- F. Submit five (5) copies of submittal data and shop drawings to the Engineer for review prior to ordering or fabrication of the equipment. The Contractor prior to submitting shall check all documents for accuracy.

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G. The Engineer will make corrections, if required, and return to the Contractor. The Contractor will then resubmit with the corrected or additional data. This procedure shall be repeated until all corrections are made to the satisfaction of the Engineer and the submittals are fully approved.

1.04 SCOPE OF WORK

A. Except as otherwise noted, the control system shall consist of all thermostats, and gateways to fill the intent of the specification and provide for a complete and operable system.

B. The EMS contractor shall review and study existing building/site conditions where applicable and all new construction drawings for the project including HVAC drawings and the entire project specifications to familiarize themselves with the equipment and system operation prior to bidding and submittal of a bid/price and notify the owner immediately of any conflicts between the project and the scope of work of this section, including work to be completed by others.

C. All equipment and installation of control devices associated with the equipment listed below shall be provided under this Contractor.

D. When the EMS system is fully installed and operational, the EMS Contractor will make themselves available to meet with the designated representatives of the owner to review the as-installed condition of the system. At that time, the EMS contractor shall demonstrate the operation of the system and prove that it complies with the intent of the drawings and specifications.

E. The Contractor shall furnish and install a complete EMS control system including all necessary hardware and all operating and applications software necessary to perform the control sequences of operation as called for in this specification. Provide and Install EMS controls for the HVAC Equipment as noted on the drawings:

F. Provide technical support necessary for commissioning of system in coordination with the HVAC Contractor, Balancing Contractor and the owner's team.

G. Contractor shall provide one training session in the operation of the system, for owner's personnel.

H. All work performed under this section of the specifications will be in compliance with all codes and regulations as mandated by the authority having jurisdiction.

1.05 SYSTEM DESCRIPTION

A. The Energy Management System (EMS) shall consist of thermostats, gateways and related accessories as indicated below and all related programming for a complete and fully

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operational web based management system using a cloud server program complying with the following specifications.

The entire Energy Management Solution (EMS) shall include a network of commercial Internet programmable thermostats which use IEEE 802.15.4 mesh wireless communication protocol to reach a Wireless Gateway (WG). The WG must connect to the owner's wide area network (WAN) over a TCP/IP connection. Access and control of EMS is through a web based management tool which sits on a cloud server and must be accessible either locally or remotely via the Internet.

1.06 WORK BY OTHERS

A. The EMS Contractor shall coordinate with other contractors prior to performing the work on this project and cooperate as necessary to achieve a complete and neat installation. To that end, each contractor shall consult the drawings and specifications for all trades to determine the nature and extent of others' work prior to fabrication and installation. The owner's representative shall be immediately notified if an area of conflict occurs between trades prior to fabrication and installation. EMS Contractor shall provide field supervision to the Mechanical Contractor for pre-installation of control components.

B. Low voltage thermostat wiring between equipment and thermostat locations shall be furnished and installed by others. Unless noted otherwise all new low voltage wiring shall be multiple conductor thermostat wiring (wire count as indicated in Thermostat Manufacturer's installation instructions) installed per owner's specifications. (Wiring in existing installations shall be minimum 3 conductor / 24 gauge wires per EMS manufacturer's standard specifications, multiple c conductor/24 gauge thermostat wiring preferred - see Installation Instructions for specific conductor counts depending on heating and cooling modes of existing equipment.)

C. Related work provided by others:

1. 110 V outlets shall be provided within 5 feet of each gateway location.
2. 1 Data port shall be provided within 10 feet of each gateway location.

D. Equipment start-up and servicing

1.07 CODE COMPLIANCE

A. Provide EMS components and ancillary equipment which are code compliant.

C. All wiring shall conform to the National Electrical Code.

B. All products of the EMS shall reside with the following agency approvals.

1. California 2013 Title 24 Compliant.

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2. California Energy Commission Occupant Control Smart Thermostat (OCST) certified.
3. OpenADR2.0 certified.

1.09 SYSTEM STARTUP & COMMISSIONING

A. Each EMS component in the system shall be tested for both hardware and software functionality. In addition, each mechanical and electrical system under control of the EMS will be tested against the appropriate sequence of operation specified herein. Successful completion of the system test shall constitute the beginning of the warranty period. A written report will be submitted to the owner indicating that the installed system functions in accordance with the plans and specifications.

B. The EMS Contractor shall provide all manpower and engineering services required to assist the HVAC Contractor and Balancing Contractor in testing, adjusting, and balancing all systems in the building. The EMS Contractor shall have a trained technician available on request during the balancing of the systems. The EMS Contractor shall coordinate all requirements to provide a complete air balance with the Balancing Contractor and shall include all labor and materials in his contract to assist with functional testing of system as it relates to EMS.

1.10 TRAINING

A. The EMS Contractor shall provide training for two (2) owner's representatives and/or maintenance personnel. The EMS Contractor shall provide on-site training to the District's representative(s) and maintenance personnel per the following description:

B. On-site training shall consist of a minimum of (1) hours, as indicated above of hands-on instruction geared at the operation and maintenance of the systems. The curriculum shall include

1. System Overview
2. System Software and Operation
3. System access
4. Software features overview
5. Changing set points and other attributes
6. Scheduling
7. Editing programmed variables
8. Displaying color graphics

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9. Running reports
10. Workstation maintenance
11. Application programming
12. Operational sequences including start-up, shutdown, adjusting and balancing.
13. Equipment maintenance

1.11 OPERATING AND MAINTENANCE MANUALS

- A. The operation and maintenance manuals shall contain all information necessary for the operation, maintenance, replacement, installation, and parts procurement for the entire EMS. This documentation shall include specific part numbers.
- B. Following project completion and testing, the EMS contractor will submit as-built documentation reflecting the exact installation of the system.

1.12 WARRANTY

- A. The EMS contractor shall warrant the system for 12 months after system acceptance and beneficial use by the District. During the warranty period, the EMS contractor shall be responsible for all necessary revisions to the software as required to provide a complete and workable system consistent with the letter and intent of the Sequence of Operation section of the specification. EMS equipment shall be warranted for a period of 5 years from the time of system acceptance.
- B. Warranty of equipment is limited to replacement of defective products.

PART 2 - PRODUCTS

2.01 Acceptable Manufacturers

A. Unless noted otherwise, all products shall be of a single manufacturer. The standard of design and quality shall be products as manufactured by Pelican Wireless Systems – BASE BID. Alternate Bid – CARRIER, TRANE.

B. Products of other manufacturers will be considered for acceptance provided they equal or exceed the material requirements and functional requirements of the specified product. A request for Architect/Engineer's approval must be submitted with complete technical data to

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allow for proper evaluation. All materials for evaluation must be received by Project Manager at least 10 days prior to bid due date.

2.01 WIRELESS GATEWAY (WG)

A. A single WG shall be capable of providing communication between a dedicated cloud server using TCP/IP and the on-site Internet Programmable Thermostats using the IEEE 802.15.4 wireless communication protocol. Additional WGs can be used for a single site, but each WG must meet or exceed these requirements

B. The WG must provide the following hardware features as a minimum:

1. Single Ethernet Port.
2. One micro-USB 5VDC power input.
3. 2.4 GHz IEEE std. 802.15.4 built-in communication processor.

C. The WG shall provide the communication link between the entire system and a cloud based server. Communication with cloud server shall be secured using AES (Advanced Encryption Standard).

D. The WG shall be able to support 2000 Internet Programmable Thermostats.

2.02 INTERNET PROGRAMMABLE THERMOSTAT (IPT)

A. Internet Programmable Thermostat shall be a wireless communicating commercial programmable thermostat that uses IEEE 802.15.4 for networking communication and a wiring terminal block for controlling a single zone HVAC unit.

B. The IPT shall provide a keypad for setting:

1. Temperature Set points.
2. System Mode (Heat, Cool, Auto, Off).
3. Fan Mode (Auto, On).
4. Light Button.

C. The IPT shall include a wiring terminal for controlling a single zone HVAC unit. The wiring terminal must be able to be removed from the IPT for installations where only 3-

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wires exist or are available between where the IPT will be placed and its connection with the HVAC unit it will be controlling. Over these 3-wires the thermostat must still be able to control the HVAC unit based on these specifications.

D. The IPT must be configurable using a Web Based App. No thermostat configuration, other than setting the IPT to Conventional, Heat Pump - O, or Heat Pump -B, shall be done at the thermostat. Web based Configuration Setting options shall include:

1. Naming the thermostat
2. Grouping multiple thermostats.
3. Heat Pump or Conventional system setting.
4. If Heat Pump; reversing valve O or B setting.
5. Cycles Per Hour (1 - 6).
6. Anticipation Degrees (0°F - 0.5°F)
7. Calibration Degrees (2.0°F - -2.0°F)
8. Heat Stages (0 - 2)
9. If Heat Pump; Aux Heat (Disabled and/or Enabled Option)
10. Cool Stages (0 - 2)
11. Fan Stages (1 - 2)
12. Fan Circulation Minutes Per Hour.
13. Temperature Display (Fahrenheit or Celsius)
14. Heat Range Temperature Setting Limitation
15. Cool Range Temperature Setting Limitation
16. Ability to disable and enable Keypad Control through schedule.
17. Heat consumption (kw, btu, ton, or watt)
17. Cool consumption (kw, btu, ton, or watt)
18. Notification Sensitivity (High, Medium, Low)
19. Alarm of exceeding temperature based on a Safe Range
20. Schedule set times (2, 3, 4, or Variable).

E. IPT settings and control through the Web Base App shall be in real-time and include:

1. Space Temperature
2. System Mode (Heat, Cool, Auto, Off).

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3. Fan Mode (Auto, On).
4. Current set point.
5. Relay status (Heat/Cool and Fan).
6. Historical Trend Graphs.
7. Scheduling
8. Lock and Unlock Entire Thermostat's Keypad
9. Lock and Unlock the Thermostat's Fan Mode setting Only

2.03. WEB BASED GRAPHICAL USER INTERFACE

- A. The Web Based App (WBA) shall be able to run on any PC that uses Safari, Chrome, Firefox, or any other web browser that meets these browsers' functionality.
- B. The WBA Platform shall be able to run on any Internet Accessible Smartphone and/or Tablet that has a Web Browser compatible with HTML5.
- C. The WBA shall allow up to a minimum of 100 simultaneous users/clients to access the Energy Management System.
- D. The Web Based client shall support at a minimum, the following functions:
 1. User log-on identification and password shall be required.
 2. HTML programming shall not be required to display any graphics or data on the Web page.
 3. Storage of data shall reside within the cloud server and shall not sit within the client's computer or device. EMS that requires data storage on a client computer or an on-site server is not acceptable.
 4. Users shall have administrator and user definable access privileges.
 5. OpenAPI interface with XML data output.
- E. Schedules:
 1. The WBA shall provide user with access to setting Internet Programmable Thermostat (IPT) schedules. Up to 12 schedule periods per day shall be available for each IPT.
 2. Schedules shall be available as Weekly (7-day), Daily, or Weekday/Weekend (5-2).

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3. The WBA shall provide the user the ability to:
 - a. View Schedules.
 - b. Add/Modify Schedules.
 - c. Assign Thermostat to a Group Schedule.
 - d. Delete Schedules.

- F. Trends:**
 1. The WBA shall provide real-time trend information on:
 - a. Each IPT's space temperature.
 - b. Each IPT's temperature set points.
 - c. Each IPT's current call; heat, cool, and/or fan.
 2. The WBA shall be able to record and provide at least two years of past trend data for every thermostat in the wireless network. Trend data shall include:
 - a. space temperature; with resolution of every 1/10th of a degree Fahrenheit.
 - b. IPT's temperature set points.
 - c. indication of whether the thermostat was calling for; heat, cool, and/or fan.
 3. Trend data shall be viewable on the WBS

- G. Alarm Notifications**
 1. The WBA shall provide automatic alarming functionally based on real-time monitoring of at least:
 - a. space temperature and temperature change.
 - b. IPT's temperature set points.
 - c. IPT's current call; heat, cool, and/or fan.
 2. The WBA shall be able to provide a user with the ability to:
 - a. View Alarms.
 - b. Set Alarm Notification sensitivity level to High, Medium, or Low.
 - c. Delete Alarms.
 3. Alarms shall be able to be sent via email and/or text message to up to 100 or more clients.

- H. Consumption Usage**

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1. The WBA shall be able to calculate and graphically display the consumption of running a single zone HVAC unit based on a user defined HVAC unit heat and/or cool consumption rate multiplied by the thermostat heat/cool call time.
2. The WBA shall be able to calculate and graphically display the cost of consumption of running a single zone HVAC unit based on taking a user defined HVAC unit heat and/or cool consumption and multiplying that by the client defined cost per kw and/or therm.
3. The WBA shall be able to display consumption usage for a single thermostat, multiple thermostats at a single time, or all the thermostats in the EMS.
4. The WBA shall be able to record and display up to at least two years of consumption usage information.

2.04. Wired Remote Temperature Sensors and Digital Alarm Input

- A. Input Temperature Sensor (ITS).
 - a. The ITS shall connect with the Internet Programmable Thermostat over 3-wires.
 - b. ITS shall provide a 10K Type II thermistor temperature sensor input.
 - c. Web Based App shall be able to record and provide at least two years of past temperature data for ITS.
 - d. The trend data shall be viewable on the WBA.
 - e. ITS must be accurate to $\pm 1.0^{\circ}\text{F}$
 - f. ITS must be able to be installed up to 500' away from IPT using standard thermostat wiring.

2.05. Wireless Proximity Sensors

- A. Wireless Proximity Sensor (WPS).
 - a. The WPS shall connect with the Internet Programmable Thermostat over the 802.15.4 wireless network.
 - b. WPS shall be powered by 2 AA batteries or equivalent.
 - c. WPS must be able to be used for either:
 - i. Accepting a motion sensor's 2-wire dry contact output.
 1. The WPS shall be able to notify an Internet Programmable Thermostat if a motion sensor's dry contact is in either the open or closed position.

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2. Dry contact open positions will indicate that the space is occupied and the IPT must be able to automatically setback its temperature setting by a range of 0F - 10F or OFF.
 3. Dry contact closed position will indicate that the space is unoccupied and set the temperature to a comfort setting when the space is occupied.
 4. Setback settings and comfort settings must be settable through the Internet Programmable Thermostat's schedule through the Web Based App (cannot be settable at thermostat).
 5. Web Based App must be able to display when a space is "Unoccupied".
- ii. Detecting if a Window OR Door is Opened or Closed.
 1. The WPS must have a built-in magnetic sensor and come with a magnet that can be installed on a door OR window.
 2. The WPS must be able to notify an Internet Programmable Thermostat if the door is open and the IPT must automatically turn to the OFF position.
 3. The WPS must be able to notify an Internet Programmable Thermostat if the door is closed and the IPT must automatically return to its last temperature and system settings.
 4. Web Based App must be able to display when the Door OR Window is Open and must be able to be set to indicate "Door" or "Window".
 - d. Web Based App shall be able to notify if the WPS batteries are low and record and provide at least two years of past history on occupancy and/or door/window status for each space a WPS is installed in.
 - e. The trend data shall be viewable on the Web Based App.
 - f. Internet Programmable Thermostat must be able to connect with at least 8 WPS, each WPS must have a unique serial number and each WPS shall be settable, through the Web Based App, as either a motion sensor input or as a door/window sensor.

PART 3 – EXECUTION

3.01 Contractor Responsibilities

A. General

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1. Installation of the Energy Management System shall be performed by an approved Contractor. The Contractor shall certify all work as proper and complete. Under no circumstances shall the design, scheduling, coordination, programming, training, and warranty requirements for the project be delegated to a subcontractor without prior written approval of the owner.
- B. Demolition
 1. Remove controls which do not remain as part of the Energy Management System. The Owner will inform the Contractor of any equipment which is to be removed that will remain the property of the Owner. All other equipment which is removed will be disposed of by the Contractor.
- C. Access to Site
 1. Unless notified otherwise, entrance to building is restricted. No one will be permitted to enter the building unless their names have been cleared with the District or the District's Representative.
- D. Code Compliance
 1. All wiring shall be installed in accordance with all applicable electrical codes and will comply with equipment manufacturer's recommendations.
- E. Cleanup
 1. At the completion of the work, all equipment pertinent to this contract shall be checked and thoroughly cleaned, and all other areas shall be cleaned around equipment provided under this contract.

3.02 Wiring, Conduit, and Cable

- A. All control wires between HVAC units and thermostat locations to be furnished and installed by others. The EMS contractor shall not begin work on this contract until all wiring is installed to the satisfaction of the EMS contractor. The EMS contractor shall provide wiring between remote temperature sensors, TA1 and thermostats as required, unless noted otherwise in drawings or specifications.

3.03 Hardware Installation

- A. Installation Practices for Devices
 1. All devices are to be mounted level/plumb and per the manufacturer's installation documentation.
- B. Identification
 1. Identify all control wires with labeling tape or sleeves using either words, letters, or numbers that can be exactly cross-referenced with as-built drawings.

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2. All field enclosures, other than controllers, shall be identified with a back lite nameplate. The lettering shall be in white against a black or blue background.
 3. Junction box covers will be marked to indicate that they are a part of the EMS system.
 4. All I/O field devices (except space sensors) that are not mounted within FIP's shall be identified with name plates.
 5. All I/O field devices inside FIP's shall be labeled.
- C. Existing Controls.
1. Existing controls are not to be reused. All EMS devices will be new.
- D. Control System Switch-over
1. The Contractor shall minimize control system downtime during switch-over. Sufficient installation mechanics will be on site so that the entire switch-over can be accomplished in a reasonable time frame.
- E. Location
1. The location of sensors is per mechanical and architectural drawings.
 2. Space humidity or temperature sensors will be mounted away from machinery generating heat, direct light and diffuser air streams.
 3. If Input Temperature Sensor(s) (ITS) is used as Outdoor air sensor, Outdoor air sensors will be mounted on the north building face directly in the outside air. Install sensors such that the effects of heat radiated from the building or sunlight is minimized.
 4. If any line voltage electrical control is being installed, field enclosures shall be located immediately adjacent to the controller panel(s) to which it is being interfaced.
- 3.04 System Programming
- A. General.
1. The Contractor shall provide all labor necessary to install, initialize, start-up and debug all system software as described in this section. This includes any operating system software.
 2. Contractor shall work with owner's representative to determine programming parameters including but not limited to hours of operation, set points, system variables, thermostat naming, and site naming. Thermostat & Site naming shall be performed by the contractor. Naming convention (equipment # or name, or space served) shall be provided by or agreed upon with the Owner.

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3.05 Commissioning and System Startup

A. EMS device functional testing.

1. Each system for which a EMS device has been installed shall be tested for proper installation and functional operation. Test shall include on-site control test to verify each wireless device is responding to signals sent from cloud based servers and responding in accordance with manufacture's specifications.

END OF SECTION