PROJECT MANUAL

FOR

COMPTON COMMUNITY COLLEGE MUSIC BUILDING RENOVATION

OWNER

COMPTON COMMUNITY COLLEGE DISTRICT
1111 EAST ARTESIA BOULEVARD
COMPTON, CA 90221-5393

ARCHITECT

WLC ARCHITECTS, INC.
8163 ROCHESTER AVENUE, SUITE 100
RANCHO CUCAMONGA, CA 91730
(909) 987-0909

PROJECT 1311500
DECEMBER 2013

PROJECT MANUAL
FOR

COMPTON COMMUNITY COLLEGE MUSIC BUILDING RENOVATION

PROJECT 1311500

DECEMBER 2013

COMPTON COMMUNITY COLLEGE DISTRICT
1111 EAST ARTESIA BOULEVARD
COMPTON, CA 90221-5393

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DIVISION OF THE STATE ARCHITECT
APPROVALS

Structural Safety

Fire and Life Safety

Access Compliance

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
APPL 1 1 5 5 4 1
AC MF FLS SS
DATE 02/20/15

PROJECT MANUAL
FOR

COMPTON COMMUNITY COLLEGE MUSIC BUILDING RENOVATION

PROJECT 1311500

DSA APPLICATION NO. 03-115541

DECEMBER 2013

COMPTON COMMUNITY COLLEGE DISTRICT
1111 EAST ARTESIA BOULEVARD
COMPTON, CA 90221-5393

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP 03 115541
AC MF FLS SS
DATE 02/20/15

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STRUCTURAL ENGINEER

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FOR

Compton Community College Music Building Renovation

OWNER

Compton Community College District

DOCUMENT 00700

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COMPTON COMMUNITY COLLEGE MUSIC BUILDING RENOVATION

GENERAL CONDITIONS

ARTICLE 1. DEFINITIONS

1.1 The District, the Contractor, and the Architect are those named as such in the Contract Documents and are; referred to as if each were of singular number and masculine gender.

1.2 Subcontractor, as used herein, includes those having direct contract with Contractor and one who furnishes material worked to a special design according to drawings and specifications of this work, but does not include one who merely furnishes material not so worked.

1.3 Worker includes laborer, worker, or mechanic.

1.4 Locality in which the work is performed means the county in which the public work is done.

1.5 Surety is the firm, or corporation that executes as surety the Contractor's Performance Bond and Payment Bond. Surety must be an admitted surety insurer pursuant to Code of Civil Procedure Section 995.120 and be U.S. Treasury listed whose U.S. Treasury listing indicates a bonding capacity in excess of the project costs.

1.6 Provide shall include "provide complete in place", that is, "furnish and install", complete, and ready for intended use.

1.7 The term "work" means labor and materials, or both, incorporated in, or to be incorporated in the construction covered by the Contract Documents.

1.8 Unless otherwise specified, the terms "approved", "directed", "satisfactory", "accepted", "acceptable", "proper", "required", "necessary", and "equal", means as approved, directed, satisfactory, accepted, acceptable, proper, required, necessary, and equal, in the opinion of the Architect.

1.9 The letters "ASTM" mean "ASTM International" and the latest edition shall apply for the respective specification designations.

1.10 Days as used in the Contract Documents shall mean consecutive calendar days unless otherwise specifically defined.

1.11 Contract Documents are those documents set forth in the executed Agreement.

1.12 Contract is the agreement executed between the District and the Contractor covering the furnishing of all material, labor, technical services, equipment and tools necessary for performance of the work. All supplemental agreements amending or extending the work shall be bound by all terms of the contract.

1.13 Reviewed, when used in conjunction with the Architect's action on the Contractor's submittals and requests, is limited to the responsibilities and duties of the Architect stated in the General and Supplementary Conditions. Such review shall not release the Contractor from responsibility to fulfill Contract Document requirements.

1.14 Furnish means to supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations.

1.15 Install is used to describe operations at project site including the actual unloading, temporary storage, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning and similar operations.

1.16 Installer is the entity engaged by the Contractor, either as an employee, subcontractor, or sub-subcontractor for performance of a particular construction activity, including installation, erection, application, and similar operation. Installers are required to be experienced in the operations they are engaged to perform.

1.17 Indicated refers to graphic representations, notes, or schedules on the drawings, or other paragraphs or schedules in the Specifications, and similar requirements in Contract Documents. Where terms such as "shown", "noted", "scheduled", and "specified" are used, it is to help locate the reference; no limitation is intended except as specifically noted.

1.18 Drawings are the graphic and pictorial portions of the Contract Documents, wherever located and whenever issued, showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

1.19 Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, construction systems, standards and workmanship for the Work, and performance of related services.

1.20 Project Manual is the volume usually assembled for the Work which may include the bidding requirements, sample forms, Conditions of the Contract and Specifications.

ARTICLE 2. DRAWINGS AND SPECIFICATIONS

2.1 Contract Documents are complementary, and what is called for by one shall be as binding as if called for by all. The intention of the documents is to include all labor and materials, equipment, and transportation necessary for the proper execution of the work. The organization of the specifications into divisions, sections, and articles as the case may be, and the arrangement of drawings shall not control the Contractor in dividing the work among subcontractors or in establishing the extent of work to be performed by any trade.

2.2 Interpretations. Figured dimensions on drawings shall govern, but work not dimensioned shall be as directed. Contractor shall not scale the drawings. Work not particularly shown or specified shall be same as similar parts that are shown or specified. Large scale details shall take precedence over smaller scale drawings as to shape and details of construction. Specifications shall govern as to materials, workmanship, and installation procedures. In case of disagreement or conflict between or within standards, specifications and drawings the more stringent, higher quality and greater quantity of work shall apply. Drawings and specifications are intended to be fully cooperative and to agree. However, if Contractor observes that drawings and specifications are in conflict, he shall promptly notify the Architect in writing and any necessary information shall be issued by the Architect in accordance with Article 5.

2.3 Questions regarding interpretation of drawings and specifications shall be clarified by the Architect whose decision shall be final. Should the Contractor commence work or any part thereof without seeking clarification, contractor waives any claim for extra work or damages as a result of any ambiguity, conflict, or lack of information.

2.4 Standards, Rules, and Regulations referred to are recognized printed standards and shall be considered as one and a part of these specifications within limits specified.

2.5 Specifications and Accompanying Drawings are intended to delineate and describe the project and its component parts to such a degree as will enable skilled and competent contractors to intelligently bid upon the work, and to carry said work to a successful conclusion.

2.6 Trade Name or Trade Term. It is not the intention of said documents to go into detailed descriptions of any materials and/or methods commonly known to the trade under "trade name" or "trade term". The mere mention or notation of such "trade name" or "trade term" shall be considered a sufficient notice to Contractor that he will be required to complete the work so named with all its appurtenances according to the best practices of the trade.

2.7 The name of any material and/or equipment shall mean furnishing and installing of same, including all incidental and accessory items thereto and/or labor therefor, as per best practices of the trade(s) involved, unless specifically noted otherwise.

2.8 Drawings and Specifications are intended to comply with laws, ordinances, rules and regulations of constituted authorities having jurisdiction, and where referred to in the Contract Documents, said laws, ordinances, rules and regulations shall be considered as part of said Contract Documents within the limits specified. The Contractor shall bear all expenses of correcting work done contrary to said laws, ordinances, rules and regulations if the Contractor knew or should have known that the work as performed is contrary to said laws, ordinances, rules and regulations and if the Contractor performed same (1) without first consulting the Architect for further instructions regarding said work or (2) disregarded the Architect's instructions regarding said work.

ARTICLE 3. COPIES FURNISHED

3.1 Contractor will be furnished, free of charge, copies of drawings and specifications as set forth in Supplementary General Conditions. Additional copies may be obtained at cost of reproduction.

ARTICLE 4. OWNERSHIP OF DRAWINGS

4.1 All drawings, specifications, and copies thereof furnished by District are its property. They are not to be used on other work and with exception of signed contract sets, are to be returned to the District on request at completion of work.

ARTICLE 5. DETAIL DRAWINGS AND INSTRUCTIONS

5.1 In case of ambiguity, conflict, or lack of information, the Contractor shall promptly notify the Architect in writing and request additional information. Any request by the Contractor for such information shall be limited to one item of work for each request. The Architect's response to such requests will be made with reasonable promptness, while allowing sufficient time in the Architect's professional judgement to permit adequate review. Any delay in the progress of the work shall not be recognized on account of failure by the Architect to furnish such information until 15 calendar days after Architect's receipt of written request by the Contractor. Additional information shall be by means of drawings or other instructions deemed necessary by the Architect for proper execution of the work. All such drawings and instructions shall be consistent with contract documents, true developments thereof, and reasonably inferable therefrom.

5.2 Work shall be executed in conformity therewith and Contractor shall do no work without proper drawings and instructions.

5.3 The Architect will furnish necessary additional details to more fully explain the work, which details shall be considered as part of the Contract Documents.

5.4 Should any details be more elaborate, in the opinion of the Contractor, than scale drawings and specifications warrant, written notice thereof shall be given to the Architect within five (5) days of the receipt of same. In case no notice is given to the Architect within five (5) days, it will be assumed the details are reasonable development of the scale drawings. In case notice is given, then the claim will be considered, and if found justified, the Architect will either modify the drawings or shall recommend to District a change order for the extra work involved.

5.5 The Contractor shall keep on the work one legible copy of all approved drawings, setting plans, schedules and specifications. Said documents shall be available to the Architect and to his representatives and all constituted authorities having jurisdiction.

5.6 All parts of the described and shown construction shall be of the best quality of their respective kinds and the Contractor is hereby advised to use all diligence to inform himself fully as to the required construction and finish, and in no case to proceed with the different parts of the work without obtaining first from the Architect such directions and/or drawings as may be necessary for the proper performance of the work.

5.7 If it is found that the Contractor has varied from the drawings and/or specifications, in materials, quality, form or finish, or in the amount or value of the materials and labor used, the Architect shall be at liberty at any time, before or after completion of the work, to order such improper work removed, remade and replaced, and all work disturbed by these changes shall be made good at the Contractor's expense, or the Architect shall receive from the Contractor, for the Owner (or District shall deduct from amount due Contractor), a sum of money equivalent to the difference in value between the work performed and that called for by the drawings and specifications, it being optional with the Architect to pursue either course.

ARTICLE 6. TIME FOR COMPLETION AND LIQUIDATED DAMAGES

6.1 Time is of the essence in this contract. Work shall commence on or before the date stated in District's notice to the Contractor to proceed, and shall be completed by Contractor in the time specified in the Supplementary General Conditions. By executing the Agreement the Contractor confirms that the Contract Time specified is a reasonable period for performing the Work. The term "day" as used in the Contract Documents shall mean consecutive calendar day unless otherwise specifically defined.

6.2 The date of commencement of the Work shall not be postponed by the failure to act by the Contractor or the failure to act by persons or entities for whom the contractor is responsible. The Contractor shall not prematurely commence operations on site or elsewhere prior to effective dates of insurance required by Article 17 and Article 18.

6.3 If the work is not completed in accordance with the foregoing it is understood that the District will suffer damage. It being impractical and infeasible to determine the amount of actual damage, it is agreed that Contractor shall pay to District as fixed and liquidated damages, and not as a penalty, the sum stipulated in the Supplementary General Conditions for each calendar day of delay until work is completed and accepted. Contractor and his surety shall be liable for the amount thereof.

6.4 Extension of Time. Contractor shall not be charged liquidated damages because of any delays in completion of the work due to unforeseeable causes beyond the control and without the fault or negligence of the Contractor including, but not restricted to: acts of God, or of public enemy, acts of Government, acts of District or anyone employed by it, or acts of another Contractor in performance of a contract with District, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and unusually severe weather or delays of subcontractors due to such causes. Normal seasonal rainfall shall not be considered reason for extension of time. Any rainfall reflected by the 10 year average for the month as evidenced by Local Climatological Data obtained from the National Weather Service is considered normal. Any wind, including gusts, of 25 miles per hour or less, is considered normal. These conditions shall be wholly at the risk of the Contractor. Despite the foregoing there shall be no more than thirty (30) calendar days total time extension allowed for weather related delays during the entire construction period.

6.5 The Contractor shall within ten (10) days of beginning of any excusable delay for which an extension of time is claimed, notify the District and the Architect in writing of the cause(s) of the delay. If, in the opinion of the District, the claim is justified, the time for completion of the work shall be extended by change order for a period of time commensurate with such a delay. The Contractor shall not be subject to liquidated damages for this period of time and shall have no claim for any other compensation relative to such a delay

6.6 Extensions of time will not be granted for change orders that, in the opinion of the District, do not affect the critical path of the project. The Contractor shall have the burden of demonstrating the effect of the claimed delay on the Contract Time and shall furnish such documentation relating there to as may be required.

6.7 There shall be no monetary reward paid to the Contractor by the District for early completion of the work prior to the time specified in the Supplementary General Conditions.

6.8 There shall be no claim allowed for additional costs or time for delays in the completion of the work based upon an early completion date established by the Contractor prior to the time period established in the Supplementary General Conditions for the completion of the work. Any early completion date established by the Contractor is wholly the responsibility of the Contractor and any costs or time delays experienced by the Contractor relative to such early completion date are solely the risk of the Contractor.

ARTICLE 7. CONSTRUCTION SCHEDULE

7.1 The Contractor shall prepare and submit for the District's and Architect's information a construction schedule for the Work. The schedule shall not exceed the time limits current under the Contract Documents, shall be related to the entire project to the extent required by the Contract Documents, and shall provide for expeditious and practical execution of the work.

7.2 Failure of the Contractor to provide proper schedules as required by the Contract Documents may, at the sole discretion of the District, constitute grounds to withhold in whole or in part, progress payments to the Contractor.

ARTICLE 8. CONTRACT SECURITY

8.1 Unless otherwise specified in Supplementary General Conditions, Contractor shall furnish a surety bond in an amount equal to 100 percent of contract price as security for faithful performance of this contract and shall furnish a separate bond in an amount at least equal to 100 percent of the contract price as security for payment of persons performing labor and furnishing materials in connection with this contract. Aforesaid bonds shall be in form set forth in these contract documents.

8.2 Upon request of Contractor, District will consider and accept multiple sureties on such bonds. Only bonds executed by admitted Surety insurers as defined in Code of Civil Procedures; Section 995.120 shall be accepted. Surety must be a California admitted surety who is U.S. Treasury listed and whose U.S. Treasury listing indicates a bonding capacity in excess of the project cost.

8.3 In conformance with Section 995.660 of the California Code of Civil Procedure, if a California admitted surety insurer issuing bonds does not meet these requirements, the insurer will be considered sufficient if each of the following documents are submitted with the bond:

.1 The original, or a certified copy, of the unrevoked appointment, power of attorney, bylaws, or other instrument entitling or authorizing the person who executed the bond to do so.

.2 A certified copy of the certificate of authority of the insurer issued by the Insurance Commissioner.

.3 A certificate from the county clerk of the county in which the court or officer is located that the certificate of authority of the insurer has not been surrendered, revoked, canceled, annulled, or suspended or, in the event that it has, that renewed authority has been granted.

.4 Copies of the insurer's most recent annual statement and quarterly statement filed with the Department of Insurance pursuant to Article 10 (commencing with Section 900) of Chapter 1 of Part 2 of Division 1 of the Insurance Code, within 10 calendar days of the insurer's receipt of a request to submit the statements.

8.4 If the admitted surety insurer complies with Article 8.3 and if it appears that the bond was duly executed, that the insurer is authorized to transact surety insurance in the state, and that its assets exceed its liabilities in an amount equal to or in excess of the amount of the bond, then notwithstanding the provisions of any state or local law or any ordinance, resolution, policy, or other act, the insurer is sufficient and shall be accepted as surety subject to Section 12090 of the Insurance Code.

ARTICLE 9. ASSIGNMENT

9.1 Contractor shall not assign this contract or any part thereof without prior written consent of District and all sureties, executing bonds on behalf of the Contractor in connection with the Contract.

9.2 Any assignment of money due or to become due under this contract shall be subject to a prior lien for services rendered or materials supplied for performance of work called for under said contract in favor of all persons, firms, or corporations rendering such services or supplying such materials to the extent that claims are filed pursuant to the Code of Civil Procedure and the Government Code, and shall also be subject to deductions for liquidated damages if liquidated damages have been assessed as specified in Article 6 herein.

9.3 If the Contractor shall, without previous written consent, assign, transfer, convey, sublet or otherwise dispose of the contract or its right, title or interest therein, or of any of the monies to become due under the contract, to any other person, company, or other corporation, such attempted or purported assignment, transfer, conveyance, sublease or other disruption shall be null, void and of no legal effect whatsoever; and the contract may, at the option of the District, be terminated, revoked and annulled, and the District shall thereupon be relieved and discharged from any and all liability and obligations growing out of the same to the contractor, and to its purported assignee or transferee.

ARTICLE 10. CHANGE IN NAME AND NATURE OF CONTRACTOR'S LEGAL ENTITY

10.1 Should a change be contemplated in the name or nature of the Contractor's legal entity, the Contractor shall first notify the Contract Section of the District in order that proper steps may be taken to have the change reflected on the Agreement.

ARTICLE 11. SEPARATE CONTRACTS

11.1 District reserves the right to let other contracts in connection with this work. Contractor shall afford other contractors reasonable opportunity for introduction and storage of their materials and execution of their work and shall properly connect and coordinate his work with theirs.

11.2 If any part of Contractor's work depends for proper execution or results upon work of any other Contractor, the Contractor shall inspect and promptly report to Architect in writing any defects in such work that render it unsuitable for such proper execution and results. His failure to so inspect and report shall constitute his acceptance of other Contractor's work as fit and proper for reception of his work, except as to defects which may develop on other Contractor's work after execution of his work.

11.3 To insure proper execution of his subsequent work, Contractor shall measure and inspect work already in place and shall at once report to the Architect in writing any discrepancy between executed work and contract documents. Contractor shall ascertain to his own satisfaction the scope of the project and nature of any other contracts that have been or may be awarded by District in prosecution of project to the end that Contractor may perform this contract in the light of such other contracts, if any

11.4 Nothing herein contained shall be interpreted as granting to Contractor exclusive occupancy at site of project. Contractor shall not cause any unnecessary hindrance or delay to any other Contractor working on project. If simultaneous execution of any contract for project is likely to cause interference with performance of some other contract or contracts District shall decide which Contractor shall continue or whether work can be coordinated so that Contractors may proceed simultaneously.

11.5 District shall not be responsible for any damages suffered or extra costs incurred by Contractor resulting directly or indirectly from award or performance or attempted performance of any other contract or contracts on project, or caused by any decision or omission of District respecting the order of precedence in performance of contracts.

11.6 If the Contractor or any of his subcontractors or employees cause loss or damage to any separate Contractor on the work, the Contractor agrees to settle with such separate Contractor by agreement or arbitration, if they will so settle. If such separate Contractor sues the District, on account of any loss so sustained, the District shall notify the Contractor, who shall indemnify and save harmless the District against any expenses or judgment arising therefrom.

ARTICLE 12. DISTRICT'S RIGHT TO TERMINATE CONTRACT FOR CAUSE

12.1 If the Contractor refuses or fails to prosecute the work or any separable part thereof with such diligence as will insure its completion within the time specified or any extension thereof, or fails to complete said work within such time, or if the Contractor should be adjudged as 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 persistently or repeatedly refuse or should fail, except in cases for which extension of time is provided, to supply enough properly skilled workmen or proper materials to complete the work in time specified, or if he should fail to make prompt payment to subcontractors or for material or labor, or persistently disregards laws, ordinances or instruction of the District, or otherwise be guilty of a substantial violation of any provision of this contract, or if he or his subcontractors should violate any of the provisions of this contract, then the District may, without prejudice to any other right or remedy, serve written notice upon him and his surety of his intention to terminate this contract, such notice to contain the reasons for such intention to terminate and unless within ten days after the service of such notice such condition shall cease or such violation shall cease and satisfactory arrangements for the correction thereof be made, this contract shall upon the expiration of said ten (10) days, cease and terminate. In such case, Contractor shall not be entitled to receive any further payment until work is finished.

12.2 In the event of any such termination, the District shall immediately serve written notice thereof upon surety and Contractor, and surety shall have the right to take over and perform this contract, provided, however, that if surety within fifteen (15) days after service upon it of said notice of termination does not give the District written notice of its intention to take over and perform this contract, or does not commence performance thereof within thirty (30) days from date of serving such notice, the District may take over the work and prosecute same to completion by contract or by any other method it may deem advisable for the account and at the expense of Contractor, and he and his surety shall be liable to the District thereby.

12.3 The District may, without liability for doing so, take possession of and utilize in completing the work such materials, appliances, plant, and other property belonging to the Contractor as may be on the site of the work and necessary therefor; accept assignment of subcontract agreements for incomplete portions of the work pursuant to prior rights of the surety if any obligated under bond relating to the Contract; finish the Work by whatever reasonable method the District may deem expedient.

12.4 If unpaid balance of contract price shall exceed expense of finishing work, including compensation for additional architectural, managerial, and administrative services, such excess shall be paid by Contractor. If such expense shall exceed such unpaid balance, Contractor shall pay difference to District. Expense incurred by District as herein provided, and damage incurred through Contractor's default, shall be certified by Architect.

12.5 The foregoing provisions are in addition to and not in limitation of any other rights or remedies available to the District. Additionally, the failure of the District in any one or more instances to insist upon strict performance of any terms of this contract or to exercise any option herein conferred shall not be construed as a waiver or relinquishment to any extent of the right to assert or rely upon any such terms or option on any future occasion.

ARTICLE 13. DISTRICT'S RIGHT TO TERMINATE OR SUSPEND CONTRACT FOR CONVENIENCE

13.1 The District may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the District may determine.

13.2 The Contract Sum and Contract time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in Subparagraph 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent:

.1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

13.3 The District may, at any time, terminate the Contract for the District's convenience and without cause.

13.4 Upon receipt of written notice from the District of such termination for the District's convenience, the Contractor shall:

.1 cease operations as directed by the District in the notice;

.2 take actions necessary, or that the District may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

13.5 In case of such termination for the District's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

ARTICLE 14. GUARANTEE

14.1 The Contractor guarantees to the District and Architect that materials and equipment furnished under the Contract will be of good quality and new unless otherwise required or permitted by the Contract Documents, that the Work will be free from defects not inherent in the quality required or permitted, and that the Work will conform to the requirements of the Contract Documents.

14.2 Besides guarantees required elsewhere, Contractor shall, and hereby does, guarantee all work for a period of one year after date of acceptance of work by District and shall repair or replace any or all such work, together with any other work, which may be displaced in so doing, that may prove defective in workmanship and/or materials and any work not conforming to the requirements of the Contract Documents, including substitutions not authorized, within one year period from date of acceptance without expense whatsoever to District, ordinary wear and tear, unusual abuse or neglect excepted. Neither the Final payment or any other provision in the Contract Documents shall relieve the Contractor of responsibility for faulty materials and workmanship.

14.3 District will give notice of observed defects with reasonable promptness. Contractor shall proceed to remedy such defects immediately upon receiving such notification. Contractor shall notify District upon completion of repairs.

14.4 In the event of failure of Contractor to comply with above mentioned conditions within one week after being notified in writing, District is hereby authorized to proceed to have defects repaired and made good at expense of Contractor who hereby agrees to pay costs and charges therefor immediately on demand.

14.5 If, in the opinion of the District, defective work creates a dangerous condition or requires immediate correction or attention to prevent further loss to the District or to prevent interruption of operations of the District, the District will attempt to give the notice required by this article. If the Contractor cannot be contacted or does not comply with the District's requirements for correction within a reasonable time as determined by the District, the District may, notwithstanding the provisions of this article, proceed to make such correction or provide such attention and the costs of such correction or attention shall be charged against the Contractor. Such action by the District will not relieve the Contractor of the guarantee provided in this article or elsewhere in this contract.

14.6 This article does not in any way limit the guarantee on any items for which a longer guarantee is specified or on any items for which a manufacturer gives a guarantee for a longer period. Contractor shall furnish District all appropriate guarantee or warranty certificates upon completion of the project.

ARTICLE 15. NOTICE AND SERVICE THEREOF

15.1 Any notice from one party to the other under the contract shall be in writing and shall be dated and signed by party giving such notice or by duly authorized representative of such party. Any such notice shall not be effective for any purpose whatsoever unless serviced in one of the following manners:

.1 If notice is given to District, by personal delivery thereof to District, or by depositing same in United States mails, enclosed in a sealed envelope addressed to District, postage prepaid and sent certified, return receipt requested.

.2 If notice is given to Contractor, by personal delivery thereof to said Contractor or to his foreman at site of project, or by depositing same in United States mails, enclosed in a sealed envelope, addressed to said Contractor at his regular place of business or at such other address as may have been established for the conduct of work under this contract, postage prepaid and sent certified, return receipt requested.

.3 If notice is given to surety or other persons, by personal delivery to such surety or other person or by depositing same in United States mails, enclosed in a sealed envelope, addressed to such surety or person at the address of such surety or person last communicated by him to party giving notice, postage prepaid and sent certified, return receipt requested.

ARTICLE 16. WORKERS

16.1 Contractor shall at all times enforce strict discipline and good order among his employees and shall not employ on work any unfit person or anyone not skilled in work assigned to him.

16.2 Any person in the employ of the Contractor whom District may deem incompetent or unfit, shall be dismissed from work and shall not again be employed on it except with written consent of District.

16.3 Contractor and Subcontractor personnel on the site:

.1 Shall report for work in a manner fit to do their job

.2 Shall not be under the influence of or in possession of any alcoholic beverage or of any controlled substance (except a controlled substance as prescribed by a physician so long as the performance or safety at the work is not affected thereby) and;

.3 Shall not have been convicted of any criminal offense which may have a discernible adverse impact on the District or its students. Contractor shall advise its employees of these requirements before they enter on the site and shall immediately remove from the site any employee in violation of these requirements as determined by the Contractor or by the District. Contractor shall impose these requirements on its subcontractors.

16.4 The Contractor shall be at all times during the performance of work hereunder in full compliance with the provisions of the Immigration Reform and Control Act of 1986 ("IRCA") in the hiring of its employees, and the Contractor shall indemnify, hold harmless and defined the District against any and all actions, proceedings, penalties or claims arising out of the Contractor's failure to comply strictly wit the IRCA.

16.5 The District and all of its facilities and workplaces are "tobacco-free" in compliance with Education Code Section 48901 and, as such, require that the Contractor be subject to the requirements mandated by the Education Code. It is the sole responsibility of the contractor to police and oversee any and all personnel used in connection with the Work and the Project, whether employed directly or indirectly by the Contractor and to enforce the tobacco-free workplace requirements of the Education Code. If Contractor fails to maintain a tobacco-free workplace, the District may enforce its lawful rights to suspend pending or subsequent payments and pursue all other rights and remedies it may have against the Contractor.

ARTICLE 17. PUBLIC LIABILITY AND PROPERTY DAMAGE INSURANCE

17.1 Contractor shall take out and maintain during the life of this contract such public liability and property damage insurance as shall protect him, the District, and the Architect from all claims for personal injury, including accidental death, as well as from all claims for property damage arising from operations under this contract, in amounts set forth in the Supplementary General Conditions.

17.2 Contractor's General Liability Insurance shall contain no exclusion that would deny coverage for any claim for either bodily injury or property damage arising out of or otherwise caused, in whole or in part, by any fungus, mildew, mold, or resulting allergens. If such exclusion exists and cannot be removed by endorsement, Contractor shall submit proof of coverage for mold claims under a Pollution Legal Liability or Contractor's Pollution Liability policy.

17.3 Contractor shall require his subcontractors, if any, to take out and maintain similar public liability and property damage insurance in amounts as herein after set forth.

ARTICLE 18. BUILDERS-RISK INSURANCE

18.1 Contractor shall maintain and cause to be maintained property insurance in the amount of the initial Contract Sum as well as subsequent modifications thereto for the entire work at the site on a replacement cost basis without voluntary deductibles or depreciation.

18.2 Property insurance shall be on an all-risk policy form and shall insure against all perils of fire and extended coverage and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, flood, earthquake, wind, lightning, smoke, riot, collapse, falsework, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements and shall cover reasonable compensation for Architects services and expenses required as a result of such insured loss.

18.3 Such property insurance shall be maintained until work is accepted by the District.

18.4 The District and Contractor waive all rights against each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and the Architect, Architects consultants, separate contractors, if any and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other perils to the extent covered by insurance obtained pursuant to this Article or other property insurance applicable to the work, except such rights as they have to proceeds of such insurance. The District or Contractor, as appropriate shall require separate contractors if any, and the subcontractors, sub-subcontractors, agents and employees of any of them by appropriate agreements, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

18.5 Partial occupancy or use in accordance with Article 30 shall not commence until the insurance company providing property insurance has consented to such partial occupancy or use by endorsement or otherwise. The District and the Contractor shall take reasonable steps to obtain consent of the insurance company and shall, without mutual consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

ARTICLE 19. PROOF OF CARRIAGE OF INSURANCE

19.1 Contractor shall not commence work nor shall he allow any subcontractor to commence work under this contract until he has obtained all required insurance and certificates which have been delivered in duplicate to and approved by District.

19.2 Certificates and insurance policies shall include the following clause: "this policy shall not be canceled or reduced in required limits of liability or amounts of insurance until notice has been mailed to District. Date of cancellation or reduction may not be less than thirty (30) days after date of mailing of notice."

19.3 Certificates of insurance shall state in particular those insured, extent of insurance, location and operation to which insurance applies, expiration date and cancellation and reduction notice.

19.4 Insurance policies required of the Contractor shall be endorsed to name the District, its officers, agents and employees as additional insureds. Such policies shall also be endorsed to indicate that they are primary and non-contributing to any insurance or self-insurance maintained by the District.

19.5 In case of Contractor's failure to provide insurance as required by contract, the District may, at District's option, take out and maintain at the expense of the Contractor, such insurance in the name of Contractor, or subcontractor, as the District may deem proper and may deduct the cost of taking out and maintaining such insurance from any sums which are due or become due to the Contractor under this contract.

ARTICLE 20. LAWS AND REGULATIONS

20.1 Contractor shall give all notices and comply with all laws, ordinances, rules and regulations bearing on conduct of work as indicated and specified.

20.2 If Contractor observes that drawings and specifications are at variance therewith, he shall promptly notify Architect in writing and any necessary information shall be issued by the Architect in accordance with Article 5.

20.3 If Contractor performs any work knowing it to be contrary to such laws, ordinances, rules and regulations, and without such notice to Architect, he shall bear all costs arising therefrom.

ARTICLE 21. PERMITS AND LICENSES

21.1 The Contractor shall initiate and pursue the application process for obtaining all permits and licenses (including all required owner signatures) necessary for the prosecution of the work, including utility fees.

21.2 District will reimburse Contractor the actual documented cost of such permits, licenses and fees, with no overhead or profit added.

ARTICLE 22. EASEMENTS

22.1 Easements for permanent structure or permanent changes in existing facilities shall be secured and paid for by District, unless otherwise specified.

ARTICLE 23. SURVEYS

23.1 Surveys to determine locations of property lines and corners will be supplied by District. Surveys to determine locations of construction, grading and site work, shall be provided by Contractor.

ARTICLE 24. TAXES

24.1 If under federal excise tax law any transaction hereunder constitutes a sale on which a federal excise tax is imposed and the sale is exempt from such excise tax because it is a sale to a state or local government for its exclusive use, the District upon request, will execute a certificate of exemption which will certify (1) that the District is a political subdivision of the state for the purposes of such exemption, and (2) that the sale is for the exclusive use of the District. No excise tax for such materials shall be included in any bid price.

24.2 Contractor shall pay all other applicable federal, state and local sales taxes and all other taxes pertinent to the work involved in this Contract.

ARTICLE 25. PATENTS, ROYALTIES, AND INDEMNITIES

25.1 The Contractor shall hold and save the District, its officers, agents and employees harmless from liability of any nature or kind, including cost and expense, for or on account of any patented or unpatented invention, process, article, or appliance manufactured or used in the performance of this contract, including its use by the District, unless otherwise specifically stipulated in the contract documents and unless such liability arises from the sole negligence or willful misconduct of the District, its officers, employees, agents or independent Contractors who are directly employed by the District.

ARTICLE 26. SHOP DRAWINGS

26.1 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. The purpose of their submittal is to demonstrate for those portions of the Work for which submittals are required by the Contract Documents the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents. Submittals which are not required by the Contract Documents may be returned by the Architect without action.

26.2 Contractor shall check and verify all field measurements; check and coordinate all information contained within such submittals with the requirements of the Work and the Contract Documents and shall submit with such sumittals with the requirements of the Work and the Contract Documents promptness and in such sequence as to cause no delay in his own work or in that of any other Contractor six (6) copies checked and approved by him of all shop or setting drawings, schedules, and materials list requested for the work of various trades. All shop drawings shall be submitted to the Architect for his review no later than ninety (90) days after the date of the Notice to Proceed.

26.3 Architect shall review such schedules and drawings within ten (10) working days of receipt of same but review shall be only for conformance with design concept of project and for compliance with information given in contract documents.

26.4 Contractor shall make any corrections required by Architect, file with him six (6) corrected copies and furnish such other copies as may be needed for construction.

26.5 Architect's review of such drawings or schedules shall not relieve Contractor from responsibility for deviations from drawings or specifications unless he has in writing called Architect's attention to such deviations at time of submission and secured his written approval nor shall it relieve him from responsibility for errors in shop drawings or schedules.

ARTICLE 27. SAMPLES

27.1 Contractor shall furnish for review, within thirty-five (35) days following Notice to Proceed of contract all samples as required in specifications together with catalogs and supporting data required by Architect. This provision shall not authorize any extension of time for performance of this contract.

27.2 Architect will review such samples, within ten (10) working days from receipt of same, but review shall be only for conformance with design and concept of work and for compliance with information given in contract documents. Work shall be in accordance with approved samples.

27.3 Unless specified otherwise, sampling, preparation of samples and tests shall be in accordance with the latest standards of the ASTM International.

27.4 Samples of materials and/or articles shall, upon demand, be submitted for tests or examinations and consideration before incorporation of same in work is started. Materials furnished must be equal to approved samples in every respect. Samples which are of value after testing will remain the property of the Contractor. Contractor shall be solely responsible for delays due to samples not being submitted in time to allow for proper time to make tests. Acceptance or rejection will be expressed in writing.

ARTICLE 28. COST BREAKDOWN AND PERIODICAL ESTIMATES

28.1 Contractor shall furnish on forms approved by District:

.1 Within ten (10) days of award of contract a detailed estimate giving complete breakdown of contract price; and

.2 A periodic itemized estimate of work done for purpose of making partial payments thereon.

.3 Within ten (10) days of request by District, a schedule of estimated monthly payments which shall be due him under the contract.

ARTICLE 29. PAYMENTS

29.1 Each month between fifteen (15) and thirty (30) days after receipt of approved periodic estimate for partial payment, there shall be paid to Contractor a sum equal to ninety five percent (95%) of value of work performed up to last day of previous month, less aggregate of previous payments.

29.2 Failure to make payment within thirty (30) days after receipt of an undisputed and properly submitted payment request from contractor shall result in the payment of interest to the Contractor in an amount equivalent to the legal rate of interest set forth in subdivision (a) of Section 685.010 of the California Code of Civil Procedure. For purposes of this article, a payment request is considered proper if funds are available for payment of the request and payment is not delayed due to an audit inquiry by the financial officer of the District.

29.3 Upon receipt of a payment request, the District shall:

.1 Review the request as soon as practicable after receipt to determine that the request is a proper payment request;

.2 Return any payment request determined not to be a proper payment request suitable for payment (accompanied by a document setting forth in writing the reasons why the request is not proper) as soon as practicable, but not later than seven days after receipt.

29.4 Monthly payments shall be made only on the basis of monthly estimates which shall be prepared by Contractor on a form approved by District and filed before the fifth day of the month during which payment is to be made. Work completed as estimated shall be an estimate only and no inaccuracy or error in said estimate shall release Contractor or any bondsman from such work or from enforcing each and every provision of this contract and District shall have the right subsequently to correct any error made in any estimate for payment.

29.5 Contractor shall not be entitled to have any payment estimates processed or be entitled to have any payment made for work performed so long as any lawful or proper direction concerning work, or any portion thereof given by the District or Architect, shall remain uncomplied with.

29.6 At any time after fifty percent (50%) of the work has been completed, if the District, by action of its governing board, finds that satisfactory progress is being made, District may make any of the remaining payments in full for actual work completed or may withhold any amount up to five percent (5%) thereof as District may find appropriate based on the Contractor's progress. Any reduction in the amount of retainage shall only be made with the consent of the Contractor's surety.

29.7 The final payment of five percent (5%) of the value of work done under this contract, if unencumbered, shall be made thirty-five (35) days after acceptance of work by District and the filing of the Notice of Completion in accordance with Article 30. Acceptance will be made only by an action of their governing board. Final payment shall not become due until the Contractor submits to the Architect a consent of surety to final payment.

29.8 The title to new materials and/or equipment for the work of this contract and attendant liability for its protection and safety, shall remain with the Contractor until incorporated in the work of this contract and accepted by the District; no part of said materials and/or equipment shall be removed from its place of storage except for immediate installation in the work of this contract; and Contractor shall keep an accurate inventory of all said materials and/or equipment in a manner satisfactory to the District or his authorized representative.

29.9 Before any payment is made hereunder, a certificate in writing shall be obtained from the Architect stating that the work for which the payment is demanded has been performed, to the best of the Architect's knowledge, information and belief, in accordance with the terms of the contract and that the amount stated in the certificate is due under the terms of the contract. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to minor deviations from the Contract Documents correctable prior to completion and to specific qualifications expressed by the Architect. However, the issuance of a certificate will not be a representation that the Architect has:

.1 Made exhaustive or continuous on-site inspections to check the quality or quantity of the Work,

.2 Reviewed construction means, methods, techniques,sequences or procedures,

.3 Reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the District to substantiate the Contractor's right to payment.

.4 Made examination to ascertain now and for what purpose the Contractor has used money paid on account of the contract Sum.

The Architect may decide not to certify payment and may withhold certification if in the Architects opinion the representation to the District required by this Article cannot be made. If the Architect is unable to certify payment he shall notify the contractor and the District in writing of the reasons for withholding certification.

29.10 The Architect's certificate shall be attached to and made a part of the claim for payment made and filed with the District provided that if the Architect shall, within three (3) days after written demand therefor, fails to deliver such certificate to the District the Contractor may file his claim for payment with the District without said certificate, but together with such claim for payment shall be filed a statement that demand was made for such certificate and that same was refused. Thereupon, the District will either allow said claim for payment presented or shall, by an order entered on the minutes of said District state the reasons for refusing to allow said claim for payment. It is understood, moreover, that the certificate of the Architect shall not be conclusive upon the owner, but merely advisory, and that the payments herein provided for shall only be made when in fact such work has been performed in accordance with this contract.

29.11 After the Architect has certified payment and the District has made payment to the Contractor, the Contractor shall promptly pay each Subcontractor in accordance with provisions of Article 35. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-Subcontractors in similar manner. Payment to material suppliers shall be treated in a similar manner to that as provided for Subcontractors.

29.12 Neither the District nor the Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, Sub-subcontractor, or material supplier except as may otherwise be required by law.

ARTICLE 30. SUBSTITUTED SECURITY

30.1 In accordance with Section 22300 of the Public Contract Code, the District will permit the substitution of securities for any monies withheld by the District to ensure performance under the contract. At the request and expense of the Contractor, securities equivalent to the amount withheld shall be deposited with the District, or with a state or federally chartered bank in California as the escrow agent, who shall then pay such monies to the Contractor. Upon satisfactory completion of the contract, the securities shall be returned to the Contractor.

30.2 Alternatively, the Contractor may request and the District shall make payment of retentions earned directly to the escrow agent at the expense of the Contractor. At the expense of the Contractor, the Contractor may direct the investment of the payments into securities and the Contractor shall receive the interest earned on the investments upon the same terms provided for in this section for securities deposited by the Contractor. Upon satisfactory completion of the contract the Contractor shall receive from the escrow agent all securities, interest, and payments received by the escrow agent from the District, pursuant to the terms of this section.

30.3 Securities eligible for investment under this section shall include those listed in Government Code Section 16430, bank or savings and loan certificates of deposit, interest bearing demand deposit accounts, standby letters of credit, or any other security mutually agreed to by the Contractor and the District.

30.4 The Contractor shall be the beneficial owner of any securities substituted for monies withheld and shall receive any interest thereon.

30.5 If the Contractor elects to receive interest on monies withheld in retention by the District, the Contractor shall, at the request of any subcontractor, make that option available to the subcontractor for any monies withheld in retention by the Contractor from the subcontractor. If the Contractor elects to receive interest on any monies withheld in retention by the District, then the subcontractor shall receive the identical rate of interest received by the Contractor on any monies withheld by the Contractor, less any pro rata costs associated with administering and calculating that interest. In the event that the interest rate is a fluctuating rate, the rate for the subcontractor shall be determined by calculating the interest rate paid during the time that retentions were withheld from the subcontractor. If the Contractor elects to substitute securities in lieu of retention, then, by mutual consent of the Contractor and subcontractor, the subcontractor may substitute securities in exchange for the release of monies held in retention by the Contractor. The provisions of this Article shall, however, only be applicable to those subcontractors performing more than five percent of the Contractor's total bid. No Contractor shall require any subcontractor to waive any provision of this Article.

30.6 In the event that the Contractor elects to substitute securities in lieu of retentions, the Contractor may withhold from his or her subcontractors, who have not elected to substitute securities in lieu of retentions, the amount of retentions that would have otherwise been withheld.

30.7 The escrow agreement used for the purposes of this section shall be substantially similar to the form set forth in the Public Contract Code Section 22300.

30.8 Contractor shall obtain written consent of surety to any such agreement for substituted securities.

30.9 Should the value of such substituted security at any time fall below the amount for which it was substituted, or any another amount which the District determines to withhold, Contractor shall immediately and at Contractor's expense, deposit additional security qualifying under said Section 22300 of the Public Contract Code, until the total security deposited is no less than equivalent to the amount subject to withholding under the contract.

30.10 Not withstanding any provisions of the escrow agreement to the contrary, for a period of 35 days following the recordation of a Notice of Completion, District shall have unlimited access to the securities to respond to stop notice claims and punch list and warranty items. Pursuant to this Article, District may withdraw from the escrow account sufficient cash to cover 125 percent of the principal amount claimed in any stop notice, and 150 percent of the estimated amount necessary to remedy any punch list and/or warranty item. To withdraw funds, District shall present to the escrow agent copies of any and all stop notices, and/or a letter from its Architect, concerning the punch list and/or warranty items, together with written notification from District making demand for the funds. In response to District's demand, upon seven days written notice, escrow agent shall immediately convert sufficient securities to cash and distribute the cash to District. In no event will escrow agent have any obligation to pay District more than the amount escrow agent is holding. District's rights under this Article are in addition to and do not supplant any other rights or remedies contained in this Article or the remainder of the escrow agreement.

ARTICLE 31. ACCEPTANCE OF COMPLETION

31.1 To establish Substantial Completion, the Contractor shall notify the Architect in writing that the work is substantially complete and shall provide a list of items that are in need of completion or correction. Contractor shall then initiate a final walk-through with the District and Architect to establish a punch list of items to be completed or corrected by the Contractor. The Architect shall prepare and distribute copies of the punch list. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. Items of work that are identified subsequent to the date of the punch list as being an item of work that is to be completed or corrected by the Contractor shall be addressed as a warranty item and be corrected or completed under the warranty provisions of the Contract.

31.2 Prior to substantial completion status, the Contractor shall submit to the Architect for approval complete project record documents, operation and maintenance manuals, and all warranties and guarantees.

31.3 The Architect, shall issue a Certificate of Substantial Completion to the District and the Contractor for their written acceptance. The Certificate of Substantial Completion shall establish responsibilities of the District and Contractor for security, maintenance, heat, utilities, damage to the work and insurance, and shall fix the time within which the Contractor shall complete all items on the punch list accompanying the Certificate. Warranties and guarantees required by the Contract Documents shall commence on the date of Substantial Completion of the work unless otherwise provided in the Certificate of Substantial Completion.

31.4 The Contractor shall proceed without delay and within a reasonable period of time to correct and complete all items on the list (Unless agreed to by the District in advance, "a reasonable period of time" to correct and complete all items on the list shall be deemed to mean twenty-five (25) days or less.).

31.5 The Contractor, upon receipt of the Certificate of Substantial Completion, may submit the semi-final Certificate for Payment (100% completion, less retention).

31.6 Upon completion of all items contained on the punch list, the Contractor shall notify the Architect in writing that all items are complete and the Contractor shall request a re-review of the punch list by the Architect. The Architect will then make a final review of the punch list as soon as practical after notification and will promptly notify the Contractor of any items that are not complete. Should the Architect be required to make more than one final review of the punch list due to the Contractor's failure to correct identified deficiencies the Contractor shall bear all costs of any such re-review, to include compensation of the Architect, the Architect's consultants, and the District's Inspector made necessary there by.

31.7 To establish Beneficial Occupancy, the District shall notify Contractor in writing of its intended occupancy prior to Substantial Completion, and execute a Change Order reflecting said change in the Agreement between the District and the Contractor. (Liquidated damages shall cease upon the date of Beneficial Occupancy or Substantial Completion, whichever occurs first.)

31.8 The District shall record a Notice of Completion upon recommendation of the Architect; upon satisfactory completion of all official punch list items and when the entire work, including all records, certificates, permits, warranties and other documentation has been completed to the satisfaction of the District and approved by the Division of the State Architect. However, the District, at its sole option, may accept completion of the Contract and record the Notice of Completion when the entire work has been completed to the satisfaction of the District, except for minor corrective items. The work shall be accepted as complete only by action of the District's Governing Board.

31.9 Upon the recordation of the Notice of Completion the Contractor may submit the final Certificate for Payment for the retentions. Approximately 35 days after the recordation of Notice of Completion, the District shall process the final payment to the Contractor. The value of any Mechanics Liens, Stop Notices, incomplete or unsatisfactory work shall be withheld as appropriate from the final payment by the District until such time as all work and payments for said work have been made in accordance with the Contract Documents and to the satisfaction of the District.

31.10 Acceptance of final payment by the Contractor shall constitute a waiver for claims by the Contractor except those previously made in writing and identified by the Contractor as unsettled at the time of Final Application for Payment. The making of final payment shall constitute a waiver of claims by the District except those arising from:

.1 Liens, claims, security interests or encumbrances arising out of the contract and unsettled,

.2 Failure of the Work to comply with the requirements of the Contract Documents.

.3 Terms of warranties and guarantees required by the Contract Documents.

31.11 In the event of a dispute between the District and the Contractor, the District may, pursuant to the provisions of Public Contract Code Section 7107, withhold from the final payment an amount not to exceed 150 percent of the disputed amount.

31.12 In the event any stop notice filed by a subcontractor or supplier of material, equipment, labor or services results in the commencement of any court action involving the District, Contractor agrees to hold the District harmless from any and all costs of said action and shall pay or reimburse the District for all reasonable costs, including attorney's fees, arising out of said action.

ARTICLE 32. PAYMENTS WITHHELD

32.1 In addition to the amount which District may retain under Article 29 entitled "Payments", and Article 31 entitled "Acceptance of Completion", District may withhold a sufficient amount or amounts of any payment or payments otherwise due to Contractor, as in its judgment may be necessary to cover:

.1 Payments which may be past due and payable for just claims against Contractor or any subcontractors for labor materials furnished in and about the performance of work on the project under this contract.

.2 Defective work not remedied.

.3 Failure of Contractor to make proper payments to his subcontractor or for material or labor.

.4 Completion of contract if there exists a reasonable doubt that contract can be completed for balance then unpaid.

.5 Damage to another Contractor.

.6 Claims filed, or reasonable evidence indicating probable filing of claims.

.7 Liquidated damages assessed against Contractor.

.8 Penalties for violation of labor laws.

.9 Payments to indemnify, defend and hold harmless the District.

.10 Failure of the Contractor to prosecute any portion of the work in accordance with provisions of the Contract Documents.

.11 Failure of the Contractor to prosecute the work in a timely manner in compliance with established progress schedules and completion dates.

.12 Failure of the Contractor to submit on a timely basis proper documentation required by the Contract Documents including, without limitation, monthly construction schedules, schedule of values, shop drawings, product data and samples, proposed product list, executed change orders and verified reports.

.13 Failure of the Contractor to maintain record drawings.

32.2 When the above grounds are removed, payment shall be made for amounts with-held because of them. No interest shall be paid for amounts withheld.

32.3 District may apply such withheld amount or amounts to payment of such claims or obligations at it's discretion. In so doing, District shall be deemed the agent of the Contractor and any payment so made by District shall be considered as a payment made under contract by District to Contractor and District shall not be liable to Contractor for such payments made in good faith. Such payments may be made without prior judicial determination of claim or obligations. District will render Contractor a proper accounting of such funds disbursed on behalf of Contractor.

ARTICLE 33. CHANGES AND EXTRA WORK

33.1 District, without invalidating contract, and as provided by law, may order extra work or make changes by altering, adding to, or deducting from work, contract sum being adjusted accordingly. All such work shall be executed under conditions of original contract. Contractor shall increase the amounts of his payment and performance bonds in proportion to any increase in price.

33.2 Architect shall have authority to make minor changes in work not involving change in cost or time and not inconsistent with the intent of the Contract Documents. An order for a minor change in the work may be issued only by the Architect. The Contractor shall execute such orders on a timely basis.

33.3 Except in an emergency endangering life or property, no extra work or change shall be made except in pursuance of a written Change Order or Construction Change Directive from the District, and no claim for addition to contract sum shall be valid unless so ordered. The Contractor shall proceed promptly to execute any work so directed.

33.4 If the Contractor is delayed in completing the work by reason of any change made pursuant to this Article, the time for completion of the work shall be extended by the same change order for a period commensurate with such delay, without additional compensation, and Contractor shall not be subject to liquidated damages for this extension. No extension of time will be granted for change orders that, in the opinion of the District, do not affect the critical path of the project.

33.5 Value of any such extra work, change, or deduction shall be determined at the sole discretion of the District in either of the three following ways:

.1 Acceptable lump sum proposal from Contractor properly itemized and supported by sufficient substantiating data to permit evaluation. Estimates for lump sum proposals shall be limited to direct expenditures necessitated specifically by the subject extra work and shall be segregated into categories which follow those outlined in Article 33.5.3. In addition, the Contractor and subcontractor will be paid a lump sum for overhead, profit, and bond. Such lump sum shall conform to the percentages outlined in Article 33.5.3. Supervision of the extra work shall be included in the lump sum percentage for overhead. For added or omitted work by Subcontractors, the Contractor shall furnish to the District the Subcontractor's detailed estimate of the cost for labor, material, and equipment, including the markup by the Subcontractor for overhead and profit. Such estimate of cost shall be signed by the Subcontractor. The same requirement shall apply to any Sub-subcontractor or material supplier.

.2 By unit prices contained in Contractor's original bid and incorporated into Contract Documents or fixed by subsequent agreement between District and Contractor. Unit prices shall include all necessary labor, material, overhead, profit, and applicable taxes.

.3 Time and Material "Force Account" for direct costs for labor, material, and equipment rental plus markups for overhead and profit for Prime Contractor, Subcontractor, and Sub-subcontractors as applicable. (Supervision is to be included in markup unless specifically agreed to in advance that special supervision is required.)

a. LABOR: Attach itemized direct hourly rates in accordance with certified payroll records times total hours expended. Separately show dollar amount for employer-paid payroll taxes/insurance benefits. Enter total as direct labor item. _____

b. MATERIAL: Attach receipts, invoices or itemized quantity and unit costs plus tax and delivery. Enter total as material item. _____

c. EQUIPMENT: Attach receipts, invoices or tear tickets indicating unit costs and total hours or loads charged. (Small tools with a value of less than $500.00 are to be included in markup.) Enter total as equipment rental item. _____

d. SUBTOTAL (Lines a + b + c) _____

e. COMBINED MARKUP FOR ALL OVERHEAD AND PROFIT SHALL BE BASED ON THE FOLLOWING:

(1) For the Prime Contractor, for work performed by his forces, fifteen percent (15%) of his direct subtotal cost. _____

(2) For the Prime Contractor, for work performed by a Subcontractor's forces, five percent (5%) of the direct subtotal cost due the Subcontractor. _____

(3) For a Subcontractor or Sub-subcontractor, for work performed by their own forces, twenty percent (20%) of their own direct subtotal costs. _____

(4) For a Subcontractor, for work performed by a Sub-subcontractor, five percent (5%) of the direct subtotal cost due the Sub-subcontractor. _____

f. SUBTOTAL (Lines d + e) _____

g. PRIME CONTRACTOR'S BOND (NTE 1% Line f) _____

h. TOTAL CHANGE ORDER REQUEST (Lines f + g) _____

33.6 The Contractor shall attach to and make a part of each claim for additional compensation and/or extension of time a claim certification. The form of certification for this purpose shall be as furnished within the Contract Documents under provisions of Document 00627.

33.7 The amount of credit to be allowed by the Contractor to the District for a deletion or change which results in a net decrease in the Contract Sum shall be actual net cost. When both additions and credits covering related work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

33.8 If the Contractor should claim that any instruction, request, drawing, specification, action, condition, omission, default or other situation obligates the District to pay additional compensation to the Contractor or to grant an extension of time for the completion of the contract, or constitutes a waiver of any provision in the contract, he shall notify the District, in writing, of such claim within ten (10) days from the date he has actual or constructive notice of the factual basis supporting the claim. The Contractor's failure to notify the District within such period shall be deemed a waiver and relinquishment of the claim against the District. If such notice be given within the specified time, the procedure shall be as stated above in this Article.

33.9 The sum agreed upon for any Change Order shall be inclusive of all claims for costs or other causes of action which the Contractor or any of his subcontractors, sub-subcontractors, or suppliers may have relating thereto. No claim relating to or flowing from a particular change shall be allowed after acceptance by the Contractor of a Change Order or the sums payable thereunder relating to that change. It is understood that the acceptance by the Contractor of a Change Order shall be final and binding upon the Contractor and shall not be subject to renegotiations or adjustment due to any cause whatsoever.

33.10 All change order requests and Change Orders shall not contain any reservation of rights and/or qualifying language by the Contractor.

33.11 All Construction Change Documents shall be approved by the Division of the State Architect in accordance with the Construction Change requirements of Title 24 of the California Code of Regulations, Part 1, Section 4-338.

33.12 A Construction Change Directive is a written order prepared by the Architect and signed by the District and Architect, directing a change in the Work prior to agreement or adjustment, if any, in the Contract Sum or Contract Time, or both. The District may, by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

33.13 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

33.14 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

.1 mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation as stipulated in Article 33.5.1.

.2 unit prices stated in the Contract Documents as stipulated in Article 33.5.2.

.3 cost to be determined on a Time and Material basis as stipulated in Article 33.5.3.

.4 as provided in Article 33.17.

33.15 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

33.16 A Construction Change Directive signed by the Contractor indicates the agreement of the Contractor therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be the same as a Change Order.

33.17 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the method and the adjustment shall be determined by the Architect on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, a reasonable allowance for overhead and profit. In such case, and also under Article 33.14.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Article 33.17 shall be limited to the costs identified under Article 33.5.3.

33.18 Pending final determination of the total cost of a Construction Change Directive to the District, amounts not in dispute for such changes in the Work shall be included in Applications for Payment accompanied by a Change Order indicating the parties' agreement with part or all of such costs. For any portion of such cost that remains in dispute, the Architect will make an interim determination for purposes of monthly certification for payment for those costs. That determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a claim in accordance with Article 67.

33.19 When the District and Contractor agree with the determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and shall be recorded by preparation and execution of an appropriate Change Order.

33.20 All Construction Change Directives shall not contain any reservation of rights and/or qualifying language by the Contractor.

33.21 All Construction Change Directives shall be approved by the Division of the State Architect in accordance with the Preliminary Change Order requirements of Title 24 of the California Code of Regulations, Part 1, Section 4-338.

ARTICLE 34. DEDUCTION FOR UNCORRECTED WORK

34.1 If the District deems it inexpedient to correct work injured or not done in accordance with contract, the District may elect to accept nonconforming work instead of requiring correction or removal and replacement of such work. The Contractor shall bear all direct, indirect, and consequential costs attributable to the evaluation of and determination to accept such work. Such costs may include but shall not be limited to fees and charges of Architect, engineers, attorneys and other professionals. If any such acceptance occurs prior to final payment, a change order shall be issued incorporating the necessary revisions in the Contract Documents with respect to the work and an equitable deduction from the Contract amount shall be made therefore. If acceptance occurs after final payment, the amount shall be paid by the Contractor directly to the District.

ARTICLE 35. PAYMENTS BY CONTRACTOR

35.1 Contractor shall pay:

.1 For all transportation and utility services not later than the 20th day of the calendar month following that in which such services are rendered.

.2 For all materials, tools and other expendable equipment to the extent of ninety five percent (95%) of cost thereof, not later than the 20th day of the calendar month following that in which such materials, tools, and equipment are delivered at site of project and balance of cost thereof not later than the 30th day following completion of that part of work in or on which such materials, tools, and equipment are incorporated or used; and

.3 To each of his subcontractors, not later than the 5th day following each payment to Contractor; the respective amounted allowed Contractor on account of work performed by respective subcontractor to the extent of such subcontractor's interest therein.

.4 Within 7 days from the time that all or any portion of the retention proceeds are received by the Contractor, the Contractor shall pay each of its subcontractors from whom retention has been withheld, each subcontractor's share of the retention received. However, if a retention payment received by the Contractor is specifically designated for a particular subcontractor, payment of the retention shall be made to the designated subcontractor, if the payment is consistent with the terms of the subcontract.

35.2 In any contract between the Contractor and a subcontractor, and in any contract between a subcontractor and any subcontractor thereunder, the percentage of the retention proceeds withheld may not exceed the percentage specified to be withheld in the Contract between the Contractor and the District. This provision shall, however, not be applicable to any contract between the Contractor and any subcontractor or any other subcontractor thereunder where a performance and payment bond, issued by an admitted surety insurer, is required to be provided by the Contractor or subcontractor and the subcontractor or a subcontractor thereunder fails or refuses to provide such contract security to the Contractor or subcontractor. No party identified in this Article shall require any other party to waive any provision of this Article.

35.3 Contractor may withhold from a subcontractor its portion of the retention proceeds if a bona fide dispute exists between the subcontractor and the Contractor. The amount withheld from the retention payment shall not exceed 150 percent of the estimated value of the dispute.

35.4 In the event that retention payments are not made within the time periods required by this Article, the Contractor withholding the unpaid amounts shall be subject to a charge of 2 percent per month on the improperly withheld amount in lieu of any interest otherwise due. Additionally, in any action for the collection of funds wrongfully withheld, the prevailing party shall be entitled to attorney's fees and costs.

ARTICLE 36. CONTRACTOR'S SUPERVISION

36.1 Specific duties of the Contractor shall be in accordance with Title 24, Part 1, Section 4-343 of the California Code of Regulations.

36.2 Unless personally present on premises (including both the site and the plant) where work is being done, Contractor shall keep on the work, during its progress, a competent superintendent satisfactory to District. Superintendent shall not be changed except with consent of District unless superintendent proves to be unsatisfactory to Contractor and ceases to be in his employ. Superintendent shall represent Contractor in his absence and all directions given to him shall be as binding as if given to Contractor. Other directions shall be so confirmed on written request in each case.

36.3 Contractor shall give efficient supervision to work, using his best skill and attention. He shall carefully study and compare all drawings, specifications, and other instructions and shall at once report in writing to Architect any error, inconsistency or omission which he may discover, but he shall not be liable to District for any damage resulting from any errors or deficiencies in contract documents or other instructions by Architect.

36.4 Contractor shall be solely responsible for and have control over the means, methods, techniques, sequences, and procedures of construction and shall be responsible for coordinating all portions of the work under the contract.

36.5 Contractor shall not be relieved of the obligation to perform the work in accordance with the Contract Documents by either activities or duties of the Architect in the Architect's administration of the Contract or by tests, inspections or approvals required or performed by persons other than the Contractor.

36.6 Contractor shall fully comply with any and all reporting requirements of Section 39151 and 81141 of the Education Code in the manner prescribed by Title 24, Part 1, Section 4-336 and 4-343.

ARTICLE 37. INSPECTOR'S FIELD OFFICE

37.1 Contractor shall provide for the use of inspector at the site a temporary office of not less than one hundred twenty square feet of floor area to be located as directed by inspector and to be maintained until removal is authorized by District. Office shall be of substantial waterproof construction with adequate natural light and ventilation by means of stock design windows. Door shall have a key-type lock or padlock hasp.

37.2 A table satisfactory for study of plans and two chairs shall be provided by Contractor. Contractor shall provide and pay for adequate electric lights, local telephone service, and adequate heat for the field office until authorized removal.

ARTICLE 38. DOCUMENTS ON WORK

38.1 Contractor shall keep one copy of all contract documents, including addenda, change orders, and Title 19, 21, and 24 of the California Code of Regulations, which is a part of contract documents, on job at all times. Said documents shall be kept in good order and available to Architect and his representatives.

38.2 Contractor shall be acquainted with and comply with all California Code of Regulation provisions as they relate to this project. (See particularly the duties of Contractor, Title 24, California Code of Regulations, Part 1, Section 4-343).

ARTICLE 39. UTILITIES

39.1 All utilities, including but not limited to electricity, water, gas, and telephone used on work shall be furnished and paid for by Contractor. Contractor shall furnish and install necessary temporary distribution systems, including meters, if necessary, from distribution points to points on site where utility is necessary to carry on the work. Upon completion of work, Contractor shall remove all temporary distribution systems.

39.2 If contract is for addition to existing facility, Contractor may, with written permission of District, use District's existing utilities by making pre-arranged payments to District for utilities used by Contractor for construction.

ARTICLE 40. SANITARY FACILITIES

40.1 The Contractor shall provide a sanitary temporary toilet building as directed by the inspector for the use of all workmen. The building shall be maintained in a sanitary condition at all times and shall be left at the site until removal is directed by the Inspector. Use of toilet facilities in the work under construction shall not be permitted except by approval of the Inspector.

ARTICLE 41. PROTECTION OF WORK AND PROPERTY

41.1 The Contractor shall be responsible for all damages to persons or property that occur as a result of his fault or negligence in connection with the prosecution of this contract and shall be responsible for the proper care and protection of all materials delivered and work performed until completion and final acceptance by the District. All work shall be solely at the Contractor's risk until completion and final acceptance by the District. He shall adequately protect adjacent property from settlement or loss of lateral support as provided by law and contract documents.

41.2 Contractor shall take all necessary precautions for safety of employees on the work and shall comply with all applicable safety laws and building codes to prevent accidents or injury to persons on, about or adjacent to premises where work is being performed. He shall erect and properly maintain at all times, as required by conditions and progress of work, all necessary safeguards, signs, barriers, light, and watchmen for protection of workmen and the public and shall post danger signs warning against hazards created by such features in the course of construction. He shall designate a responsible member of his organization on the work, whose duty shall be prevention of accidents. Name and position of person so designated shall be reported to the District.

41.3 In an emergency affecting safety of life or of work or of adjoining property, Contractor, without special instruction or authorization from Architect or District, is hereby permitted to act, at his discretion, to prevent such threatened loss or injury, and he shall so act, without appeal, if so authorized or instructed by Architect or District. Any compensation claimed by Contractor on account of emergency work shall be determined by agreement.

41.4 Contractor shall provide such heat, covering, and enclosures as are necessary to protect all work, materials, equipment, appliances and tools against damage by weather conditions.

41.5 Contractor shall take adequate precautions to protect existing sidewalks, curbs, pavements, utilities, adjoining property, and structures, and to avoid damage thereof, and repair any damage thereto caused by construction operations.

41.6 Contractor shall (unless the requirements are waived by the Inspector);

.1 Enclose working area with a substantial barricade, arrange work to cause minimum amount of inconvenience and danger to students and faculty in their regular school activities, and perform work which may interfere with school routine before or after school hours. (This subsection applies to new construction on existing sites).

.2 Provide substantial barricades around any shrubs or trees indicated to be preserved.

.3 Deliver materials to building area over route designated by Architect.

.4 Take preventive measures to eliminate objectionable dust.

.5 Confine his apparatus, the storage of materials, and the operations of his workmen to limits indicated by law, ordinances, permits, or directions of Architect and shall not unreasonably encumber premises with his materials, and enforce all instructions of District and Architect regarding signs, advertising, fires, danger signals, barricades, and smoking and require that all persons employed on work comply with all regulations while on construction site.

.6 Take care to prevent disturbing or covering any survey markers, monuments, or other devices marking property boundaries or corners. If such markers are disturbed by accident, they shall be replaced by an approved civil engineer at no cost to the District.

41.7 Should the Contractor encounter any material defined as being hazardous by Section 25249.5, et seq, of the California Health and Safety Code, also known as the Safe Drinking Water and Toxic Enforcement Act of 1986 Proposition 65, on the site which has not been rendered harmless, the Contractor shall immediately stop work in the affected area and notify the District and the Architect of the condition in writing. Work in the affected area shall not be resumed except by written agreement of the District and Contractor if the hazardous material has not been rendered harmless. The work in the affected area shall be resumed in the absence of hazardous material, or when it has been rendered harmless.

41.8 The Contractor shall not be required to perform without consent any work relating to hazardous material.

ARTICLE 42. LAYOUT AND FIELD ENGINEERING

42.1 All field engineering required for laying out this work and establishing grades for earthwork operations shall be furnished by the Contractor at his expense. Such work shall be done by a qualified civil engineer approved by the Architect. Any required "record" drawings of site development shall be prepared by the approved civil engineer.

ARTICLE 43. CUTTING AND PATCHING

43.1 Contractor shall do all cutting, fitting, or patching of work as required to make its several parts come together properly and fit it to receive or be received by work of other Contractors showing upon, or reasonably implied by, the drawings and specifications for the completed structure, and he shall make good after them as Architect may direct.

43.2 All costs caused by defective or ill-timed work shall be borne by party responsible therefor.

43.3 Contractor shall not endanger any work by current, excavating, or otherwise altering work and shall not cut or alter work of any other Contractor save with consent of Architect.

ARTICLE 44. CLEANING UP

44.1 Contractor at all times shall keep premises free from debris such as waste, rubbish, and excess materials and equipment caused by this work; debris shall be removed from premises. Contractor shall not leave debris under, in or about the premises.

44.2 Upon completion of work, he shall clean interior and exterior of building including fixtures, equipment, walls, floors, ceilings, roofs, window sills and ledges, horizontal projections, and any areas where debris has collected to surfaces are free from foreign materials or discoloration; he shall clean and polish all glass, plumbing fixtures, and finish hardware and similar finish surfaces and equipment and remove temporary fencing, barricades, planking and construction toilet and similar temporary facilities from site.

ARTICLE 45. CORRECTION OF WORK BEFORE FINAL PAYMENT

45.1 Contractor shall promptly remove from premises all work condemned by District as failing to conform to contract, whether incorporated or not. Contractor shall promptly replace and re-execute his own work to comply with contract documents without additional expense to District and shall bear the expense of making good all work of other Contractors destroyed or damaged by such removal or replacement.

45.2 If Contractor does not remove such condemned work within a reasonable time, fixed by written notice, District may remove it and may store the material at Contractor's expense. If Contractor does not pay expenses of such removal within ten (10) days time thereafter, District may, upon ten (10) days written notice, sell such materials at auction or at private sale and shall account for net proceeds thereof, after deducting all costs and expenses that should have been borne by Contractor.

ARTICLE 46. ACCESS TO WORK

46.1 District and its representatives shall at all times have access to work in preparation or progress, wherever located.

46.2 Contractor shall provide safe and proper facilities for such access so that District's representatives may perform their functions under contract.

ARTICLE 47. OCCUPANCY

47.1 District reserves the right to occupy buildings at any time before completion, and such occupancy shall not constitute final acceptance of any part of work covered by this contract.

ARTICLE 48. DISTRICT'S INSPECTOR

48.1 One or more inspectors employed by District in accordance with requirements of Title 24 of the California Code of Regulations will be assigned to the work. His duties are specifically defined in Section 4-342 of said Title 24, Part 1.

48.2 All work shall be under observation of said inspector. He shall have free access to any or all parts of work at any time. Contractor shall furnish inspector reasonable facilities for obtaining information respecting progress and manner of work and character of materials.

48.3 Such observations shall not, in any way relieve Contractor from responsibility for full compliance with all terms and conditions of the contract, nor be construed to lessen to any degree, the Contractor's responsibility for providing efficient and capable superintendence. The inspector is not authorized to make changes in the drawings or specifications, nor shall his approval of work and methods relieve the Contractor of responsibility for the correction of subsequently discovered defects.

ARTICLE 49. TRENCH EXCAVATION

49.1 Pursuant to Labor Code Section 6705, if the Contract price exceeds $25,000. and involves the excavation of any trench or trenches five feet or more in depth, the Contractor shall, in advance of excavation, submit to the District or a registered civil or structural engineer employed by the District a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation of such trench or trenches.

49.2 If such plan varies from the Shoring System Standards established by the Construction Safety Orders, the plan shall be prepared by a registered civil or structural engineer, but in no case shall such plan be less effective than that required by the Construction Safety Orders. No excavation of such trench or trenches shall be commenced until said plan has been accepted by District or by the person to whom authority to accept has been delegated by District.

49.3 Pursuant to Labor Code Section 6705, nothing in this article shall impose tort liability upon the District or any of its employees.

ARTICLE 50. EXISTING UTILITY LINES; REMOVAL, RESTORATION

50.1 Pursuant to Government Code Section 4215, the District assumes the responsibility for removal, relocation, and protection of utilities located on the construction site at the time of commencement of construction under this Contract with respect to any such utility facilities which are not identified in the plans and specifications. The Contractor shall not be assessed for liquidated damages for delay in completion of the project caused by failure of the District to provide for removal or relocation of such utility facilities. District shall compensate the Contractor for the costs of locating, repairing damage not due to the failure of the Contractor to exercise reasonable care, and removing or relocating such utility facilities not indicated in the plans and specifications with reasonable accuracy, and for equipment necessarily idle during such work.

50.2 This article shall not be construed to preclude assessment against the Contractor for any other delays in completion of the work. Nothing in this article shall be deemed to require the District to indicate the presence of existing service laterals or appurtenances whenever the presence of such utilities on the site of the construction project can be inferred from the presence of other visible facilities, such as buildings, meters, junction boxes, manholes, or similar appurtenances on or adjacent to the site of the construction.

50.3 If the Contractor while performing work under this Contract, discovers utility facilities not identified by the District in the Contract plans or specification, Contractor shall immediately notify the District and the utility in writing.

50.4 It shall be Contractor's sole responsibility to timely notify all public and private utilities serving the site prior to commencing work. The Contractor shall notify and receive clearance from any cooperative agency, such as Underground Service Alert, in accord with Government Code Section 4216.

ARTICLE 51. SUBSURFACE CONDITIONS

51.1 If work under this Contract involves digging trenches or other excavations that extend deeper than four feet below the surface, the Contractor shall promptly, and before the following conditions are disturbed, notify the District, in writing, of any:

.1 Material that the Contractor believes may be material that is hazardous waste, as defined in Section 25117 of the Health and Safety Code, that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law.

.2 Subsurface or latent physical conditions at the site differing from those indicated.

.3 Unknown physical conditions at the site of any unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in the work of the character provided for in the contract.

51.2 If, in the District's opinion, any change is required for performance of extra work not covered by this Contract, the District may order such change under the provisions of Article 33 herein.

51.3 In accordance with Public Contracts Code 7104, any dispute arising between Contractor and District as to any of the conditions listed in .1, .2, .3 above, or with respect to Article 33 of this Contract, shall not excuse the Contractor from the completion date required by this Contract and the Contractor shall proceed with all work to be performed under this Contract.

51.4 In addition, the District reserves the right to terminate this Contract should the District determine not to proceed because of any condition described in .1, .2, or .3 above. Contractor shall receive payment for all work performed to the date of termination.

ARTICLE 52. TESTS AND INSPECTIONS

52.1 If contract, District's instructions, laws, ordinances, or any public authority require any work to be specially tested or approved, Contractor shall give notice in accordance with such authority of its readiness for observation or inspection at least two (2) working days prior to being tested or covered up. If inspection is by authority other than District, Contractor shall inform District of date fixed for such inspection. Required certificates of inspection shall be secured by Contractor.

52.2 Observations by District shall be promptly made, and where practicable at source of supply. If any work should be covered up without approval of consent of District, it must, if required by District, be uncovered for examination and satisfactorily reconstructed at Contractor's expense in compliance with contract. Costs of tests of any materials found to be not in compliance with contract shall be paid for by District with the cost of such tests being included in an appropriate change order deducting from payments then or thereafter due the Contractor the costs of such tests to include the cost of any additional services performed by the Architect or his consultants. Other costs for tests and inspections of materials shall be paid by District.

52.3 Where such inspection and testing are to be conducted by an independent laboratory or agency, such materials or samples of materials to be tested shall be selected by such laboratory or agency, or District's representative, and not by Contractor.

52.4 Contractor shall notify District a sufficient time in advance of manufacture of materials to be supplied by him under contract, which must by terms of contract be tested in order that District may arrange for testing of same at source of supply. Any materials shipped by Contractor from source of supply prior to having satisfactorily passed such testing and inspection, or prior to receipt of notice from said representative that such testing and inspection will not be required, shall not be incorporated in work without prior approval of District and subsequent testing and inspection.

52.5 Re-examination of questioned work may be ordered by District and, if so ordered, work must be uncovered by Contractor. If such work is found in accordance with contract documents, District shall pay costs of re-examination and replacement. If such work is not found to be in accordance with contract documents, Contractor shall bear all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses.

52.6 Payment for Tests and Inspection will be made as follows:

.1 District will pay cost of testing and inspection except the following for which the Contractor shall reimburse the District through deductive change order:

a. Any retesting and sampling required due to failure of original test.

b. Any testing and inspection required to be performed that requires testing laboratory or agency to perform services outside the state of California.

c. Concrete design mix.

d. Additional testing expenses caused by failure of the Contractor to adhere to construction schedule or caused by failure of the Contractor to give proper advanced notice or caused by Contractor delay.

ARTICLE 53. SOILS INVESTIGATION REPORT

53.1 When a soils investigation report obtained from test holes at site is available, such report shall not be a part of this contract.

53.2 Any information obtained from such report or any information given on drawings as to subsurface soil condition or to elevations of existing grades or elevations of underlying rock is approximate only, is not guaranteed, and does not form a part of the contract.

53.3 Contractor is required to make a visual examination of site and must make whatever tests he deems appropriate to determine underground condition of soil.

53.4 Contractor agrees that he will make no claim against District for damages in event that during progress of work Contractor encounters subsurface or latent conditions at site materially differing from those shown on drawings or indicated in specifications, or for unknown conditions of an unusual nature which differ materially from those ordinarily encountered and generally recognized as inherent in the work of the character provided for in plans and specifications.

ARTICLE 54. ARCHITECT'S STATUS

54.1 The Architect shall be the District's representative during construction period and he shall observe the progress and quality of the work on behalf of the District.

54.2 He shall have the authority to act on behalf of District only to the extent expressly provided in the Contract Documents.

54.3 The Architect shall be, in the first instance, the judge of the performance of this contract. He shall side neither with the District nor with the Contractor, but shall use his powers under the Contract to enforce its faithful performance by both.

54.4 The Architect shall have all responsibilities and power established by law including California Code of Regulations, Title 24, Part 1, Section 4-341.

54.5 The Architect will not have control over or charge of and will not be responsible for construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the work, since these are solely the Contractor's responsibility as provided in Article 35. The Architect will not be responsible for the contractor's failure to carry out the work in accordance with the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons performing portions of the work.

54.6 General observation of the Work by the Architect shall in no way imply that the Architect or his or her representatives are in any way responsible for the safety of the Contractor or its employees or that the Architect or his or her representatives will maintain supervision over the Contractor's construction methods or personnel.

54.7 If at any time during the life of this contract, through no fault of his own, the Architect is required to provide the District additional professional services for any reason by any act of the Contractor, the Contractor shall be held liable for the cost of any such additional service. Additional professional services of the Architect shall include but shall not necessarily be limited to the following:

.1 Services made necessary by the default of the Contractor.

.2 Services made necessary due to defects or deficiencies in the work of the Contractor.

.3 Services required by failure of the Contractor to perform according to any provision of the Contract Documents.

.4 Services in connection with evaluating substitutions of products, materials, equipment and subcontractors proposed by the Contractor and making subsequent revisions to drawings, specifications and providing other documentation required.

.5 Services for evaluating and processing claims other than those normally and customarily submitted by the Contractor in connection with the work.

.6 Services required by the failure of the Contractor to prosecute the work in a timely manner in compliance with specified time of completion.

.7 Service in conjunction with the testing, adjusting, balancing and start-up of equipment other than the normal amount customarily associated for the type of work involved.

.8 Services for other than the initial review and one re-review of requested submittals of shop drawings, product data and samples.

In such case an appropriate change order will be issued deducting from payments then or thereafter due the Contractor the cost of the Architects additional professional services. Such Change Order shall be deemed to have been executed by the Contractor, whether or not actually signed by the Contractor unless the Change Order is shown to have been prepared in bad faith by the District. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the District.

ARTICLE 55. ARCHITECT'S DECISIONS

55.1 The Architect shall make decisions on all claims of the District or Contractor and on all other matters relating to the execution and progress of the work upon written request of either the District or Contractor.

55.2 The Architect's response to such requests will be made with reasonable promptness, while allowing sufficient time in the Architect's professional judgement, to permit adequate review and evaluation of request. Any delay in the progress of the work shall not be recognized on account of failure by the Architect to respond to such request until 15 calendar days after Architect's receipt of written request.

55.3 The Architect's decisions on matters relating to aesthetic effect will be final.

ARTICLE 56. MATERIALS AND WORK

56.1 Except as otherwise specifically stated in this contract, Contractor shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, superintendence, temporary constructions of every nature, and all other services and facilities of every nature whatsoever necessary to execute and complete this contract within specified time.

56.2 Unless otherwise specified, all materials shall be new and the best of their respective kinds and grades as noted and/or specified, and workmanship shall be of good quality.

56.3 Materials shall be furnished in ample quantities and at such times as to ensure uninterrupted progress of work and shall be stored properly and protected as required. Contractor shall be entirely responsible for damage or loss by weather or other causes to materials or work under this contract.

56.4 No materials, supplies, or equipment for work under this contract shall be purchased subject to any chattel mortgage, or under a conditional sale or other agreement by which an interest therein, or in any part thereof, is retained by seller or supplier. Contractor warrants good title to all material, supplies and equipment installed or incorporated in work and agrees upon completion of all work to deliver premises, together with all improvements and appurtenances constructed or placed thereon by him, to District free from any claim, liens or charges. He further agrees that neither he nor any person, firm or corporation furnishing any materials or labor for any work covered by this contract shall have any right to lien upon premises or any improvement or appurtenances thereon, except that Contractor may install metering devices or other equipment of utility companies or of political subdivisions, title to which is commonly retained by utility company or political subdivision. In event of installation of any such metering device or equipment, Contractor shall advise District as to owner thereof.

56.5 Nothing contained in this article, however, shall defeat or impair right of persons furnishing material or labor under any bond given by Contractor for their protection, or any rights under any law permitting such persons to look to funds due Contractor in hands of such persons to look to funds due Contractor in hands of District, and this provision shall be inserted in all subcontractors and material Contractors, and notice of its provisions shall be given to all persons furnishing material for work when no formal contract is entered into for such materials.

56.6 Contractor shall, after signing of agreement with District, place orders for materials and/or equipment as specified so that delivery of same may be made without delays to the work. Contractor shall, upon demand from the Architect, furnish to the Architect documentary evidence showing the orders have been placed.

56.7 District reserves the rights, for any neglect in not complying with the above instructions, to place orders for such materials and/or equipment as it may deem advisable in order that the work may be completed at the specific date mentioned in the agreement, and all expenses incidental to the procuring said materials and/or equipment shall be paid for by the Contractor.

56.8 Materials shall be stored on the premises in such manner so as not to interfere with the work and so that no portion of the structure shall be overloaded

56.9 Materials or work required or necessary to be tested shall be tested under supervision of, as directed by, and at such places as may be convenient to the Architect. The required testing of all structural materials shall be done by an approved Testing Laboratory.

56.10 No materials furnished, installed or incorporated in the work shall contain asbestos. Asbestos and/or asbestos - containing products shall be defined as all items containing, but not limited to, chrysotile, amesite, anthophylite, tremolite, and actinolite. Any or all materials containing greater than one-tenth of one percent (.1%) asbestos shall be defined as asbestos - containing material. All work or materials installed with asbestos - containing equipment will be immediately rejected and this work will be removed at no additional cost to the District. If Contractor believes a specified material contains asbestos it shall be the responsibility of the Contractor to notify the District so that an appropriate substitute can be made in a timely manner so as not to delay the work. Upon completion of the work, Contractor shall submit a certificate stating that, to the best of his knowledge, no materials containing asbestos were used in the work, products, items, or equipment. Forms for this purpose are included within the Contract Documents.

56.11 If asbestos is found to exist in any of the materials, products, items or equipment provided as part of the work, the Contractor shall be financially responsible for all costs resulting from removal in accordance with a District approved method and replacement to an asbestos free condition. This financial responsibility of the Contractor shall not terminate with the end of the one year warranty period, but shall continue through the life of the facility.

56.12 Contractor shall insure that material safety data sheets are available in a readily accessible place at the work site, for any material requiring a material safety data sheet per the federal "hazard communication" standard, or employee's right-to-know law. The Contractor shall also insure proper labeling on any substance brought into the job site, and that any person working with the material, or within the general area of the material, is informed of the hazards of the substance and follows proper handling and protection procedures. Contractor shall comply with the provisions of California Health and Safety Code Section 25249, et seq., which requires the posting and giving of notice to persons who may be exposed to any chemical known to the State of California to cause cancer. The Contractor agrees to familiarize itself with the provisions of this section, to comply fully with its requirements.

ARTICLE 57. SUBSTITUTIONS

57.1 Whenever in specifications any materials, process, or article is indicated or specified by grade, patent, or proprietary name or by name of manufacturer, such specification shall be deemed to be used for the purpose of facilitating description of material, process, or article desired and shall be deemed to be followed by the words "or equal". Contractor may, under the provisions of Public Contract Code Section 3400, unless otherwise stated, offer any material, process, or article which shall be substantially equal or better in every respect to that article specified. Burden of proof as to equality of any material, process, or article shall rest with Contractor. Contractor shall submit request together with substantiating data for substitution of an item prior to the date established for the receipt of the bid. Actions taken, if any, concerning the request for substitution will be by written addendum issued by the District. In the absence of written addendum, the request for substitution shall be deemed denied for purposes of the District's evaluation of the bids.

57.2 Provision authorizing submissions of substitution data shall not in any way authorize an extension of time for performance of this contract.

57.3 In event Contractor furnishes material, process, or article more expensive than that specified, difference in cost of such material, process, or article so furnished shall be borne by Contractor.

ARTICLE 58. SUBCONTRACTING

58.1 District reserves the right to approve all subcontractors. Such approval shall be a consideration to the awarding of the contract and unless notification to the contrary is given to the Contractor prior to the signing of the Contract, the list of subcontractors submitted with the proposal will be deemed to be acceptable.

58.2 District's consent to or approval of any subcontractor under this Contract shall not in any way relieve Contractor of his obligations under this Contract and no such consent or approval shall be deemed to waive any provisions of this Contract.

58.3 Contractor agrees to bind every subcontractor by terms of the Contract as far as such terms are applicable to subcontractor's work. If Contractor shall subcontract any part of this Contract, Contractor shall be as fully responsible to District for acts and omissions of his subcontractor and of persons either directly or indirectly employed by subcontractor, as he is for acts and omissions of persons directly employed by himself. Nothing contained in Contract Documents shall create any contractual relation between any subcontractor and District.

58.4 In accordance with California Business and Professions Code Section 7059, if Contractor is designated as a "specialty contractor" (as defined in Section 7058 of the Business and Professions Code), all of the work to be performed outside of the Contractor's license specialty shall be performed by a licensed subcontractor in compliance with the "Subletting and Subcontracting Fair Practices Act", California Public Contract Code Section 4100, et seq.

58.5 Substitution or addition of subcontractors shall be permitted only as authorized in the "Subletting and Subcontracting Fair Practices Act", commencing at Section 4100 of the Public Contracts Code.

58.6 District and Architect will not undertake to settle any differences between the Contractor and his subcontractors or between subcontractors.

ARTICLE 59. WAGE RATES

59.1 Pursuant to the provisions of Article 2 (commencing at Section 1720), Chapter 1, Part 7, Division 2 of the Labor Code of California, the District has obtained from the Director of the Department of Industrial Relations the general prevailing rate of per diem wages and the prevailing rate for holiday and overtime work in the locality in which the work is to be performed for each craft, classification, or type of worker needed to execute the contract. Holidays shall be as defined in the collective bargaining agreement applicable to each particular craft, classification or type of worker employed under the contract.

59.2 Per diem wages shall be deemed to include employer payments for health and welfare, pensions, vacation, travel time and subsistence pay as provided in Section 1773.1 of the California Labor code, apprenticeship or other training programs authorized by Section 3093 of the California Labor Code, and similar purposes when the term "per diem wages" is used herein.

59.3 If during the period this bid is required to remain open, the Director of Industrial Relations determines that there has been a change in any prevailing rate of per diem wages in the locality in which the work under the contract is to be performed, he shall make the change available to the District, but the change shall not effect the Request for Bids or the contract subsequently awarded.

59.4 Holiday and overtime work, when permitted by law, shall be paid for at a rate of at least one and one-half times the above specified rate of per diem wages, unless otherwise specified.

59.5 There shall be paid each worker of the Contractor or any of his subcontractors engaged in work on the project not less than the wage rate listed herein, regardless of any contractual relationship which may be alleged to exist between the Contractor or any subcontractors and such workmen.

59.6 The Contractor shall as a penalty to the District, forfeit not more than Fifty Dollars ($50.00) for each calendar day, or portion thereof, for each worker paid less than the prevailing rates as determined by the director for such work or craft in which such worker is employed for any public work done under the contract by him or her or by any subcontractor under him or her.

59.7 The amount of the penalty shall be determined by the Labor Commissioner and shall be based on consideration of:

.1 Whether the Contractor or Subcontractor's failure to pay the correct rate of per diem wages was a good faith mistake and, if so, the error was promptly and voluntarily correct upon being brought to the attention of the Contractor or Subcontractor; and

.2 Whether the Contractor or Subcontractor has a prior record of failing to meet its prevailing wage obligations.

59.8 The amount of this forfeiture shall be determined by the Labor Commissioner and shall be based on consideration of the contractor's mistake, inadvertence, or neglect in failing to pay the correct rate of prevailing wages, or the previous record of the contractor in meeting his or her prevailing wage obligations, or a contractor's willful failure to pay the correct rates of prevailing wages. A mistake, inadvertence, or neglect in failing to pay the correct rate of prevailing wages is not excusable if the contractor had knowledge of his or her obligations under this part.

59.9 The difference between the prevailing wage rates and the amount paid to each worker for each calendar day, or portion thereof, for which each worker was paid less than the prevailing wage rate, shall be paid to each worker by the Contractor.

59.10 Contractor shall post at appropriate conspicuous points on the site of project, a schedule showing all determined minimum wage rates and all authorized deductions, if any, from unpaid wages actually earned.

ARTICLE 60. RECORD OF WAGES PAID: INSPECTION

60.1 Pursuant to Section 1776 of the Labor Code:

.1 Each Contractor and subcontractor shall keep an accurate payroll record, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by him or her in connection with the public work under this contract.

.2 The payroll records enumerated under subdivision .1 shall be certified and shall be available for inspection at all reasonable hours at the principal office of the Contractor and Subcontractor on the following basis:

a. A certified copy of an employee's payroll record shall be made available for inspection or furnished to such employee or his or her authorized representative on request.

b. A certified copy of all payroll records enumerated in subdivision .1 shall be made available for inspection or furnished upon request to a representative of the District, the Division of Labor Standards Enforcement and the Division of Apprenticeship Standards of the Department of Industrial Relations.

c. A certified copy of all payroll records enumerated in subdivision .1 shall be made available upon request by the public for inspection or copies thereof made; provided, however, that a request by the public shall be made through either the District, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement. If the requested payroll records have not been provided pursuant to paragraph (b), the requesting party shall, prior to being provided the records, reimburse the costs of preparation by the Contractor, subcontractors, and the entity through which the request was made. The public shall not be given access to such records at the principal office of the Contractor and Subcontractor.

.3 The certified payroll records shall be on forms provided by the Division of Labor Standards Enforcement or shall contain the same information as the forms provided by the division.

.4 Each Contractor and Subcontractor shall file a certified copy of the records enumerated in subdivision .1 with the entity that requested such records within ten (10) days after receipt of a written request.

.5 Any copy of records made available for inspection as copies and furnished upon request to the public or any public agency by the District, the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement shall be marked or obliterated in such a manner as to prevent disclosure of an individual's name, address and social security number. The name and address of the Contractor and Subcontractor awarded the contract or performing the contract shall not be marked or obliterated. Any copy of records made available for inspection by, or furnished to, a jonit labor-management committee established pursuant to the federal Labor Management Cooperation Act of 1978 (Section 175a of Title 29 of the United States Code) shall be marked or obliterated only to prevent disclosure of an individual's name and social security number.

.6 The Contractor and Subcontractor shall inform the District of the location of the records enumerated under subdivision .1, including the street address, city and county, and shall, within five (5) working days, provide a notice of a change of location and address.

.7 The Contractor and Subcontractor shall have ten (10) days in which to comply, subsequent to receipt of written notice specifying in what respects such Contractor and Subcontractor must comply with this section. In the event that the Contractor or Subcontractor fails to comply within the 10-day period, the Contractor or Subcontractor shall, as a penalty to the District, forfeit Twenty-Five Dollars ($25.00) for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement, such penalties shall be withheld from progress payments then due.

.8 The responsibility for compliance with this Article shall rest upon the Contractor. The Contractor is, however, not subject to a penalty due to the failure of a subcontractor to comply with this Article.

.9 The District may withhold or delay contract payments to the Contractor and/or any subcontractor if:

a. The required prevailing rate of per diem wages determined by the Director of the Department of Industrial Relations is not paid to all workers employed on the project; or

b. The Contractor or subcontractor(s) fail to submit all required certified payroll records with each application for payment, but not less than once per month; or

c. The Contractor or subcontractor(s) submit incomplete or inadequate payroll records; or

d. The Contractor or subcontractor(s) fail to comply with the Labor Code requirements concerning apprentices; or

e. The Contractor or subcontractor(s) fail to comply with the District's Labor Compliance Program; or

f. The Contractor or subcontractor(s) fail to comply with any applicable state laws governing labor on public works projects.

ARTICLE 61. HOURS OF WORK

61.1 As provided in Article 3 (commencing at Section 1810), Chapter 1, Part 7, Division 2 of the Labor Code, eight (8) hours of labor shall constitute a legal day's work. The time of service of any worker employed at any time by the Contractor or by any subcontractor on any subcontract under this contract, upon the work or upon any part of the work contemplated by this contract is limited and restricted to eight (8) hours during any one calendar day and forty (40) hours during any one calendar week, except as hereinafter provided.

61.2 Notwithstanding the provisions hereinabove set forth, work performed by employees of Contractors in excess of eight (8) hours per day, and forty (40) hours during any one week upon this public work shall be permitted compensation of all hours worked in excess of eight (8) hours per day at not less than one and one-half times the basic rate of pay.

61.3 The Contractor shall pay to the District a penalty of not more than Twenty-Five Dollars ($25.00) for each workman employed in the execution of this contract by the Contractor or by any subcontractor for each calendar day during which such workman is required or permitted to work more than eight (8) hours in any calendar day and forty (40) hours in any one calendar week in violation of the provisions of Article 3 (commencing at Section 1810), Chapter 1, Part 7, Division 2 of the Labor Code, unless compensation to the worker so employed by the Contractor is not less than one and one-half (1 1/2) times the basic rate of pay for all hours worked in excess of eight (8) hours per day.

61.4 Any work necessary to be performed after regular working hours, or on Sundays or other holidays shall be performed without additional expense to District.

61.5 Should the work of the Contractor require the presence of the District Inspector beyond regular working hours or on Sundays or other holidays the Contractor shall reimburse the District for the purpose of employing the District Inspector at his normal per hour rate for a minimum of two hours per occurrence. Reimbursement shall occur under provisions of Article 33.

61.6 Should the Contractor require access to existing projects or sites during hours when there is not a District custodian or maintenance technician available, the Contractor, upon prior approval from the District' shall reimburse the District, for the purpose of employing a District custodian or maintenance technician, at their normal per hour rate, for a minimum of two hours per occurrence. Reimbursement shall occur under provisions of Article 33.

ARTICLE 62. APPRENTICES

62.1 All apprentices employed by Contractor to perform services under the contract shall be paid the standard wage paid to apprentices under the regulations of the craft or trade at which he or she is employed, and shall be employed only at the work of the craft or trade to which he or she is registered. Only apprentices, as defined in Section 3077, who are in training under apprenticeship standards and written apprenticeship agreements under Chapter 4 (commencing with Section 3070), of Division 3 are eligible to be employed under this contract. The employment and training of each apprentice shall be in accordance with the apprenticeship standards and apprentice agreements under which he or she is training.

62.2 When the Contractor to whom the contract is awarded by the District or any subcontractor under him or her, in performing any of the work under the contract or subcontract, employs workers in any apprenticeable craft or trade, the Contractor and subcontractor shall apply to the joint apprenticeship committee, administering the apprenticeship standards of the craft or trade in the area of the site of the public work, for a certificate approving the contractor or subcontractor under the apprenticeship standards for the employment and training of apprentices in the area or industry affected. However, approval as established by the joint apprenticeship committee or committees shall be subject to the approval of the Administrator of Apprenticeship. The joint apprenticeship committee or committees, subsequent to approving the subject Contractor or subcontractor, shall arrange for the dispatch of apprentices to the Contractor or subcontractor in order to comply with this section. Every contractor and subcontractor shall submit contract award information to the applicable joint apprenticeship committee which shall include an estimate of journeyman hours to be performed under the contract, the number of apprentices to be employed, and the approximate dates the apprentices will be employed. There shall be an affirmative duty upon the joint apprenticeship committee or committees, administering the apprenticeship standards of the crafts or trade in the area of the site of the public work, to ensure equal employment and affirmative action and apprenticeship for women and minorities. Contractors or subcontractors shall not be required to submit individual applications for approval to local joint apprenticeship committees provided they are already covered by the local apprenticeship standards. The ratio of work performed by apprentices to journeymen, who shall be employed in the craft or trade on the public work, may be the ratio stipulated in the apprenticeship standards under which the joint apprenticeship committee operates, but, except as otherwise provided in this section, in no case shall the ratio be less than one hour of apprentices work for every five hours of labor performed by a journeyman. However, the minimum ratio for the land surveyor classification shall not be less than one apprentice for each five journeymen.

62.3 Any ratio shall apply during any day or portion of a day when any journeyman, or the higher standard stipulated by the joint apprenticeship committee, is employed at the job site and shall be computed on the basis of the hours worked during the day by journeymen so employed, except for the land surveyor classification. The contractor shall employ apprentices for the number of hours computed as above before the end of the contract. However, the contractor shall endeavor, to the greatest extent possible, to employ apprentices during the same time period that the journeymen in the same craft or trade are employed at the job site. Where an hourly apprenticeship ratio is not feasible for a particular craft or trade, the Division of Apprenticeship Standards, upon application of a joint apprenticeship committee, may order a minimum ratio of not less than one apprentice for each five journeymen in a craft or trade classification.

62.4 The Contractor or subcontractor, if he or she is covered by this section upon the issuance of the approval certificate, or if he or she has been previously approved in the craft or trade, shall employ the number of apprentices or the ratio of apprentices to journeymen stipulated in the apprenticeship standards. Upon proper showing by the Contractor that he or she employs apprentices in the craft or trade in the state on all of his contracts on an annual average of not less than one hour of apprentice work for every five hours of labor performed by a journeyman, or in the land surveyor classification, one apprentice for each five journeymen, the Division of Apprenticeship Standards may grant a certificate exempting the contractor from the 1-to-5 hourly ratio as set forth in this section. This section shall not apply to contracts of general contractors or to contracts of specialty contractors not bidding for work through a general or prime contractor, when the contracts of general contractors or those specialty contractors involve less than thirty thousand dollars ($30,000) or 20 working days. Any work performed by a journeyman in excess of eight hours per day or 40 hours per week, shall not be used to calculate the hourly ratio required by this section.

"Apprenticeable craft or trade", as used in this Article means a craft or trade determined as an apprenticeable occupation in accordance with rules and regulations prescribed by the Apprenticeship Council. The joint apprenticeship committee shall have the discretion to grant a certificate, which shall be subject to the approval of the Administrator of Apprenticeship, exempting a Contractor from the 1-to-5 ratio set forth in this article when it finds that any one of the following conditions is met:

.1 Unemployment for the previous three-month period in the area exceeds an average of 15 percent (15%), or

.2 The number of apprentices in training in such area exceeds a ratio of 1-to-5.

.3 There is a showing that the apprenticeable craft or trade is replacing at least one-thirtieth (1/30) of its journeymen annually through apprenticeship training, either on a statewide basis or on a local basis.

.4 Assignment of an apprentice to any work performed under a public works contract would create a condition which would jeopardize his or her life or the life, safety or property of fellow employees or the public at large, or if the specific task to which the apprentice is to be assigned is of such a nature that training cannot be provided by a journeymen.

62.5 When exemptions are granted to an organization which represents Contractors in a specific trade from the 1-to-5 ratio on a local or statewide basis, the member Contractors will not be required to submit individual applications for approval to local joint apprenticeship committees, if they are already covered by the local apprenticeship standards.

62.6 A Contractor to whom the contract is awarded or any subcontractor under him or her, who, in performing any of the work under the contract, employs journeymen or apprentices in any apprenticeable craft or trade and who is not contributing to a fund or funds to administer and conduct the apprenticeship program in any such craft or trade in the area of the site of public work, to which fund or funds other Contractors in the area of the site of the public work are contributing, shall contribute to the fund or funds in each craft or trade in which he or she employs journeymen or apprentices on the public works in the same amount or upon the same basis and in the same manner as the other Contractors do, but where the trust fund administrators are unable to accept the funds, Contractors not signatory to the trust agreement shall pay a like amount to the California Apprenticeship Council. The Contractor or subcontractor may add the amount of the contributions in computing his or her bid for the contract. The Division of Labor Standards Enforcement is authorized to enforce the payment of the contributions to the fund or funds as set forth in Labor Code Section 227.

62.7 Prior to commencing work on the project, the Contractor and subcontractors shall submit contract award information to an applicable apprenticeship program that can supply apprentices to the project and make the request for the dispatch of apprentices in accordance with the Labor Code. The information submitted shall include an estimate of journeyman hours to be performed under the Contract, the number of apprentices proposed to be employed, and the approximate dates the apprentices would be employed. A copy of this information shall also be submitted to the District if requested. Within 60 days after concluding work on the project, the Contractor and subcontractors shall submit to the District, if requested, and to the apprenticeship program a verified statement of the journeyman and apprentice hours performed on the project.

62.8 The responsibility of compliance with this article and Section 1777.5 for all apprenticeable occupations is with the prime Contractor.

62.9 All decisions of the joint apprenticeship committee under this article and Section 1777.5 are subject to Section 3081.

62.10 It shall be unlawful for an employer or a labor union to refuse to accept otherwise qualified employees as registered apprentices on any public works on the grounds of race, religious creed, color, national origin, ancestry, sex or age, except as provided in Section 3077.

62.11 Pursuant to Section 1777.7, in the event a Contractor or subcontractor willfully fails to comply with the provisions of this article and Section 1777.5 of the Labor Code:

.1 The Director of Industrial Relations shall deny to the contractor or subcontractor, both individually and in the name of the business entity under which the contractor or subcontractor is doing business, the right to bid on, or to receive, any public works contract for a period of up to one year for the first violation and for a period of up to three years for the second and subsequent violations. Each period of debarment shall run from the date the determination of noncompliance by the Administrator of Apprenticeship becomes an order of the California Apprenticeship Council.

.2 A contractor or subcontractor who violates Section 1777.5 shall forfeit as a civil penalty the sum of one hundred dollars ($100) for each calendar day of noncompliance. Notwithstanding Section 1727, upon receipt of a determination that a civil penalty has been imposed, the awarding body shall withhold the amount of the civil penalty from contract progress payments then due or to become due.

.3 In lieu of the penalty provided for in subdivision (a) or (b), the director may for a first time violation and with the concurrence of the joint apprenticeship committee, order the contractor or subcontractor to provide apprentice employment equivalent to the work hours that would have been provided for apprentices during the period of noncompliance.

.4 Any funds withheld by the awarding body pursuant to this section shall be deposited in the General Fund if the awarding body is a state entity, or in the equivalent fund of an awarding body if the awarding body is an entity other than the state.

.5 The interpretation and enforcement of Section 1777.5 and this section shall be in accordance with the rules and procedures of the California Apprenticeship Council.

ARTICLE 63. ASSIGNMENT OF ANTI-TRUST CLAIMS

63.1 Pursuant to Section 4551 of the Government Code, in entering into a public works contract or a subcontract to supply goods, services or materials pursuant to a public works contract, the Contractor or subcontractor offers and agrees to assign to the District all rights, title and interest in and to all causes of action it may have under Section 4 of the Clayton Act, (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2(commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, services or materials pursuant to the public works contract or the subcontract. This assignment shall be made and become effective at the time the awarding body tenders final payment to the Contractor, without further acknowledgment by the parties. If the District receives, either through judgement or settlement, a monetary recovery for cause of action assigned under Chapter 11 (commencing with Section 4550) of Division 5 of Title 1 of the Government Code, the assignor shall be entitled to receive reimbursement for actual legal costs incurred and may, upon demand, recover from the District any portion of the recovery, including treble damages, attributable to overcharges that were paid by the assignor, but were not paid by the District as part of the bid price, less the expenses incurred in obtaining that portion of the recovery.

63.2 Upon demand in writing by the assignor, the District shall, within one year from such demand, reassign the cause of action assigned pursuant to this article if the assignor has been or may have been injured by the violation of law for which the cause of action arose, and (a) the District has not been injured thereby, or (b) the District declines to file a court action for the cause of action.

ARTICLE 64. WORKER'S COMPENSATION INSURANCE

64.1 The Contractor shall provide, during the life of this contract, worker's compensation insurance for all of his employees engaged in work under this contract, on or at the site of the project, and, in case any of his work is sublet, the Contractor shall require the subcontractor similarly to provide worker's compensation insurance for all the latter's employee. Any class of employee or employees not covered by a subcontractor's insurance shall be covered by the Contractor's insurance. In case any class of employees engaged in work under this contract, on or at the site of the project, is not protected under the Worker's Compensation Statute, the Contractor shall provide or shall cause a subcontractor to provide, adequate insurance coverage for the protection of such employees not otherwise protected. The Contractor shall file with the District certificates of his insurance protecting workers. Contractor is required to secure payment of compensation to his employees in accordance with the provisions of Section 3700 of the Labor Code.

ARTICLE 65. STATE AUDIT

65.1 Pursuant to and in accordance with the provisions of Government Code Section 10532, or any amendments thereto, all books, records and files of the District, the Contractor, or any subcontractor connected with the performance of this Contract involving the expenditure of state funds in excess of Ten Thousand Dollars, ($10,000.00), including, but not limited to, the administration thereof, shall be subject to the examination and audit of the Office of the Auditor General of the State of California for a period of three (3) years after final payment is made under this Contract. Contractor shall preserve and cause to be preserved such books, records, and files for the audit period.

ARTICLE 66. PROVISIONS REQUIRED BY LAW DEEMED INSERTED

66.1 Each and every provision of law and clause required by law to be inserted in this contract shall be deemed to be inserted herein and the contract shall be read and enforced as though it were included herein, and if through mistake or otherwise any such provision is not inserted, or is not correctly inserted, then upon application of either party the contract shall forthwith be physically amended to make such insertion or correction.

ARTICLE 67. MEDIATION AND ARBITRATION OF CLAIMS

67.1 Submission of a claim, properly certified, with all required supporting documentation, and written rejection or denial of all or part of the claim by the District, is a condition precedent to any action, proceeding, litigation, suit or demand for mediation or arbitration under these General Conditions.

67.2 Pursuant to Public Contract Code Section 20104(c), the current provisions of Article 1.5 of Chapter 1 of Part 3 of the Public Contract Code (commencing with Section 20104) concerning the mediation and arbitration of public works claims are incorporated herein and a copy of these provisions are added to these General Conditions as follows.

Section 20104. Application of Article; Provision Included in Plans and Specifications.

(a) (1) This article applies to all public works claims of three hundred seventy-five thousand dollars ($375,000.00) or less which arise between a contractor and a local agency.

(2) This article shall not apply to any claims resulting from a contract between a contractor and a public agency when the public agency has elected to resolve any disputes pursuant to Article 7.1 (commencing with Section 10240) of Chapter 1 of Part 2.

(b) (1) "Public work" has the same meaning as in Sections 3100 and 3106 of the Civil Code, except that "public work" does not include any work or improvement contracted for by the state or the Regents of the University of California.

(2) "Claim" means a separate demand by the contractor for (A) a time extension, (B) payment of money or damages arising from work done by or on behalf of the contractor pursuant to the contract for a public work and payment of which is not otherwise expressly provided for or the claimant is not otherwise entitled to, or (C) an amount the payment of which is disputed by the local agency.

(c) The provisions of this article or a summary thereof shall be set forth in the plans or specifications for any work which may give rise to a claim under this article.

(d) This article applies only to contracts entered into on or after January 1, 1991.

Section 20104.2. Claims; Requirements; Tort Claims Excluded.

For any claim subject to this article, the following requirements apply:

(a) The claim shall be in writing and include the documents necessary to substantiate the claim. Claims must be filed on or before the date of final payment. Nothing in this subdivision is intended to extend the time limit or supersede notice requirements otherwise provided by contract for the filing of claims.

(b) (1) For claims of less than fifty thousand dollars ($50,000.00), the local agency shall respond in writing to any written claim within 45 days of receipt of the claim, or may request, in writing, within 30 days of receipt of the claim, any additional documentation supporting the claim or relating to defenses to the claim the local agency may have against the claimant.

(2) If additional information is thereafter required, it shall be requested and provided pursuant to this subdivision, upon mutual agreement of the local agency and the claimant.

(3) The local agency's written response to the claim, as further documented, shall be submitted to the claimant within 15 days after receipt of the further documentation or within a period of time no greater than that taken by the claimant in producing the additional information, whichever is greater.

(c) (1) For claims of over fifty thousand dollars ($50,000.00) and less than or equal to three hundred seventy-five thousand dollars ($375,000.00), the local agency shall respond in writing to all written claims within 60 days of receipt of the claim, or may request, in writing, within 30 days of receipt of the claim, any additional documentation supporting the claim or relating to defenses to the claim the local agency may have against the claimant.

(2) If additional information is thereafter required, it shall be requested and provided pursuant to this subdivision, upon mutual agreement of the local agency and the claimant.

(3) The local agency's written response to the claim, as further documented, shall be submitted to the claimant within 30 days after receipt of the further documentation, or within a period of time no greater than that taken by the claimant in producing the additional information or requested documentation, whichever is greater.

(d) If the claimant disputes the local agency's written response or the local agency fails to respond within the time prescribed, the claimant may so notify the local agency, in writing, either within 15 days of receipt of the local agency's response or within 15 days of the local agency's failure to respond within the time prescribed, respectively, and demand an informal conference to meet and confer for settlement of the issues in dispute. Upon a demand, the local agency shall schedule a meet and confer conference within 30 days for settlement of the dispute.

(e) Following the meet and confer conference, if the claim or any portion remains in dispute, the claimant may file a claim as provided in Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the Government Code. For purposes of those provisions, the running of the period of time within which a claim must be filed shall be tolled from the time the claimant submits his or her claim pursuant to subdivision (a) until the time that claim is denied, as a result of the meet and confer process including any period of time utilized by the meet and confer process.

(f) This article does not apply to tort claims and nothing in this article is intended nor shall be construed to change the time periods for filing tort claims or actions specified by Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the Government Code.

Section 20104.4. Civil Actions; mediation and arbitration; trial de Novo; witnesses.

The following procedures are established for all civil actions filed to resolve claims subject to this article.

(a) Within 60 days, but no earlier than 30 days, following the filing or responsive pleadings, the court shall submit the matter to nonbinding mediation unless waived by mutual stipulation of both parties. The mediation process shall provide for the selection within 15 days by both parties of a disinterested third person as mediator, shall be commenced within 30 days of the submittal, and shall be concluded within 15 days from the commencement of the mediation unless a time requirement is extended upon a good cause showing to the court or by stipulation of both parties. If the parties fail to select a mediator within the 15-day period, any party may petition the court to appoint the mediator.

(b) (1) If the matter remains in dispute, the case shall be submitted to judicial arbitration pursuant to Chapter 2.5 (commencing with Section 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, notwithstanding Section 1141.11 of that code. The Civil Discovery Act of 1986 (Article 3 (commencing with Section 2016) of Chapter 3 of Title 3 of Part 4 of the Code of Civil Procedure) shall apply to any proceeding brought under this subdivision consistent with the rules pertaining to judicial arbitration.

(2) Not withstanding any other provision of law, upon stipulation of the parties, arbitrators appointed for purposes of this article shall be experienced in construction law, and, upon stipulation of the parties, mediators and arbitrators shall be paid necessary and reasonable hourly rates of pay not to exceed their customary rate, and such fees and expenses shall be paid equally by the parties, except in the case of arbitration where the arbitrator, for good cause, determines a different division. In no event shall these fees or expenses be paid by state or county funds.

(3) In addition to Chapter 2.5 (commencing with Section 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, any party who after receiving an arbitration award requests a trial de novo but does not obtain a more favorable judgment shall, in addition to payment of costs and fees under that chapter, pay the attorney's fees on of the other party arising out of a trial de novo.

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

Section 20104.6 Payment on undisputed portion of claim; interest on arbitration awards or judgments.

(a) No local agency shall fail to pay money as to any portion of a claim which is undisputed except as otherwise provided in the contract.

(b) In any suit filed under Section 20104.4, the local agency shall pay interest at the legal rate on any arbitration award or judgment. The interest shall begin to accrue on the date the suit is filed in a court of law.

ARTICLE 68. NON-DISCRIMINATION

68.1 In the performance of this Contract, Contractor agrees that it will not engage in nor permit such subcontractors as it may employ to engage in the unlawful discrimination against any employee or applicant for employment because of race, religion, color, national origin, ancestry, physical handicap, medical condition, marital status, age (over 40) or sex. Contractor and subcontractors shall comply with the provisions of the Fair Employment and Housing Act as set forth in Government Code Section 12900 et seq. and all applicable regulations promulgated thereunder, including all amendments thereto.

68.2 The Contractor hereby assures that it will comply with the Americans with Disabilities Act of 1990, 42 USC Sections 12101 et seq., to ensure that disabled individuals shall be reasonably accommodated in accordance with the Act, and the Contractor shall not exclude from participation in, or deny the benefit of, or otherwise subject a disabled individual to discrimination under this Contract or under any project, program, or activity supported by this Contract.

ARTICLE 69. ATTORNEY'S FEES

69.1 If either party to the contract commences an action against the other to enforce any of the terms of the Contract Documents or because of a breach by either party of any of the terms hereof, the prevailing party (as determined by the court, mediator, or arbitrator) shall be entitled to recover from the other party its reasonable attorney's fees, costs and expenses incurred in connection with the prosecution or defense of such action. The term "attorney's fees and costs" shall mean the fees and expenses of counsel to the parties hereto, which shall include printing, photostating, duplicating and other expenses, air freight charges and fees billed for law clerks, paralegals and other persons not admitted to the bar but performing services under the supervision of an attorney.

END OF DOCUMENT

SECTION 01458

TESTING LABORATORY SERVICES

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Selection and payment.

B. Contractor submittals.

C. Laboratory responsibilities.

D. Laboratory reports.

E. Limits on testing laboratory authority.

F. Contractor responsibilities.

G. Schedule of inspections and tests.

H. Test and inspection form.

1.2 REFERENCES

A. ASTM C140 - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.

B. ASTM D3740 - Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

C. ASTM E329 - Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction.

D. CBC - California Building Code, Title 24, Part 2 of the California Code of Regulations (CCR).

E. DSA - Division of the State Architect, Office of Regulation Services, Structural Safety Section.

F. IR - Interpretation of Regulation Documents, Division of the State Architect.

1.3 SELECTION AND PAYMENT

A. Owner will employ and pay for services of an independent testing laboratory to perform specified inspection and testing as specified by Owner's testing laboratory.

B. Owner will pay cost of testing and inspection except the following for which the Contractor shall reimburse the Owner through deductive change order:

1. Any retesting and sampling required due to failure of original test.

2. Any testing and inspection required to be performed that requires testing laboratory or agency to perform services outside the state of California.

3. Concrete design mix.

4. Additional testing expenses caused by failure of the Contractor to adhere to construction schedule or caused by failure of the Contractor to give proper advanced notice or caused by Contractor delay.

C. Contractor shall employ and pay for services required to perform specified inspection and testing specified as Contractor responsibility.

D. Employment of testing laboratory shall in no way relieve Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.4 QUALITY ASSURANCE

A. Comply with requirements of ASTM E329 and ASTM D3740, TITLE 24, PART 1, SECTIONS 4-335(b), 4-335(g), and 4-335(h)

B. Laboratory Staff: Maintain a full time registered engineer on staff to review services.

C. Testing Equipment: Capable of performing tests required calibrated at reasonable intervals with devices acceptable to the National Bureau of Standards.

D. All testing agency management, laboratory, and field supervisory personnel shall have at least five years experience in the inspection and testing of work and materials of construction.

E. Testing laboratory shall maintain a current letter of acceptance issued by the Division of the State Architect (DSA) demonstrating that it has met the criteria established by the Division of the State Architect for performance of inspection work and testing of materials. Laboratory to furnish copy of acceptance letter upon request. FACILITY SHALL BE ACCEPTABLE TO THE ARCHITECT & DSA.

1.5 OWNER'S TESTING LABORATORY RESPONSIBILITIES

A. Test samples of mixes submitted by Inspector.

B. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.

C. Perform specified inspection, sampling, and testing of products in accordance with specified standards.

D. Ascertain compliance of materials and mixes with requirements of Contract Documents.

E. Promptly notify Architect and Contractor of observed irregularities or non-conformance of Work or products.

F. Perform additional inspections and tests required by Architect.

G. Attend preconstruction conferences and progress meetings when requested by Architect.

1.6 LABORATORY REPORTS

A. After each inspection and test, promptly submit within no more than 14 days of the date of the inspection or test one copy of laboratory report to Architect, Engineer, Owner's Resident Inspector, Division of the State Architect and to Contractor. Reports of test results of materials and inspections found not to be in compliance with the requirements of the Contract Documents shall be forwarded immediately to the Architect, Engineer, Owner's Resident Inspector, Division of the State Architect and the Contractor.

B. Include:

1. Date issued.

2. Project title and number.

3. Name of inspector.

4. Date and time of sampling or inspection.

5. Identification of product and Specifications section.

6. Location in the Project.

7. Type of inspection or test.

8. Date of test.

9. Ambient conditions at time of test or sample-taking.

10. Results of tests and interpretation of test results.

11. Professional opinion as to whether tested work is in conformance with Contract Documents.

12. Recommendations on retesting.

C. Verification of Test Reports: Each testing agency shall submit to the Architect and the Division of the State Architect a verified report in duplicate covering all of the tests which were required to be made by that agency during the progress of the project. Such report shall be furnished each time that work on the project is suspended, covering the tests up to that time and at the completion of the project, covering all tests.

TEST REPORTS SHALL BE SIGNED BY A CALIFORNIA LICENSED CIVIL ENGINEER. VERIFIED REPORT SHALL LIST ALL NON COMPLIANT WORK.

1.7 LIMITS ON TESTING LABORATORY AUTHORITY

A. Laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.

B. Laboratory may not approve or accept any portion of the Work.

C. Laboratory may not assume any duties of Contractor.

D. Laboratory has no authority to stop the Work.

1.8 CONTRACTOR RESPONSIBILITIES

A. Submit proposed mix designs to Architect for review in accordance with Section 03300.

B. Cooperate with laboratory personnel, and provide access to the Work and to manufacturer's facilities.

C. Notify Architect, Owner's Resident Inspector and testing laboratory 48 hours prior to expected time for operations requiring inspection and testing services.

1. When tests or inspections cannot be performed after such notice, reimburse Owner for laboratory personnel and travel expenses incurred due to the Contractor's negligence.

2. The Contractor shall notify the Owner's representative a sufficient time in advance of the manufacture of material to be supplied by him under the Contract Documents, which must by terms of the Contract be tested, in order that the Owner may arrange for the testing of same at the source of supply.

3. Any material shipped by the Contractor from the source of supply prior to having satisfactorily passed such testing and inspection or prior to the receipt of notice from said representative that such testing and inspection will not be required shall not be incorporated in the job.

D. Employ and pay for services of Owner's testing laboratory to perform additional inspections, sampling and testing required when initial tests indicate work does not comply with contract documents.

1.9 SCHEDULE OF INSPECTIONS AND TESTS BY OWNER'S TESTING LABORATORY

A. Perform tests and inspections for the following in conformance with the (CBC) California Building Code (International Building Code with State of California Amendments), Title 24, Part 2, of the California Code of Regulations (CCR).

1. Structural Tests and Special Inspections

(a) General - 1701A

(b) Approvals - 1703A

(c) Special Inspections - 1704A

~~(1) Structural Steel - 1705A.2 and Table 1705A.2.1.~~

(1) STRUCTURAL STEEL - 1704.A.3 AND TABLE 1704A.3

(2) Welding - 1704A.3.1

(3) Concrete - 1704A.4 and Table 1704A.4

~~(4) Glass Unit Masonry - 1705A.4.1~~

~~(5) Masonry Veneer - 1705A.4.1~~

(6) Wood - 1704A.6

(7) Soils - 1704A.7 and Table 1704A.7

~~(8) Pile Foundation - 1705A.7 and Table 1705A.7~~

~~(9) Pier Foundation - 1705A.8 and Table 1705A.8~~

~~(10) Sprayed Fire-Resistant Materials - 1705A.13~~

~~(11) Mastic and Intumescent Fire-Resistant Coatings - 1705A.14~~

~~(12) Exterior Insulation and Finish Systems - 1705A.15~~

~~(13) Water-Resistive Barrier - 1704A.14.1~~

~~(14) Shotcrete - 1705A.18, 1910A.5, 1910A.10~~

~~(15) Reinforced Gypsum Concrete - 1911A.5, 1913~~A.6

~~(16) Composition Construction Cores - 1913A.4~~

~~(17) Prestressed Concrete - 1705A.3.4~~

(d) Special Inspections for Seismic Resistance - Section 1707A

(1) Structural Steel - Continuous Inspection, Welding - 1707A.2

(2) Structural Wood - Continuous and Periodic Inspection - 1707A.3

(3) Cold-Formed Steel Framing - Periodic Inspection- 1707A.4

~~(4) Storage Racks and Access Floors - Periodic Inspection - 1705A.11.7~~

(5) Architectural Components - Periodic Inspection - 1707A.6

(6) Mechanical and Electrical Components - Periodic Inspection - 1707A.7

~~(7) Designated Seismic Systems - Verification - 1707A.8~~

~~(8) Seismic Isolation Systems - Continuous Inspection - 1705A.11.8~~

2. Foundations (Chapter 18A)

(a) Earth fill compaction - 1803A.5.8

~~(b) Observation of Driven Pile Installation - 1705A.8.1~~

~~(c) Observation of Caissons - Table 1705A.8~~

3. Concrete (Chapter 19A)

(a) Concrete Inspection

(1) Portland Cement Tests - 1916A.1

~~(2) Gunite/Shotcrete - 1910A.5. 1910A.10~~

(3) Reinforcing Bars - TABLE 1704A.3, 1916A.2

~~(4) Waiver of Reinforcing Bar Tests - 1913A.2~~

~~(5) Prestressing Steel & Anchorage - 1913A.3~~

(6) Batch Plant Inspection - 1704A.4.2

(7) Waiver of Batch Plant Inspection - 1704A.4.3

(8) Frequency of Tests for Concrete - 1916A.7.3

(b) Concrete Quality

(1) Proportions of Concrete - 1903A, 1904A, 1905A

(c) Job Site Inspection

(1) Site Placement Inspection - 1704A.4.5

(d) Anchors in Concrete

(1) Drilled-In-Expansion Bolts or Epoxy-Type Anchors in Concrete - 1916A.7

~~4. Masonry (Chapter 21A)~~

~~(a) Materials~~

~~(1) Masonry Units - 2103A.1, 2, 4, 5, 6, 7~~

~~(2) Mortar - 2103A.9~~

~~(3) Grout - 2103A.13~~

~~(4) Grout Aggregates - 2102A.13.3~~

~~(5) Reinforcing Bars - 2102A.14~~

~~(6) Additives and Admixtures - 2103A.15~~

~~(b) Masonry Quality~~

~~(1) Concrete Masonry Unit - 2105A.2.2.1.2~~

~~(2) Clay Masonry 2015.A.2. 2.1.1~~

~~(3) Masonry Prism Tests - 2105A.3, 2105A.2.2.2~~

~~(4) Masonry Core Tests - 2105A.5~~

~~(5) Mortar and Grout - 2105A.2.2.1.4~~

(6) ~~Mandatory Tests - DSA IR 21-4~~

~~a) Measurements - ASTM C140, Section 5~~

~~b) Compressive Strength - ASTM C140, Section 6~~

~~c) Absorption - ASTM C140, Section 8~~

~~d) Reporting - ASTM C140, Section 10~~

5. Structural Steel (Chapter 22A)

(a) Materials

(1) Material Identification - 2203A

(2) Inspection and Tests of Structural Steel - 1704A.3

~~(3) Tests of H.S. Bolts, Nuts, Washers - 2212A.1~~

~~(4) Tests of End Welded Studs - 2212A.1~~

~~(5) Steel Joist Tests - 1704A.3.2.1~~

(6) Shop Fabrication Inspection - 1704A.2

~~(7) High Strength Bolt Inspection - 1704A.3.3 & TABLE 1704A.3~~

(8) Welding Inspection - 1704A.3.1

~~(9) Nelson Stud Welding - 2213A.2~~

(10) Non-Destructive Weld Testing - DSA IR 17-2

6. Wood (Chapter 23)

(a) Materials

(1) Lumber and Plywood Grading - 2303

~~(2) Pre-Fabricated Wood I-Joists - 2303.1.2~~

~~(3) Glued-Laminated Members - 2303.1.3~~

(4) Wood Structural Panels - 2303.1.4

(5) Fiberboard - 2303.1.5

(6) Hardboard - 2303.1.6

(7) Particleboard - 2303.1.7

(8) Floor Underlayment - 2303.1.7.1

(9) Preservative Treatment - 2303.1.8

~~(10) Structural Composite Lumber - 2303.1.9~~

~~(11) Fire-Retardant Treated Wood - 2303.2~~

~~(b) Wood Inspection~~

~~(1) Timber Connectors - 1704A.6.4~~

~~(2) Plate Connected Wood Trusses - 1704A.6.2~~

~~(3) Glu-Laminated Fabrication - 1704A.6.3.1~~

~~7.~~ Veneer (Chapter 14)

~~(a)~~ Materials

~~(1) Masonry Units - 1404.4, 2103A~~

~~(2) Precast Concrete Units - 1404.6~~

~~(3) Mortar and Grout 2103A, 2103A.13~~

~~(4) Bond and Shear Tests - 1410.2.1~~

~~(b)~~ Inspection of Veneer

~~(1)~~ Veneer Inspection - 1704A.4.1

~~8. Roof Covering (Chapter~~ 15)

~~(a) Installation~~

~~(1) Roof Tile - 1507.3.10, 1512~~

~~(b) Inspection~~

~~(1) Roof Tile - 1711A.2.1~~

9. Aluminum (Chapter 20)

(a) Materials

(1) General - 2002.1

(b) Inspection

(1) Testing and Inspection - 2003.1

10. Remotely Fabricated Construction Elements

(a) Testing and Inspection - DSA IR A-15

B. Perform tests and inspections for the following in conformance with the California Building Code (CBC), Title 24, Part 2 of the California Code of Regulations (CCR).

1. Foundations - Chapter 18A:

(a) Earth Fill Compaction 1803A.5.8, ASTM D1556, ASTM D 1557

2. Concrete - Chapter 19:

(a) Tests - 1903.1

3. Concrete Quality - Chapter 19A:

(a) Proportions of Concrete - 1905A.2

NOTE: Strength tests are not required for equipment pads, pipe and conduit cover and minor non-structural concrete.

~~4. Unit Masonry - Chapter 21:~~

~~(a) Material Test - 2105.1~~

5. Steel - Chapter 22:

(a) Structural Steel - 2203A.1

(b) Welding - 2204A.1

(c) Bolts - 2204 A.2

(d) Special Inspection - 1704~~A~~ As indicated on the drawings.

C. Perform additional test required by individual Specification Sections.

1.10 SCHEDULE OF INSPECTIONS AND TESTS BY CONTRACTOR

A. Contractor Responsibility:

1. Statement of Responsibility 1704A Refer to listed special inspections under Article 1.9.

B. Planting and Irrigation:

1. Testing as specified in Division 2 including, but not limited to; soils analysis and irrigation pressure testing.

C. Plumbing:

1. Testing as specified in Division 15 including, but not limited to: Sterilization, soil waste and vent, water piping, source of water, gas piping, downspouts and storm drains.

D. Automatic Fire Sprinklers:

1. Testing as specified in Division 15 shall include, but not be limited to: hydrostatic pressure.

E. Heating, Ventilating and Air Conditioning:

1. Testing as specified in Division 15 shall include, but not be limited to: Ductwork tests, cooling tower tests, boiler tests, controls testing, piping tests, water and air systems, and test and balance of heating and air conditioning systems.

F. Electrical

1. Testing as specified in Division 16 including, but not limited to: Equipment testing, all electrical system operations, grounding system and checking insulation after cable is pulled.

1.11 INSPECTION BY THE OWNER

A. An Inspector employed by the Owner in accordance with the requirements of the California Code of Regulations Title 24, Part 1 will be assigned to the work. His duties are specifically defined in Section 4-342 of Title 24, Part 1.

B. The Owner and his representatives shall at all times have access for the purpose of inspection to all parts of the work and to the shops wherein the work is in preparation, and the Contractor shall at all times maintain proper facilities and provide safe access for such inspection.

C. The work of construction in all stages of progress shall be subject to the personal continuous observation of the Inspector. He shall have free access to any or all parts of the work at any time. The Contractor shall furnish the Inspector reasonable facilities for obtaining such information as may be necessary to keep him fully informed respecting the progress and manner of the work and the character of the materials. Inspection of the work shall not relieve the Contractor from any obligation to fulfill this Contract. The presence of an Inspector shall in no way change, mitigate or alleviate the responsibility of the Contractor.

D. The Inspector is not authorized to change, revoke, alter, enlarge or decrease in any way any requirement of the Contract Documents, drawings, specifications or subsequent change orders.

E. Whenever there is insufficient evidence of compliance with any of the provisions of Title 24, Part 2 of the California Code of Regulations or evidence that any material or construction does not conform to the requirements of Title 24, Part 2 of the California Code of Regulations, the Division of the State Architect may require tests as proof of compliance. Test methods shall be as specified herein or by other recognized and accepted test methods determined by the Division of the State Architect. All tests shall be performed by a testing laboratory accepted by the Division of the State Architect.

2. PART 2 PRODUCTS

Not Used

3. PART 3 EXECUTION

3.1 STRUCTURAL TEST AND INSPECTION FORM

A. Form DSA 103 attached.

END OF SECTION

DSA DIVISION OF THE STATE ARCHITECT
DEPARTMENT OF GENERAL SERVICES

DSA-103 rev 1/12

Statement of Structural Tests and Special Inspections

2010 CBC

INCREMENT #

DSA File No.: 19-01

Application No.: 03-115541

Date Submitted: 2/20/2015

Revised:

Revised:

School Name	EL CAMINO COLLEGE COMPTON CENTER	District	COMPTON COMMUNITY COLLEGE DISTRICT

IMPORTANT: This form is only a summary list of structural tests and special inspections required for the project. The actual tests and inspections must be performed as detailed on the DSA approved documents. The project inspector is responsible for providing inspection of all facets of construction, including but not limited to, special inspections not listed on this form such as structural wood framing, high-load wood diaphragms, cold-formed steel framing, anchorage of non-structural components, etc., per Title 24, Part 2, Chapter 17A. **NOTE**: This form is also available for projects submitted for review under the 2007 CBC.

INSTRUCTIONS: Click a plus sign (+) before any category or subcategory to reveal additional tests and special inspections. An "X" before a listed test or inspection indicates it is a mandatory requirement. A shaded box indicates a test or special inspection that may be required, depending on the scope of the construction and other issues. A shaded box can be clicked indicating your selection of that test. **Note:** A minus (-) on a category or subcategory heading indicates that it can be collapsed. However, any selections you may have made will be cleared. Click on the "COMPILE" button to show only the tests finally selected. **For more information on use of this form, see DSA-103.INSTR.**

Note: All references to the California Building Code (CBC) are to the 2010 edition.

REQUIRED	TEST OR SPECIAL INSPECTION	TYPE [1]	PERFORMED BY [2]	CODE REFERENCE AND NOTES
-	**SOILS**			
	1. GENERAL:	**Table 1704A.7**		
X	a. Verify that: • site has been prepared properly prior to placement of controlled fill and/or excavations for foundations, • foundation excavations are extended to proper depth and have reached proper material, and • materials below footings are adequate to achieve the design bearing capacity.	**Periodic**	**GE***	* By geotechnical engineer or his or her qualified representative.
-	**2. COMPACTED FILLS:**	**Table 1704A.7**		
X	a. Perform qualification testing of fill materials.	**Test**	**Lab***	* Under the supervision of the geotechnical engineer.
X	b. Verify use of proper materials and inspect lift thicknesses, placement, and compaction during placement of fill.	**Continuous**	**GE***	* By geotechnical engineer or his or her qualified representative.
X	c. Test compaction of fill.	**Test**	**Lab***	* Under the supervision of the geotechnical engineer.
-	**5. RETAINING WALLS:**			
X	a. Placement of soil reinforcement, drainage devices, and backfill.	**Continuous**	**GE***	* Placement, compaction and inspection of backfill per Section 1704A.7.1 for fills supporting foundations (see Section 2 above).
X	c. Concrete retaining walls.	Provide tests and inspections per CONCRETE section below.		
-	**CONCRETE**	**Table 1704A.4**		
-	**7. CAST IN PLACE CONCRETE**			
	Material Verification and Testing:			
X	a. Verify use of required design mix.	**Periodic**	**SI & PI***	* To be performed by batch-plant special inspector and project inspector.
X	b. Test reinforcing steel.	**Test**	**Lab**	**1916A.2** (1916.1.6[+]). ASTM A370. See IR 17-10

+ In the CODE REFERENCE AND NOTES column indicates DSA-SS/CC sections that can be used by community colleges, per 2010 CBC Sec. 1.9.2.2.

DSA DIVISION OF THE STATE ARCHITECT
DEPARTMENT OF GENERAL SERVICES

DSA-103 rev 1/12

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2010 CBC

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DSA File No.: 14-C1

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Date Submitted: 2/20/2015

Revised:

Revised:

X	c. Perform slump, temperature, and (where required) air content tests.	Test	Lab	ASTM C172, ASTM C31.
X	d. Test concrete (compression).	Test	Lab	**1905A.6** (1905.6+). ASTM C39.
	Inspection:			
X	e. Inspect batching of concrete.	Continuous	SI	**1704A.4.2**; (see 1704A.4.3 , option 2 for waiver based on design parameters).
X	f. Inspect placement of formwork, reinforcing steel, embedded items and concrete. Inspect curing and form removal.	Continuous	PI*	* May be performed by a special inspector when specifically approved by DSA.
-	**11. POST-INSTALLED ANCHORS:**			
X	a. Inspect installation of post-installed anchors	Continuous	PI	**Table 1704A.4**
X	b. Test post-installed anchors.	Test	Lab	**1916A.7** (1916.1.11+).
+	**MASONRY**	**Table 1704A.5.3**		
-	**STEEL**	**Table 1704A.3**		
-	**17. STRUCTURAL STEEL AND COLD-FORMED STEEL USED FOR STRUCTURAL PURPOSES**			
	Material Verification:			
X	a. Verify that all materials are appropriately marked and that: • Mill certificates indicate material properties that comply with requirements, • Material sizes, types and grades comply with requirements.	Periodic	*	* By special inspector when performed off-site; by project inspector for steel shipped directly to project site without welding or fabrication.
X	b. Test unidentified materials	Test	Lab	**2203A.1** (2203.1+). ASTM A370.
X	c. Examine seam welds of structural tubes and pipes	Periodic	SI*	* See DSA IR 17-3.
	Inspection:			
X	d. Verify member locations, bracing and all details constructed in the field.	Continuous	PI	
X	e. Verify stiffener locations, connection tab locations and all construction details fabricated in the shop.	Periodic	SI	
-	**19. WELDING:**			DSA IR 17-3, AWS D1.1 and AWS D1.8 (AWS D1.3 for cold formed steel).
	Verification of Materials, Equipment, Welders, etc:			
X	a. Verify weld filler material identification markings per AWS designation listed on the DSA approved documents and the WPS.	Periodic	SI	
X	b. Verify weld filler material manufacturer's certificate of compliance.	Periodic	SI	
X	c. Verify WPS, welder qualifications and equipment.	Periodic	SI	See DSA IR 17-3.
-	**19.1 SHOP WELDING:**			
X	a. Inspect groove, multi-pass, and fillet welds > 5/16"	Continuous	SI	Per AISC 360 (and AISC 341 as applicable). See DSA IR 17-3.
X	b. Inspect single-pass fillet welds ≤ 5/16"	Periodic	SI	Per AISC 360 (and AISC 341 as applicable). See DSA IR 17-3.
X	c. Inspect welding of stairs and railing systems.	Periodic	SI	**1704A.3.1** Per AISC 360 (and AISC 341 as applicable). See DSA IR 17-3.
-	**19.2 FIELD WELDING:**			
X	a. Inspect groove, multi-pass, and fillet welds > 5/16"	Continuous	SI	Per AISC 360 (and AISC 341 as applicable). See DSA IR 17-3.
X	b. Inspect single-pass fillet welds ≤ 5/16"	Periodic	SI	Per AISC 360 (and AISC 341 as applicable). See DSA IR 17-3.
X	f. Inspect welding of stairs and railing systems	Periodic	SI*	* May be performed by the project inspector when approved by DSA. See DSA IR 17-3. 1704A.3.1.2 and 1704A.3.1.4

+ In the CODE REFERENCE AND NOTES column indicates DSA-SS/CC sections that can be used by community colleges, per 2010 CBC Sec. 1.9.2.2.

DSA DIVISION OF THE STATE ARCHITECT
DEPARTMENT OF GENERAL SERVICES

DSA-103 rev 1/12

Statement of Structural Tests and Special Inspections

2010 CBC

INCREMENT #

DSA File No.: 19-C1

Application No.: 03-115541

Date Submitted: 2/20/2015

Revised:

Revised:

+	WOOD	
+	OTHER	Section 1704A.15

+ In the CODE REFERENCE AND NOTES column indicates DSA-SS/CC sections that can be used by community colleges, per 2010 CBC Sec. 1.9.2.2.

DSA DIVISION OF THE STATE ARCHITECT
DEPARTMENT OF GENERAL SERVICES

DSA-103 rev 1/12

Statement of Structural Tests and Special Inspections

2010 CBC

INCREMENT #

DSA File No.: 19-01

Application No.: 03-115541

Date Submitted:

Revised:

Revised:

Summary of Verified Reports Required:

Note: Project Inspector, contractor, architect and engineer verified reports are always required (Form DSA-6 or DSA-6A/E as applicable).

1 Soils testing and Inspection: Geotechnical Verified Report - Form DSA-293
2 All Structural Testing: Laboratory Verified Report - Form DSA-291
3 Concrete Batch Plant Inspection: Special Inspection Verified Report - Form DSA-292
4 Shop Welding Inspection: Special Inspection Verified Report - Form DSA-292
5 Field Welding Inspection: Special Inspection Verified Report - Form DSA-292

KEY to Columns	
1 Type -	**2 Performed By -**
Continuous – Indicates that a continuous special inspection is required	**GE** – Indicates that the special inspection is to be performed by a registered geotechnical engineer or his or her authorized representative
Periodic – Indicates that a periodic special inspection is required	**Lab** – Indicates that the test is to be performed by a testing laboratory accepted in the DSA laboratory Evaluation and Acceptance (LEA) Program
Test – Indicates that a test is required	**PI** – Indicates that the special inspection is to be performed by the project inspector
	SI – Indicates that the special inspection is to be performed by a special inspector
(Note: The difference between "tests" and "special inspections" is addressed in IR 17-4) COMPILE PRINT	**(Note that reassignment of responsibility is permitted only with the written approval of DSA)**

WLC ARCHITECTS, INC.

Name of Architect or Engineer in general responsible charge

JESUS TORRES, S.E., T&B ENGINEERING, INC.

Name of Structural Engineer (When structural design has been delegated)

Signature of Architect or Structural Engineer

2-10-15

date

REGISTERED PROFESSIONAL ENGINEER
JESUS R. TORRES
No. S4723
EXPIRES 06-30-16
STRUCTURAL
STATE OF CALIFORNIA

Architect or Structural Engineer Stamp

IDENTIFICATION STAMP
DIV OF THE STATE ARCHITECT
APP. # 03-115541

AC N/A F/LS N/A SS DO

DATE 2/20/2015

+ In the CODE REFERENCE AND NOTES column indicates DSA-SS/CC sections that can be used by community colleges, per 2010 CBC Sec. 1.9.2.2.

SECTION 01630

PRODUCT SUBSTITUTION PROCEDURES

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Product options.

B. Substitution procedures.

1.2 DEFINITIONS

A. Requests for changes in products, materials, or equipment required by Contract Documents proposed by the Contractor prior to and after award of the Contract are considered requests for substitutions. The following are not considered substitutions:

1. Revisions to Contract Documents requested by the Owner or Architect.

2. Specified options of products, materials, and equipment included in Contract Documents.

1.3 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers with Provision for Substitution: Products of manufacturers named and meeting specifications with substitution of products or manufacturer only when submitted under provisions of this section.

C. Products Specified by Naming One or More Manufacturers without Provision for Substitution: No substitution allowed.

1.4 LIMITATIONS ON SUBSTITUTIONS SUBMITTED PRIOR TO THE RECEIPT OF BIDS

A. The Bid shall be based upon the standards of quality established by those items of equipment and/or materials which are specifically identified in the Contract Documents.

B. Architect may consider requests for substitutions of specified equipment and/or materials only when requests are received by Architect prior to the date established for the receipt of bids as stipulated in Document 00200 - Instructions to Bidders.

C. Consideration by Architect of a substitution request will be made only if request is made in strict conformance with provisions of this section.

D. Burden of proof of merit of requested substitution is the responsibility of the entity requesting the substitution.

E. It is the sole responsibility of the entity requesting the substitution to establish proper content of submittal for requests for substitutions. Incomplete submittals will be rejected.

F. Architect's decision on substitution requests are final and do not require documentation or justification.

G. When substitution is not accepted, provide specified product.

H. Substitute products shall not be included within the bid without written acceptance by Addendum.

1.5 LIMITATIONS ON SUBSTITUTIONS SUBMITTED AFTER THE AWARD OF THE CONTRACT

A. The Contract is based upon the standards of quality established by those items of equipment and/or materials which are specifically identified in the Contract Documents.

B. Consideration by Architect of substitution requests received after the established date of the receipt of bids or contract award will only be made when one or more of the following conditions are met and documented:

1. Specified item fails to comply with regulatory requirements.

2. Specified item has been discontinued.

3. Specified item, through no fault of the Contractor, is unavailable in the time frame required to meet project schedule.

4. Specified item, through subsequent information disclosure, will not perform properly or fit in designated space.

5. Manufacturer declares specified product to be unsuitable for use intended or refuses to warrant installation of product.

6. Substitution would be, in the sole judgement of the Architect, a substantial benefit to the Owner in terms of cost, time, energy conservation, or other consideration of merit.

C. Notwithstanding the provisions of Article 1.4 of this section and the above, the Architect may consider a substitution request after the date of the receipt of bids or contract award, if in the sole discretion of the Architect, there appears to be just cause for such a request. The acceptance of such a late request does not waive any other requirement as stated herein.

D. Consideration by Architect of a substitution request will be made only if request is made in strict conformance with provisions of this section.

E. Substitutions will not be considered when they are indicated or implied on shop drawings or product data submittals without separate written request as required by provisions of this section.

F. Review of shop drawings does not constitute acceptance of substitutions indicated or implied on shop drawings.

G. Substitutions will not be considered when requested or submitted directly by subcontractor or supplier.

H. Substitutions will not be considered as a result of the failure to pursue the work promptly or coordinate activities properly.

I. Burden of proof of merit of requested substitution is the responsibility of the Contractor.

J. It is the sole responsibility of the Contractor to establish proper content of submittal for requests for substitutions. Incomplete submittals will be rejected.

K. Owner shall receive full benefit of any cost reduction as a result of any request for substitution.

L. Architect's decision on substitution requests is final and does not require documentation or justification.

M. When substitution is not accepted, provide specified product.

N. Substitute products shall not be ordered or installed without written acceptance.

1.6 REGULATORY REQUIREMENTS

A. It shall be the responsibility of the entity requesting the substitution to obtain all regulatory approvals required for proposed substitutions.

B. All regulatory approvals shall be obtained for proposed substitutions prior to submittal of substitution request to Architect.

C. All costs incurred by the Owner in obtaining regulatory approvals for proposed substitutions to include the costs of the Architect and any authority having jurisdiction over the project shall be reimbursed to the Owner. Costs of these services shall be reimbursed regardless of final acceptance or rejection of substitution.

D. Substitutions of materials or work procedures which affect the health, safety and welfare of the public shall have prior approval of the Division of the State Architect (DSA) field representative.

1.7 SUBSTITUTION REPRESENTATION

A. In submitting a request for substitution, the entity requesting the substitution makes the representation that he or she:

1. Has investigated the proposed substitution and has determined that it meets or exceeds the quality level of the specified product.

2. Will provide the same warranty or guarantee for the substitution as for the specified product.

3. Will coordinate installation and make changes to other work which may be required for the work to be completed with no additional cost to the Owner.

4. Waives claims for additional cost or time extension which may subsequently become apparent.

5. Will reimburse Owner for the cost of Architect's review or redesign services associated with substitution request.

1.8 SUBMITTAL PROCEDURE

A. Submit six copies of each request.

B. Submit request with Architect's Substitution Request Form. Form may be obtained at the office of the Architect. Substitution requests received without request form will be returned unreviewed.

C. Limit each request to one proposed substitution.

D. Request to include sufficient data so that direct comparison of proposed substitution can be made.

E. Provide complete documentation for each request. Documentation shall include the following information, as appropriate, as a minimum:

1. Statement of cause for substitution request.

2. Identify product by specification section and article number.

3. Provide manufacturer's name, address, and phone number. List fabricators, suppliers, and installers as appropriate.

4. List similar projects where proposed substitution has been used, dates of installation and names of Architect and Owner.

5. List availability of maintenance services and replacement materials.

6. Documented or confirmation of regulatory approval.

7. Product data, including drawings and descriptions of products.

8. Fabrication and installation procedures.

9. Samples of proposed substitutions.

10. Itemized comparison of significant qualities of the proposed substitution with those of the product specified. Significant qualities may include size, weight, durability, performance requirements and visual effects.

11. Coordination information, including a list of changes or modifications needed to other items of work that will become necessary to accommodate proposed substitution.

12. Statement on the substitutions effect on the construction schedule.

13. Cost information including a proposal of the net change, if any, in the Contract sum if the substitution is submitted after the receipt of bids or contract award.

14. Certification that the substitution is equal to or better in every respect to that required by the Contract Documents and that substitution will perform adequately in the application intended.

15. Waiver of right to additional payment or time that may subsequently become necessary because of failure of substitution to perform adequately.

F. Inadequate warranty, vagueness of submittal, failure to meet specified requirements, or submittal of insufficient data will be cause for rejection of substitution request.

1.9 ARCHITECT'S REVIEW

A. Within 14 days of receipt of request for substitution, the Architect will accept or reject proposed substitution.

B. If a decision on a substitution cannot be made within the time allocated, the product specified shall be used.

C. There shall be no claim for additional time for review of proposed substitutions.

D. Final acceptance of a substitution submitted prior to the date established for the receipt of bids will be in the form of an addendum.

E. Final acceptance of a substitution submitted after the award of the contract will be in the form of a Change Order.

2. PART 2 PRODUCTS

Not Used.

3. PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01732

CUTTING AND PATCHING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Requirements and limitations for cutting and patching of Work.

1.2 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore surfaces to original or specified conditions after installation of other work.

1.3 REGULATORY REQUIREMENTS

A. Unless specifically shown on the drawings, no structural member shall be cut, drilled, or notched without prior written authorization from the Architect and the Division of the State Architect.

1.4 SUBMITTALS

A. Submit written request in advance of cutting or patching which affects:

1. Structural integrity of any element of Project.
2. Integrity of weather-exposed or moisture-resistant element.
3. Efficiency, maintenance, or safety of any operational element.
4. Visual qualities of sight exposed elements.
5. Work of Owner or separate contractor.

B. Include in request:

1. Identification of Project.
2. Location and description of affected work.
3. Necessity for cutting or patching.
4. Description of proposed work, and Products to be used.
5. Alternatives to cutting and patching.
6. Effect on work of Owner or separate contractor.
7. Written permission of affected separate contractor.
8. Date and time work will be executed.

1.5 QUALITY ASSURANCE

A. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

B. Do not cut or patch operating elements that would reduce their capacity to perform or that would result in increased maintenance or decreased operational life or safety.

C. Do not cut or patch construction that would result in visual evidence of cutting or patching.

D. Remove and replace construction that has been cut or patched in a visually unsatisfactory manner.

2. PART 2 PRODUCTS

2.1 MATERIALS

A. Primary Products: Those required for original installation.

B. Substitutions: Under provisions of Section 01630.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Inspect existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.

B. After uncovering existing Work, inspect conditions affecting performance of work.

C. Beginning of cutting or patching means acceptance of existing conditions.

3.2 PREPARATION

A. Provide temporary supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of Project from damage.

B. Provide protection from elements for areas which may be exposed by uncovering work.

3.3 CUTTING AND PATCHING

A. Execute cutting, fitting, and patching to complete Work.

B. Fit Products together, to integrate with other work.

C. Uncover work to install ill timed work.

D. Remove and replace defective or non-conforming work.

E. Remove samples of installed work for testing when requested.

F. Provide openings in the Work for penetration of mechanical and electrical work.

G. Cut rigid materials using saw or drill. Pneumatic tools not allowed without prior approval.

3.4 PERFORMANCE

A. Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.

B. Employ skilled and experienced installer to perform cutting and patching.

C. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

D. Restore work with new Products in accordance with requirements of Contract Documents.

E. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

F. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material, to full thickness of the penetrated element.

G. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

3.5 CLEANING

A. Clean areas and spaces where cutting and patching was performed.

B. Completely remove paint, mortar, oils, sealant, and similar materials.

END OF SECTION

SECTION 02222

MINOR DEMOLITION FOR REMODELING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Removal of designated building equipment and fixtures.

B. Removal of designated construction.

C. Disposal of materials.

D. Storage of salvaged materials.

E. Cap and identify utilities.

F. Temporary partitions to allow building occupancy.

G. Temporary fire protection.

H. Schedule of materials and equipment.

1.2 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or recycled.

B. Disposal: Removal off-site of demolition waste and subsequently deposit in landfill acceptable to authorities having jurisdiction.

C. Salvage: Recovery of demolition waste for subsequent reuse.

D. Existing to Remain: Items of construction that are not to be removed and that are not indicated to be removed salvaged.

1.3 MATERIALS OWNERSHIP

A. Historic items, relics, cornerstones, commemorative plaques, tablets and similar objects encountered during demolition are to remain the Owner's property.

B. Carefully remove each item in a manner to prevent damage and deliver to Owner.

1.4 SUBMITTALS

A. Predemolition Photographs: Show conditions of exiting adjacent construction and site improvements that might be misconstrued as damaged by demolition operations. Submit before work begins.

B. Record Documents: Submit under provisions of Section 01770. Accurately record locations of utilities and subsurface obstructions.

1.5 REGULATORY REQUIREMENTS

A. Conform to applicable codes for demolition work, safety of structure, electrical disconnection and reconnection dust control and disposal of materials.

B. Comply with 2010 California Fire Code (CFC), California Code of Regulations, (CCR) Title 24, Part 9, Chapter 14 - Fire Safety During Construction and Demolition.

C. Obtain required permits from authorities.

D. Notify affected utility companies before starting work and comply with their requirements.

E. Do not close or obstruct egress width to exits.

F. Do not disable or disrupt building fire or life safety systems without 3 day prior written notice to the Owner.

1.6 PROJECT CONDITIONS

A. Areas of buildings to be demolished will be evacuated and their use discontinued before start of work.

B. Owner will occupy building(s) adjacent to demolition area. Conduct demolition so owner's operation will not be disrupted.

C. Provide at least 72 hour notice to Owner of activities that will affect Owner's operation.

D. Maintain access to existing walkways, exits and other adjacent occupied facilities.

E. Owner assumes no responsibility for areas of buildings to be demolished.

F. Hazardous Materials: Hazardous materials are present in buildings to be demolished. A report on the presence of hazardous materials is on file for review and use.

1. Hazardous materials remediation is specified in Section 13280 – Hazardous Material Remediation.

2. Do not disturb hazardous materials except as specified.

1.7 SCHEDULING

A. Schedule work under provisions of Section 01329.

B. Schedule Work to coincide with owner occupancy.

C. Perform work during normal hours of operation.

D. Notify Owner in writing 5 days in advance of any required work to be performed on a weekend or holiday.

E. Coordinate utility and building service interruptions with Owner.

F. Schedule tie-ins to existing systems to minimize disruption.

G. Coordinate Work to ensure fire sprinklers, fire alarms, smoke detectors, emergency lighting, exit signs and other life safety systems remain in full operation in occupied areas.

1.8 PROJECT CONDITIONS

A. Conduct demolition to minimize interference with adjacent and occupied building areas.

B. Cease operations immediately if structure appears to be in danger and notify Architect. Do not resume operations until directed.

2. PART 2 PRODUCTS

Not Used.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Correlate existing conditions with requirements indicated.

B. Inventory and record condition of items to be removed and salvaged.

C. Execute predemolition photographs.

D. Verify that hazardous waste remediation is complete.

3.2 PREPARATION

A. Existing Utilities: Locate, identify, disconnect and seal or cap off indicated utilities serving areas to be demolished.

B. Salvaged Items: Clean, pack and identify items for storage or delivery to Owner.

C. Protect existing items which are not indicated to be salvaged, removed, or altered.

D. Erect and maintain weatherproof closures for exterior openings.

E. Erect and maintain temporary partitions to prevent spread of dust, fumes, noise, and smoke to provide for Owner occupancy as specified in Section 01110.

3.3 DEMOLITION

A. Conduct demolition to minimize interference with adjacent and occupied building areas.

B. Cease operations immediately if structure appears to be in danger. Notify Architect. Do not resume operations until directed.

C. Maintain protected egress and access to the Work.

D. Maintain fire safety during demolition in accordance with CFC, Chapter 14.

E. Demolish in an orderly and careful manner. Protect existing supporting structural members.

3.4 SALVAGING OF DEMOLITION MATERIALS

A. Salvage materials under the provisions of Section 01524.

A. Clean salvaged items.

B. Pack or crate items after cleaning. Identify contents.

C. Store items in secure area until delivery to Owner.

D. Protect items from damage.

E. Install salvaged items to comply with requirements for new materials and equipment.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

A. Except for items to be reused, salvaged, reinstalled, or otherwise indicated to remain, remove demolished materials from Project site and legally dispose of them in an EPA – approved landfill.

B. Do not burn or bury materials on site.

3.6 CLEANING

A. Clean adjacent structures and improvements of dust, dirt and debris caused by demolition.

B. Remove temporary construction.

C. Return adjacent areas to condition existing before demolition operations began.

D. Leave site in a clean condition.

3.7 SCHEDULES

A. Salvage, store, and protect the following materials and equipment for reinstallation:

1. Lighting control panel.

2. Stage curtain motor.

3. HVAC ductwork as indicated.

B. Protect the following materials and equipment to remain:

1. Existing roofing system.

END OF SECTION

SECTION 02230

SITE CLEARING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Remove surface debris.

B. Remove indicated paving, curbs.

C. Clear site of plant life and grass.

D. Remove trees and shrubs.

E. Remove root system of trees and shrubs.

F. Erosion and sedimentation control measures.

1.2 REGULATORY REQUIREMENTS

A. Conform to applicable code for dust control and disposal of debris.

B. Coordinate clearing Work with utility companies.

C. Obtain required permits from authorities.

D. Do not close or obstruct roadways and sidewalks without permits.

1.3 DEFINITIONS

A. Remove: Removal of existing construction and legally dispose of items off-site unless indicated to be removed and salvaged.

B. Disposal: Removal off-site of demolition waste and subsequently deposit in landfill acceptable to authorities having jurisdiction.

C. Salvage: Recovery of demolition waste for subsequent reuse.

D. Existing to Remain: Items of construction that are not to be removed and that are not indicated to be removed salvaged.

1.4 SUBMITTALS

A. Preclearing Photographs: Show conditions of existing adjacent construction and site improvements that might be misconstrued as damaged by clearing operations. Submit before work begins.

B. Record Documents: Submit under provisions of Section 01770. Accurately record locations of capped utilities and other subsurface conditions.

1.5 QUALITY ASSURANCE

A. Perform best management practice techniques for given site conditions as defined in Section 3 of the Stormwater Best Management Practice Handbook (BMP Handbook), Construction Edition, as published by the California Storm Water Quality Association.

B. Coordinate work of this section with permit provisions of State Water Resources Control Board Order No. 2010-0014 DWQ and the Storm Water Pollution Prevention Plan.

C. Comply with City of Compton Dust Control Ordinance.

2. PART 2 PRODUCTS

Not Used.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Correlate existing conditions with requirements indicated.

B. Inventory and record condition of items to be removed and salvaged.

C. Execute predemolition photographs.

3.2 PREPARATION

A. Verify that existing plant life and features designated to remain are tagged or identified.

3.3 EROSION AND SEDIMENTATION CONTROL

A. Provide erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of Storm Water Pollution Prevention Plan.

B. Inspect, repair, and maintain erosion and sedimentation control measures during clearing operations.

3.4 PROTECTION

A. Protect utilities that remain, from damage.

B. Protect trees, plant growth, and features designated to remain as final landscaping.

C. Protect bench marks and existing structures from damage or displacement.

3.5 CLEARING

A. Clear areas required for access to site and execution of Work.

B. Remove trees and shrubs indicated. Remove stumps, main root ball.

C. Clear undergrowth and deadwood without disturbing subsoil.

D. Remove debris, rock, and extracted plant life.

E. Remove paving, curbs, and other items as indicated. Neatly saw cut edges at right angle to surface.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. Except for items to be recycled or otherwise indicated to remain, remove demolished materials from Project site and legally dispose of them in an EPA – approved landfill.

B. Do not burn or bury materials on site.

3.7 CLEANING

A. Clean adjacent structures and improvements of dust, dirt and debris caused by clearing.

B. Return adjacent areas to condition existing before clearing operations began.

C. Leave site in a clean condition.

END OF SECTION

SECTION 02311

FINISH GRADING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Finish grade subsoil and proof roll.

B. Place, level, and compact topsoil.

1.2 SAMPLES

A. Submit samples under provisions of Section 01330.

B. Submit 10 lb sample of each type of fill to testing laboratory, in air-tight containers.

C. Submit name of imported materials source. Provide materials from same source throughout the work. Change of source requires Architect's approval.

D. Submit test reports under provisions of Section 01458.

1.3 PROTECTION

A. Protect trees, shrubs, lawns, and other features remaining as portion of final landscaping.

B. Protect bench marks, sidewalks.

C. Repair or replace all damage.

2. PART 2 PRODUCTS

2.1 MATERIALS

A. Existing Topsoil: Excavated and re-used material, graded free of roots, rocks larger than one inch, subsoil, debris and large weeds.

B. Imported Topsoil: Friable loam; free of subsoil, roots, grass, excessive amount of weeds, stone, and foreign matter; acidity range (pH) of 5.5 to 7.5; containing an amount of organic matter normal to the region.

C. Materials (existing and import) shall be free of any toxic materials listed (by federal or state EPA or federal or state health agencies) as hazardous materials.

3. PART 3 EXECUTION

3.1 INSPECTION

A. Verify site conditions and note irregularities affecting work of this Section.

B. Notify Architect of discrepancies found.

C. Beginning work of this Section means acceptance of existing conditions.

3.2 SUBSOIL PREPARATION

A. Eliminate uneven areas and low spots. Remove debris, roots, branches, stones, in excess of 1 inch in size.

B. Remove subsoil contaminated with petroleum products.

C. Scarify subgrade to depth of 3 inches where topsoil is scheduled. Scarify in areas where equipment used for hauling and spreading topsoil has compacted subsoil.

3.3 PLACING TOPSOIL

A. Place topsoil in areas where planting is scheduled.

B. Use topsoil in relatively dry state. Place during dry weather.

C. Fine grade topsoil eliminating rough or low areas. Maintain levels, profiles, and contours of subgrade.

D. Remove stone, roots, grass, weeds, debris, and foreign material while spreading.

E. Manually spread topsoil around trees, plants, and building to prevent damage.

F. Lightly compact placed topsoil.

3.4 DISPOSAL OF EXCESS AND WASTE MATERIAL

A. Remove waste materials, trash, and debris, and dispose of legally off site.

B. Remove surplus topsoil materials from site and dispose of legally off site.

C. Leave material stockpile areas completely free of excess materials.

3.5 TOLERANCES

A. Top of Topsoil: Plus or minus 1/2 inch.

3.6 PLACEMENT SCHEDULE

A. The following paragraphs identify compacted topsoil thicknesses for various locations.

B. Grass, Seeded: 6 inches.

C. Grass, Sod: 4 inches.

D. Shrub Beds: 18 inches.

E. Flower Beds: 12 inches.

F. Planter Boxes: To within 3 inches of box rim.

3.7 MAINTENANCE

A. Protect newly graded areas. Keep free of trash and debris.

B. Provide erosion control methods to prevent erosion.

C. Repair and reestablish grades in settled, eroded, and rutted areas to specified tolerances and density.

D. Where completed areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

E. Where settling occurs, remove surface (pavement, lawn, or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition or surface finish to match adjacent work and eliminate evidence of restoration.

END OF SECTION

SECTION 02312

ROUGH GRADING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Remove topsoil and stockpile for later reuse.

B. Grade and rough contour site.

C. Consolidation and compaction.

D. Erosion and sedimentation control measures.

1.2 REFERENCES

A. 2010 CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, Appendix J.

B. Los Angeles County Code.

C. City of Compton Dust Control Ordinance.

D. Storm Water Quality Task Association - Stormwater Best Management Practice Handbook (BMP Handbook) Construction Edition.

E. ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.

F. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. Rammer and 18 inch Drop.

G. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods. (Shallow Depth).

H. ASTM D2937 - Test Method for Density of Soil in Place by the Drive-Cylinder Method.

I. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods. (Shallow Depth).

1.3 SUBMITTALS

A. Submit samples under provisions of Section 01330.

B. Submit 10 lb. sample of each type of fill to testing laboratory in air-tight containers.

C. Submit name of imported materials source. Provide materials from same source throughout the work. Change of source requires Architect's approval.

D. Submit test reports under provisions of Section 01458.

1.4 PROJECT RECORD DOCUMENTS

A. Submit documents under provisions of Section 01770.

B. Accurately record location of utilities remaining, rerouted utilities, new utilities by horizontal dimensions, elevations or inverts, and slope gradients.

1.5 PROTECTION

A. Protect trees, shrubs, lawns, and other features remaining as portion of final landscaping.

B. Protect bench marks, existing structures, side walks.

C. Protect above or below grade utilities which are to remain.

D. Repair damage.

1.6 QUALITY ASSURANCE

A. Comply with 2010 CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, Appendix J.

B. Comply with Los Angeles County Code.

C. Comply with City of Compton Dust Control Ordinance.

D. Perform best management practice dust control techniques for given site conditions as defined in Section 3 of the Storm Water Best Management Practice Handbook, (BMP Handbook) Construction Edition.

1.7 FIELD CONDITIONS

A. Verify that survey benchmark and intended elevations for the work areas are as indicated.

B. Perform site assessment to identify any contaminated soils which may occur on site.

C. Notify Architect of unexpected subsurface conditions and discontinue work in area affected until notified to resume work.

2. PART 2 PRODUCTS

2.1 SOIL MATERIALS

A. Existing Subsoil: Excavated and re-used material, graded free of lumps and rocks larger than 3 inches in any dimension.

B. Imported Subsoil: Non-expansive predominantly granular soils such as a silty sand, free of lumps and rocks larger than 3 inches in any dimension, and debris. Expansion index less than 20, and no more than 50 percent of the material shall pass a No. 200 sieve. Material shall contain sufficient fines (binder) to result in a stable subgrade.

C. Existing Topsoil: Excavated and re-used material, graded free of roots, rocks larger than 1 inch, subsoil, debris and large weeds.

D. Materials (existing and import) shall be free of any toxic materials listed (by federal or state EPA or federal or state health agencies) as hazardous materials.

E. Materials (existing and import) are subject to the approval of the Soils Engineer for use in the project.

F. Provide imported materials when sufficient satisfactory soil materials are not available from on site sources.

2.2 EQUIPMENT

A. Equipment: Capable of excavating topsoil, subsoil, grading, and compaction of material.

3. PART 3 EXECUTION

3.1 INSPECTION

A. Verify agreement of existing site conditions with indicated conditions.

B. Notify Architect of discrepancies found.

C. Beginning work of this Section constitutes acceptance of existing conditions.

3.2 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Identify known below grade utilities. Stake and flag locations.

C. Identify and flag above grade utilities.

D. Maintain and protect existing utilities remaining which pass through work area.

E. Notify utility company and pay all costs to remove and relocate utilities.

F. Upon discovery of unknown utility or concealed conditions, discontinue affected work; notify Architect.

3.3 TOPSOIL EXCAVATION

A. Excavate topsoil from areas to be further excavated, relandscaped, or regraded.

B. Stockpile in area designated on site.

C. Do not excavate wet topsoil.

D. Stockpile topsoil to depth not exceeding 8 feet. Place, grade, and shape stockpile for proper drainage.

3.4 EROSION AND SEDIMENTATION CONTROL

A. Provide erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways according to requirements of the Storm Water Pollution Prevention Plan.

B. Inspect, repair, and maintain erosion and sedimentation control measures during earthwork operations.

3.5 GRADING

A. Uniformly grade areas within limits of grading including adjacent transition areas.

B. Make such cuts or fills as may be required to bring subgrade to elevations shown and to tolerances specified.

C. Plow or otherwise break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond to existing surface.

D. Where grades are not indicated, grade uniformly level or slope between points for which elevations are given.

E. In absence of more specific grading information, slope ground away from building for a distance of 20 feet at 2 percent.

F. Make grade changes gradual. Blend slope into level areas.

G. Compact each layer of fill to required density.

3.6 COMPACTION

A. Control soil compaction during construction providing density specified for each area classification.

B. Place and compact fill materials in continuous layers of not more than 6 inch thick compacted depth.

C. Provide not less than the specified percentages of density of soil material compacted at optimum moisture content, for each layer of soil material in place.

D. When existing ground surfaces have a density less than that specified for a particular area classification, scarify existing surface to a depth of 12 inches, moisture-condition to optimum moisture content and compact to required percentage of maximum density.

E. Maintain optimum moisture content of fill materials to attain required compaction density.

F. Moisture content shall be uniform throughout all layers. Add necessary moisture or aerate soil material at borrow source if it is not possible to obtain uniform moisture content at soil surface at time of placement.

G. When moisture content and condition of each soil layer is satisfactory, compact soils to specified density.

H. Compaction of soils by use of water jetting or puddling is not an acceptable procedure.

I. Correct improperly compacted areas or layers as directed by Architect if soil density tests indicate inadequate compaction.

3.7 DISPOSAL OF EXCESS AND WASTE MATERIAL

A. Remove waste materials, including unacceptable excavated material, trash, and debris, and dispose of legally off site.

3.8 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01458.

B. Allow testing service to inspect, test, and approve each subgrade and fill layer before further construction work is performed.

C. Laboratory tests and analysis of fill material will be performed in accordance with ASTM D1557 and with Section 01458.

D. In place site tests and analysis of fill material will be performed in accordance with ASTM D1556, ASTM D2937, or ASTM D2922 and with Section 01458.

E. In place site moisture tests will be performed in accordance with ASTM D3017.

F. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

3.9 GRADING TOLERANCES

A. Grade areas to within not more than 0.10 foot above or below required subgrade elevation.

3.10 MAINTENANCE

A. Protect newly graded areas. Keep free of trash and debris.

B. Provide erosion control methods to prevent erosion.

C. Repair and reestablish grades in settled, eroded, and rutted areas to specified tolerances and density.

D. Where completed areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

E. Where settling occurs, remove surface (pavement, lawn, or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface finish to match adjacent work and eliminate evidence of restoration.

3.11 PLACEMENT SCHEDULE

A. Building Pad:

1. Existing or imported subsoil fill to subgrade elevation, compacted to 95 percent.

B. Grass Areas:

1. Subsoil fill, existing or import, to subgrade elevation, compact to 90 percent.

C. Planted Areas:

1. Subsoil fill, existing or import, to subgrade elevation, compact to 90 percent.

D. Paving Areas:

1. Subsoil fill existing or import, to subgrade elevation, compact to 95 percent.

END OF SECTION

SECTION 02316

BACKFILLING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Building perimeter and site structure backfilling to subgrade elevations.

B. Fill under slabs-on-grade.

C. Consolidation and compaction.

D. Fill for over-excavation.

1.2 REFERENCES

A. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, Chapter 18A.

B. ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.

C. ASTM D448 - Sizes of Aggregate for Roadway and Bridge Construction.

D. ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.

E. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb Rammer and 18 inch Drop.

F. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

G. ASTM D2937 - Test Method for Density of Soil in Place by the Drive-Cylinder Method.

H. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.3 SUBMITTALS

A. Submit under provisions of Section 01330.

B. Samples: Submit 10 lb. sample of each type of fill to testing laboratory, in air-tight containers.

C. Submit name of imported materials source. Provide materials from same source throughout the work. Change of source requires Architect's approval.

D. Submit test reports under provisions of Section 01458.

1.4 QUALITY ASSURANCE

A. Comply with CBC, California Building Code, (CCR) Title 24, Part 2, Chapter 18A.

1.5 FIELD CONDITIONS

A. Verify that survey benchmark and intended elevations for the work areas are as indicated.

B. Notify Architect of unexpected subsurface conditions and discontinue work in area affected until notified to resume work.

1.6 PROTECTION

A. Protect trees, shrubs, lawns, and other features remaining as portion of final landscaping.

B. Protect bench marks, fences, roads, sidewalks paving, and curbs.

C. Repair or replace all damage.

2. PART 2 PRODUCTS

2.1 SOIL MATERIALS

A. Imported Subsoil: Non-expansive predominantly granular soils such as a silty sand, free of lumps and rocks larger than 3 inches in any dimension, and debris. Expansion index less than 20, and no more than 50 percent of the material shall pass a No. 200 sieve. Material shall contain sufficient fines (binder) to result in a stable subgrade.

B. Sand: Natural river or bank sand free of silt, clay, loam, friable or soluble materials or organic matter, graded in accordance with ASTM C136, all passing the No. 4 sieve and only 5 percent passing the No. 200 sieve.

C. Pea Gravel: Natural stone; washed, free of clay, slate, organic matter, graded in accordance with ASTM C136, 1/4 inch to 5/8 inch.

D. Gravel: Coarse aggregate; free of clay, shale and organic matter; ASTM D448, grading size 6 with 100 percent passing a 1 inch sieve and not more than 5 percent passing a No. 4 sieve.

E. Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, graded in accordance with ASTM C136, with 100 percent passing a 1-1/2 inch sieve and not more than 5 percent passing a No. 4 sieve.

F. Crushed Stone Base: Permeable base meeting California Department of Transportation 3/4 inch Permeable Class II Base designation according to the following gradation:

Mesh Size	% Passing
1 inch	100
3/4 inch	90-100
3/8 inch	40-100
#4	25-40
#8	18-33
#30	5-15
#50	0-7
#200	0-3

G. Concrete: Structural concrete conforming to Section 03300 with a compressive strength of 2,000 psi for fill to correct over-excavation.

H. Materials (existing and import) shall be free of any toxic materials listed (by federal or state EPA or federal or state health agencies) as hazardous materials.

I. Materials: (existing and import) are subject to the approval of the Soils Engineer for use in the project.

J. Provide imported materials when sufficient satisfactory soil materials are not available from on site sources.

2.2 ACCESSORIES

A. Permeable Geotextile Fabric: 14ON fabric manufactured by Mirafi Inc., www.tcmirafi.com.

B. Impermeable Geotextile Fabric: Reinforced liner, 12 mils thick, weighing 6 oz/sq yd; Hercushield 2400 Fabric manufactured by In-Line Plastics, LC, www.in-lineplastics.com

C. Substitutions: Under the provisions of Section 01630.

2.3 EQUIPMENT

A. Equipment: Capable of excavating subsoil, mixing and placing materials, wetting, consolidation, grading, and compaction of material.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify fill materials to be reused are acceptable.

B. Verify areas to be backfilled are free of debris or water.

3.2 PREPARATION

A. Generally, compact subgrade to density requirements for subsequent backfill materials.

B. Cut out soft areas of subgrade not capable of in situ compaction. Backfill with subsoil fill and compact to density equal to or greater than requirements for subsequent backfill material.

3.3 BACKFILLING

A. Backfill excavations as promptly as work permits, but not until the following has been completed:

1. Acceptance of subgrade.

2. Construction below grade, where applicable, for waterproofing.

3. Removal of concrete formwork.

4. Removal of shoring and bracing if not to be left in place.

5. Backfill of voids in subgrade with satisfactory materials.

6. Removal of trash and debris.

7. Permanent or temporary bracing or horizontally supported walls.

B. Compact subgrade to density requirements for subsequent backfill.

C. Backfill to contours and elevations required.

D. Place geotextile fabric over drainage fill prior to placing backfill.

E. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.

F. Place and compact fill material in continuous layers not exceeding specified compacted depth for each layer.

G. Employ a placement method that does not disturb or damage foundation waterproofing.

H. Before placing successive layers, all ruts, and other hollows more than 6 inches in depth shall be regraded and compacted.

I. Maintain optimum moisture content of backfill materials.

J. Backfill against supported foundation walls.

K. Backfill simultaneously on each side of unsupported foundation walls.

L. Remove and replace or scarify and air dry subgrade or fill material that is too wet to permit compaction to required density.

3.4 COMPACTION

A. Control soil compaction during construction providing density specified for each area classification.

B. Place and compact fill materials in continuous layers of not more than 6 inch thick compacted depth.

C. Provide not less than the specified percentages of density of soil material compacted at optimum moisture content, for each layer of soil material in place.

D. When existing ground surfaces have a density less than that specified for a particular area classification, scarify existing surface to a depth of 12 inches, moisture-condition to optimum moisture content and compact to required percentage of maximum density.

E. Maintain optimum moisture content of fill materials to attain required compaction density.

F. Moisture content shall be uniform throughout all layers. Add necessary moisture or aerate soil material at borrow source if it is not possible to obtain uniform moisture content at soil surface at time of placement.

G. When moisture content and condition of each soil layer is satisfactory compact soils to specified density.

H. Compaction of free draining material such as gravel shall be by treads of crawler type tractor, surface vibrator, smooth or pneumatic roller, hand or power tampers.

I. Compaction of soils by use of water jetting or puddling is not an acceptable procedure.

J. Correct improperly compacted areas or layers as directed by Architect if soil density tests indicate inadequate compaction.

3.5 DISPOSAL OF EXCESS AND WASTE MATERIAL

A. Remove waste materials, including unacceptable excavated material, trash, and debris, and dispose of legally off site.

B. Remove surplus backfill materials from site and dispose of legally off site.

C. Leave material stockpile areas completely free of excess materials.

3.6 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01458.

B. Allow testing service to inspect, test, and approve each subgrade and fill layer before further backfill or construction work is performed.

C. Laboratory tests and analysis of fill material will be performed in accordance with ASTM D1557 and with Section 01458.

D. In place site tests and analysis of fill materials will be performed in accordance with ASTM D1556, ASTM D2937 or ASTM D2922, and with Section 01458.

E. In place site moisture tests will be performed in accordance with ASTM D3017.

F. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

3.7 GRADING TOLERANCES

A. Pavements: Shape surface of areas under pavement to line, grade, and cross-section, with finish surface not more than 1/2 inch above or below required subgrade elevation.

B. Building Slab: Grade smooth and even, free of voids, to required subgrade elevation. Final grade tolerance to be within 1/2 inch when tested with a 10 foot straightedge.

3.8 MAINTENANCE

A. Protect newly graded areas. Keep free of trash and debris.

B. Provide erosion control methods to prevent erosion.

C. Repair and reestablish grades in settled, eroded, and rutted areas to specified tolerances and density.

D. Where completed areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

E. Where settling occurs, remove surface (pavement, lawn, or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface finish to match adjacent work and eliminate evidence of restoration.

3.9 PLACEMENT SCHEDULE

A. Interior Slab-On-Grade:

1. imported subsoil fill 12 inches thick to subgrade elevation, compacted to 95 percent.

2. Cover with gravel fill, 6 inches thick, compact to 95 percent.

B. Exterior Side of Foundation Walls:

1. imported subsoil fill, to subgrade elevation, compacted to 95 percent.

C. Fill under Footings:

1. imported subsoil fill, 24 inches thick to subgrade elevation, compacted to 95 percent.

D. Retaining Walls:

1. imported subsoil fill to subgrade elevation, compacted to 95 percent.

E. Concrete Paving:

1. Subsoil fill, existing or import, to subgrade elevation, compact to 95 percent.

2. Cover with aggregate base specified under Section 02751.

F. Concrete Walks, Curbs, and Gutters:

1. Subsoil fill, existing or import, to subgrade elevation, compact to 95 percent.

2. Cover with sand, base to subgrade required, compact to 90 percent.

G. Fill to Correct Overexcavation:

1. Lean concrete of minimum compressive strength as specified.

2. Imported fill, to required elevation, compact to 95 percent.

END OF SECTION

SECTION 02319

EXCAVATION

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Excavation for building foundations.

B. Excavation for slabs-on-grade, paving, and landscaping.

C. Excavation for site structures.

1.2 REFERENCES

A. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, Chapter 18A and Appendix J.

1.3 QUALITY ASSURANCE

A. Comply with Chapters 18A and Appendix J of the CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2.

1.4 FIELD CONDITIONS

A. Verify that survey benchmark and intended elevations for the Work are as indicated.

B. Notify Architect of unexpected subsurface conditions and discontinue work in area affected until notified to resume work.

1.5 PROTECTION

A. Protect trees, shrubs, lawns, and other features remaining as portion of final landscaping.

B. Protect bench marks, fences, roads, sidewalks paving, and curbs.

C. Underpin adjacent structures, including utilities and pipe chases, which may be damaged by excavation work.

D. Protect above or below grade utilities which are to remain.

E. Barricade open excavations and post warning lights. Operate lights from dusk to dawn.

F. Protect facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

G. Repair or replace all damage.

2. PART 2 PRODUCTS

2.1 EQUIPMENT

A. Equipment: Capable of excavating subsoil.

3. PART 3 EXECUTION

3.1 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Identify known below grade utilities. Stake and flag locations.

C. Identify and flag above grade utilities.

D. Maintain and protect existing utilities remaining which pass through work area.

E. Notify utility company and pay all costs to remove and relocate utilities.

F. Upon discovery of unknown utility or concealed conditions, discontinue affected work; notify Architect.

3.2 EXCAVATION FOR STRUCTURES

A. Excavate subsoil required to accommodate building foundation, site structures and construction operations.

B. Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 foot.

C. Extend a sufficient distance from footings and foundations to permit placing and removal of formwork, installation of services, other construction, and for inspection.

D. Overexcavate a minimum depth of 2 feet beneath all footings.

E. Extend overexcavation a minimum distance of 1 foot horizontally beyond exterior face of foundation wall footing.

F. Hand trim excavation. Remove loose matter.

G. Remove lumped subsoil, boulders and rock up to 1/3 cu yd measured by volume. Replace with approved fill material and compact as specified.

H. Do not disturb bottom of excavations intended for bearing surfaces.

I. Scarify bottom of excavation to a depth of 24 inches, moisture-condition to optimum moisture content and compact as specified.

3.3 EXCAVATION FOR PAVEMENTS

A. Cut surface under pavements to comply with cross-sections, elevations, and grades as shown, to subgrade elevations required and to grade tolerances specified.

B. Overexcavate a minimum depth of 12 inches beneath all slabs-on-grade.

C. Overexcavate a minimum depth of 12 inches beneath all paving.

D. Scarify subgrade beneath slabs-on-grade to a depth of 12 inches, moisture-condition to optimum moisture content and compact as specified.

E. Scarify subgrade beneath paving to a depth of 12 inches, moisture-condition to optimum moisture content and compact as specified.

3.4 STORAGE OF EXCAVATED MATERIALS

A. Stockpile excavated materials in designated on-site area.

B. Segregate excavated materials based upon intended use.

C. Place, grade, and shape stockpile for proper drainage.

D. Locate stockpile away from edge of excavation.

E. Do not stockpile materials within drip line of trees.

3.5 STABILITY OF EXCAVATIONS

A. Comply with local codes, ordinances, and requirements of agencies having jurisdiction.

B. Machine slope banks to angle or repose or less.

C. Maintain sides and slopes of excavations in safe condition until completion of backfilling.

D. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.

E. Provide shoring and bracing in good serviceable condition.

F. Extend shoring and bracing as excavation progresses.

G. Maintain shoring and bracing in excavations regardless of time period excavation will be open.

H. Provide permanent steel sheet piling wherever subsequent removal of piling would permit lateral movement of soil under adjacent structures. Cut off top of piling 2'-6" below finish grade and leave permanently in place.

I. Design and Calculations: Provide by licensed California engineer in accordance with requirements of the California Building Code and Safety Orders of the State of California, Division of Industrial Safety; Title 8, Division 1, Chapter 4, Subchapter 4, Article 6.

3.6 DEWATERING

A. Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.

B. Grade top perimeter of excavations to prevent surface water from draining into excavations.

C. Do not allow water to accumulate in excavations.

D. Remove water to prevent softening of foundation bottoms and soil changes detrimental to stability of subgrades.

E. Provide and maintain pumps, well points, sumps, suction and discharge lines and other components necessary to convey water away from excavations.

F. Establish and maintain temporary drainage ditches and other diversions to convey rain water and water removed from excavations to runoff areas.

G. Do not use trench excavations as temporary ditches.

3.7 DISPOSAL OF EXCESS AND WASTE MATERIAL

A. Remove excess and waste materials, including unacceptable excavated material, trash, and debris, and dispose of legally off site.

3.8 PROTECTION OF WORK

A. Protect finished work under provisions of Section 01600.

B. Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation.

C. Protect bottom of excavations from freezing, water saturation, and disturbance.

3.9 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01458.

B. Allow testing service to inspect, test, and approve subgrade before further construction work is performed.

3.10 GRADING TOLERANCES

A. Structures: Shape surface of areas under foundations to line, grade, and cross-section, with finish surface not more than 0.10 foot above or below required subgrade elevation.

B. Pavements: Shape surface of areas under pavement to line, grade, and cross-section, with finish surface not more than 1/2 inch above or below required subgrade elevation.

C. Building Slab: Grade smooth and even, free of voids, to required subgrade elevation. Final grade tolerance to be within 1/2 inch when tested with a 10 foot straightedge.

END OF SECTION

SECTION 02321

TRENCHING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Excavate trenches for utilities from outside building to municipal utilities.

B. Execavate trenches for utilities on interior of building.

C. Compacted bedding under fill over utilities.

D. Backfilling and compaction.

E. Fill for overexcavation.

1.2 REFERENCES

A. ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.

B. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb Rammer and 18 inch Drop.

C. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

D. ASTM D2937 - Test Method for Density of Soil in Place by the Drive-Cylinder Method.

E. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.3 SUBMITTALS

A. Submit under provisions of Section 01330.

B. Samples: Submit 10 lb sample of each type of fill to testing laboratory, in air-tight containers.

C. Submit test reports under provisions of Section 01458.

1.4 PROJECT RECORD DOCUMENTS

A. Submit documents under provisions of Section 01770.

B. Accurately record location of utilities remaining, rerouted utilities, new utilities by horizontal dimensions, elevations or inverts, and slope gradients.

1.5 FIELD CONDITIONS

A. Verify that survey benchmark and intended elevations for the Work as indicated.

B. Notify Architect of unexpected subsurface conditions and discontinue work in area affected until notified to resume work.

1.6 PROTECTION

A. Protect trees, shrubs, lawns, and other features remaining as portion of final landscaping.

B. Protect bench marks, fences, roads, sidewalks paving, and curbs.

C. Underpin adjacent structures, including utilities and pipe chases, which may be damaged by excavation work.

D. Protect above or below grade utilities which are to remain.

E. Barricade open excavations and post warning lights. Operate lights from dusk to dawn.

F. Protect facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by trenching operations.

G. Repair or replace all damage.

2. PART 2 PRODUCTS

2.1 FILL MATERIALS

A. Types specified in Section 02316.

2.2 BED MATERIALS

A. Subsoil: As specified in Section 02316.

B. Sand: As specified in Section 02316.

2.3 EQUIPMENT

A. Equipment: Capable of excavating subsoil, mixing and placing materials, wetting, consolidation, grading, and compaction of material.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that fill materials to be reused are acceptable.

B. Verify agreement of existing site conditions with indicated conditions.

C. Notify Architect of discrepancies found.

D. Beginning work of this Section constitutes acceptance of existing conditions.

3.2 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Identify known below grade utilities. Stake and flag locations.

C. Identify and flag above grade utilities.

D. Maintain and protect existing utilities remaining which pass through work area.

E. Notify utility company and pay all costs to remove and relocate utilities.

F. Upon discovery of unknown utility or concealed conditions, discontinue affected work; notify Architect.

3.3 TRENCH EXCAVATION

A. Excavate subsoil required to accommodate water, gas, electric and telephone conduit, to municipal or private utilities.

B. Excavate trenches to uniform width, sufficiently wide to provide ample working room and a minimum of 8 inch clearance on both sides of the pipe.

C. Excavate trenches to depth indicated or required to establish indicated slope and invert elevations.

D. Depth of excavations on the exterior of the building shall provide for the minimum coverage above the top of the pipe, conduit, or tank measured from the lowest adjacent finish grade, as follows unless otherwise indicated on the Drawings:

1.	Steel Pipe and Conduit	24 inches
2.	Copper Water Tube	18 inches
3.	Cast-Iron, Pressure Pipe	36 inches
4.	Plastic Pipe (other than waste)	30 inches
5.	Plastic Waste Pipe	24 inches
6.	Soil, Sewer & Storm Drain	18 inches
7.	Irrigation Pipe (pressure)	24 inches
8.	Irrigation Pipe (non-pressure)	12 inch

E. For pipe or conduit less than 4 inches in nominal size, do not excavate beyond indicated depths. Hand-excavate bottom to accurate elevations and support pipe or conduit on undisturbed soil.

F. For pipe or conduit, 4 inches and larger, carry excavation 4 inches below required elevation and backfill with sand bedding to support pipe or conduit.

G. Cut out soft areas of subgrade not capable of in situ compaction. Backfill with subsoil and compact to density equal to or greater than requirements for subsequent backfill material.

H. Hand trim excavation. Remove loose material.

I. Excavation cut not to interfere with bearing splay of foundations.

J. At each pipe joint dig bell hole to relieve pipe bell of loads and to ensure continuous bearing of pipe on bearing surface.

K. Remove lumped subsoil, boulders and rock up to 1/3 cu yd measured by volume. Replace with sand bedding material and compact as specified.

3.4 STORAGE OF EXCAVATED MATERIALS

A. Stockpile excavated materials in designated on-site area.

B. Segregate excavated materials based upon intended use.

C. Place, grade, and shape stockpile for proper drainage.

D. Locate stockpile away from edge of excavations.

E. Do not stockpile materials within drip line of trees.

3.5 UNAUTHORIZED EXCAVATION

A. Correct unauthorized excavation at no cost to Owner.

B. Backfill excavation to correct elevation with concrete as specified.

3.6 STABILITY OF EXCAVATIONS

A. Comply with local codes, ordinances, and requirements of agencies having jurisdiction.

B. Machine slope banks to angle of repose or less.

C. Maintain sides and slopes of excavations in safe condition until completion of backfilling.

D. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.

E. Provide shoring and bracing in good serviceable condition.

F. Extend shoring and bracing as excavation progresses.

G. Maintain shoring and bracing in excavations regardless of time period excavation will be open.

H. Provide permanent steel sheet piling wherever subsequent removal of piling would permit lateral movement of soil under adjacent structures. Cut off top of piling 2'-6" below finish grade and leave permanently in place.

3.7 DEWATERING

A. Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.

B. Grade top perimeter of excavations to prevent surface water from draining into excavations.

C. Do not allow water to accumulate in excavations.

D. Remove water to prevent softening of trench bottoms and soil changes detrimental to stability of subgrades.

E. Provide and maintain pumps, well points, sumps, suction and discharge lines and other components necessary to convey water away from excavations.

F. Establish and maintain temporary drainage ditches and other diversions to convey rain water and water removed from excavations to runoff areas.

G. Do not use trench excavations as temporary ditches.

3.8 BEDDING OF TRENCHES

A. Support pipe and conduit during placement and compaction of bedding fill.

B. Place a minimum of 4 inches of sand bedding beneath all piping and conduit 4 inches in diameter and larger.

C. Place a minimum of 12 inches of sand bedding above all piping and conduit.

D. Compact sand bedding to density required.

3.9 BACKFILLING

A. Backfill excavations as promptly as work permits, but not until the following has been completed:

1. Acceptance of subgrade.

2. Inspection, testing, approval and record documentation of location of underground utilities.

3. Removal of shoring and bracing if not to be left in place.

4. Backfill of voids in subgrade with satisfactory materials.

5. Removal of trash and debris.

6. Installation of bedding material.

B. Compact subgrade to density requirements for subsequent backfill.

C. Backfill to contours and elevations required.

D. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.

E. Place and compact fill material in continuous layers not exceeding specified compacted depth for each layer.

F. Employ a placement method that does not disturb or damage utilities in trenches.

G. Before placing successive layers, all ruts, and other hollows more than 6 inches in depth shall be regraded and compacted.

H. Maintain optimum moisture content of backfill materials.

I. Backfill trenches with concrete where excavation is less than 3 feet below bottom of footing. Place concrete to level of bottom of adjacent footing. Width of concrete backfill to match width of footing and be full width of trench. Maintain minimum 6 inch encasement on sides, top, and bottom.

J. Backfill trenches with concrete for piping or conduit where top of piping or conduit is less than 30 inches below finished elevation of paving. Minimum 6 inches of encasement on sides and top.

K. Remove and replace or scarify and air dry subgrade or fill material that is too wet to permit compaction to required density.

3.10 COMPACTION

A. Control soil compaction during construction providing density specified for each area classification.

B. Place and compact fill materials in continuous layers of not more than 6 inch thick compacted depth.

C. Provide not less than the specified percentages of density of soil material compacted at optimum moisture content, for each layer of soil material in place.

D. When existing ground surfaces have a density less than that specified for a particular area classification, scarify existing surface to a depth of 12 inches, moisture-condition to optimum moisture content and compact to required percentage of maximum density.

E. Maintain optimum moisture content of fill materials to attain required compaction density.

F. Moisture content shall be uniform throughout all layers. Add necessary moisture or aerate soil material at borrow source if it is not possible to obtain uniform moisture content at soil surface at time of placement.

G. When moisture content and condition of each soil layer is satisfactory compact soils to specified density.

H. Compaction of free draining material such as gravel shall be by treads of crawler type tractor, surface vibrator, smooth or pneumatic roller, hand or power tampers.

I. Compaction of soils by use of water jetting or puddling is not an acceptable procedure.

J. Correct improperly compacted areas or layers as directed by Architect if soil density tests indicate inadequate compaction.

3.11 DISPOSAL OF EXCESS AND WASTE MATERIAL

A. Remove waste materials, including unacceptable excavated material, trash, and debris, and dispose of legally off site.

B. Remove surplus backfill materials from site and dispose of legally off site.

C. Leave material stockpile areas completely free of excess materials.

3.12 PROTECTION OF WORK

A. Protect finished work under provisions of Section 01600.

B. Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation.

C. Protect bottom of excavations from freezing, water saturation, and disturbance.

3.13 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01458.

B. Allow testing service to inspect, test, and approve each subgrade and fill layer before further backfill or construction work is performed

C. Laboratory tests and analysis of fill material will be performed in accordance with ASTM D1557 and with Section 01458.In place site tests and analysis of fill material will be performed in accordance with ASTM D1556, ASTM D2937 or ASTM D2922, and with Section 01458.

D. In place site moisture tests will be performed in accordance with ASTM D3017.

E. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

3.14 GRADING TOLERANCES

A. Top Surface of Backfill: To within not more than 0.10 foot above or below required subgrade elevation.

3.15 PLACEMENT SCHEDULE

A. Fill to Correct Overexcavation:

1. Lean concrete of minimum compressive strength as specified.

2. Imported fill, to required elevation, compact to 95 percent.

B. Utility Trenches on Interior of Building:

1. Sand bedding to 12 inches above pipe, compact to 95 percent.

2. imported subsoil fill, compact to 95 percent.

3. Cover with gravel fill, 6 inches thick, compact to 95 percent.

C. Utility Trenches on Exterior of Building:

1. Sand bedding to 12 inches above pipe, compact to 90 percent.

2. imported subsoil fill, compact to 90 percent.

END OF SECTION

SECTION 02751

CEMENT CONCRETE PAVING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Concrete sidewalks, curbs, gutters, utility slabs, parking areas, driveways, driveway aprons and approaches.

B. Finishing concrete pavements.

C. Surface treatment with sealer and slip resistant coatings.

D. Aggregate base course.

E. Concrete pavement striping.

F. Steel reinforcement.

G. Fibrous secondary reinforcement.

1.2 REFERENCES

A. ACI 301 - Specifications for Structural Concrete for Buildings.

B. ACI 117 - Standard Specification for Tolerances for Concrete Construction and Materials.

C. ADAAG - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities.

D. ASTM A82 - Specification for Steel Wire, Plain, for Concrete Reinforcement.

E. ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.

F. ASTM A184 - Specification for Fabricated Deformed Steel Bar Mats for Concrete.

G. ASTM D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction.

H. ASTM A615 - Deformed and Plain Billet-Steel for Concrete Reinforcement.

I. ASTM C33 - Concrete Aggregates.

J. ASTM C94 - Ready Mixed Concrete.

K. ASTM C150 - Portland Cement.

L. ASTM C260 - Air-Entraining Admixtures for Concrete.

M. ASTM C289 - Potential Reactivity of Aggregates.

N. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.

O. ASTM C494 - Chemical Admixtures for Concrete.

P. ASTM C618- Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture for Concrete.

Q. ASTM C979 - Pigments for Integrally Colored Concrete.

R. ASTM C1116 - Specification for Fiber-Reinforced Concrete and Shotcrete.

S. 2010 CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, California State Accessibility Standards.

T. DSA/AC - Division of State Architect/Access Compliance.

U. National Ready Mix Concrete Association - Plant Certification Program.

V. Southern California Chapter, American Public Works Association - Standard Specifications for Public Works Construction.

W. Stormwater Best Management Practice Handbook (BMP Handbook), Construction Edition, as published by the California Storm Water Quality Association.

1.3 QUALITY ASSURANCE

A. Perform work in accordance with ACI 301.

B. Obtain materials from same source throughout.

1.4 QUALIFICATIONS

A. Manufacturer: Manufacturer of ready-mix concrete products complying with ASTM C94 requirements for production facilities and equipment. Certified according to National Ready Mix Concrete Association's Plant Certification Program.

B. Pavement Installer: Company who has completed pavement work similar in material, design, and extent to that indicated for this project.

C. Detectable Warning Pavement Installer: Company specializing in applying the work of this section with a minimum of 5 years experience and approved by manufacturer of the detectable warning products used.

1.5 REGULATORY REQUIREMENTS

A. Conform to applicable code for paving work on public property.

B. Conform to (CBC) California Building Code, (CCR) Title 24, Part 2, and ADAAG for access requirements for individuals with disabilities.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Provide concrete curing, finishing, and waste management techniques as defined in Section 4 of the Storm Water Best Management Practice Handbook, (BMP Handbook) Construction Edition.

1.7 SUBMITTALS

A. Submit product data under provisions of Section 01330.

B. Include data on joint filler, admixtures and curing compounds.

C. Submit proposed mix design to testing laboratory and to Architect for review prior to commencement of work.

D. Submit manufacturer's instructions under provisions of Section 01330.

1.8 WARRANTY

A. Provide five year warranty under the provisions of Section 01770 for detectable warning pavement.

B. Warranty: Shall indicate compliance with standards required by CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, Section 1133B.8.5. Warranty coverage shall include durability criteria which indicates that the shape, color fastness, sound-on-cane acoustic quality, resilience, and attachment will not degrade significantly for at least five years after original installation. As used in this

Article, "not degrade significantly" means that the product maintains at least 90 percent of its approved design characteristics, as determined by the Division of The State Architect.

2. PART 2 PRODUCTS

2.1 CONCRETE MATERIALS

A. Cement: ASTM C150 Normal-Type I or Type II Portland type, gray color, from single source throughout project.

B. Fine and Coarse Aggregates: ASTM C33, non-reactive when tested in accordance with ASTM C289 and Appendix X-1 of ASTM C33.

C. Water: Clean and not detrimental to concrete.

2.2 BASE MATERIALS

A. Aggregate Base: Crushed rock conforming to Section 200-2.2 of the Standard Specifications for Public Works Construction.

2.3 FORM MATERIALS

A. Conform to ACI 301.

2.4 REINFORCEMENT

A. Reinforcing Steel: ASTM A615; 60 ksi yield grade; deformed billet steel bars, uncoated finish.

B. Welded Steel Wire Fabric: Plain type, ASTM A185; in coiled rolls or flat sheets; uncoated finish.

C. Fabricated Bar Mats: ASTM A184; welded or clip-assembled steel bar mats of ASTM A615, Grade 60 steel bars.

D. Tie Wire: ASTM A82, annealed steel, minimum 16 gage size.

E. Dowels: ASTM A615; 40 ksi yield grade, plain steel, uncoated finish.

F. Supports: Chairs, spacers, dowel bar supports and other devices for spacing, supporting and fastening reinforcing bars, welded wire fabric, and dowels in place.

2.5 ACCESSORIES

A. Curing Compound: ASTM C309, Type 1-D, Class B.

B. Preformed Joint: ASTM D1751, 1/2 inch thick.

C. Clear Sealer: One component alkylalkoxy, silane penetrating sealer.

D. Joint Sealers: As specified in Section 07900.

E. Rock Salt: Commercial standard packaged rock crystals, No. 2 size, free of fines.

2.6 ADMIXTURES

A. Air Entrainment: ASTM C260.

B. Fly Ash: ASTM C618, Class F.

C. Water Reducing Admixture: ASTM C494, Type A.

D. Colored Concrete Pigment: ASTM C979 of color selected.

2.7 FINISH MATERIALS

A. Aggregate: Natural angular; 1/4 inch minimum size to 3/8 inch maximum size; clean washed type. No reactive or iron bearing aggregate permitted. Grey color from single source throughout.

B. Slip Resistant Aggregate: 95 percent minimum fused homogeneous aluminum oxide.

2.8 DETECTABLE WARNING PAVEMENT

A. Surface applied detectable warning system meeting nominal dimensional and color contrast requirements of the CBC, California Building Code, (CCR), California Code of Regulations, Title 24, Part 2, Section 1133B.8.5 and be approved by DSA/AC.

B. Detectable warning pavement to be constructed using the Vitrified Polymer Composite Armor-Tile System manufactured by Engineered Plastics, Inc., www.armor-tile.com.

C. Color of pavement shall be of contrasting yellow color conforming to Color 33538 in accordance with Federal Standard 595B.

2.9 CONCRETE MIX

A. Mix concrete in accordance with ASTM C94, Alternative No. 3.

B. Provide concrete of the following characteristics:

1. Driveways, aprons and approaches: Compressive strength of 3,500 psi at 28 days.

2. Sidewalks, curbs, gutters and utility slabs: Compressive Strength of 2,500 psi at 28 days.

3. Slump: 4 to 6 inches.

4. Maximum aggregate size: 1 inch.

5. Cement Content: Minimum 540 lbs/cu. yd.

6. Fly Ash: Maximum 25 percent by weight.

7. Air Entrainment: 2 to 4 percent.

8. Water Cement Ratio: 0.50.

2.10 PAVEMENT STRIPING PAINT

A. Vinyl emulsion type, yellow color, except at accessible parking spaces, blue color. Blue color to be equal to Color 15090 in accordance with Federal Standard 595B.

B. Acceptable products:

1. W801 Vin-L-Stripe Traffic Paint, manufactured by Dunn-Edwards, www.dunnedwards.com.

2. 506 Traffic Line Paint-Vinyl, manufactured by Frazee, www.frazeepaint.com.

C. Substitutions: Under provisions of Section 01630.

3. PART 3 EXECUTION

3.1 INSPECTION

A. Verify compacted subgrade is ready to support paving and imposed loads.

B. Verify gradients and elevations of base are correct.

C. Beginning of installation means acceptance of existing conditions.

3.2 BASE

A. Prepare and compact base materials in accordance with provisions of Section 02316.

3.3 PREPARATION

A. Moisten base to minimize absorption of water from fresh concrete.

B. Coat surfaces of adjacent manholes, catch basins, inlets, and other fixed objects with oil to form isolation joint and prevent bond with paving.

C. Notify Architect minimum 24 hours prior to commencement of concreting operations.

3.4 FORMING

A. Place and secure forms to correct location, dimension, and profile.

B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

C. Place joint fillers vertical in position, in straight lines. Secure to formwork during concrete placement.

3.5 REINFORCEMENT

A. Place reinforcement at mid-height of slabs-on-grade.

B. Lap adjoining pieces of welded wire fabric one full mesh and lace splice with wire. Offset laps of adjoining sheets.

C. Place fabricated bar mats in lengths as long as practical. Overlap adjacent mat 2 inches.

D. Interrupt reinforcement at expansion joints.

E. Place secondary fiber reinforcement in concrete mix in quantities as specified for concrete pavements.

F. Place reinforcement to achieve slab and curb alignment as detailed.

G. Provide doweled joints at interruption of concrete with one end of dowel set in capped sleeve to allow longitudinal movement.

3.6 PLACING CONCRETE

A. Place concrete in accordance with ACI 301.

B. Hot and Cold Weather Placement: ACI 301.

C. Place concrete formwork on public property in conformance with applicable code.

D. Ensure reinforcement, inserts, embedded parts, and formed joints are not disturbed during concrete placement.

E. Place concrete continuously between predetermined construction joints and control joints. Do not break or interrupt successive pours such that cold joints occur.

F. Do not push or drag concrete into place or use vibrators to move concrete into place.

G. Place concrete to pattern indicated in strip sequence.

3.7 JOINTS

A. Review locations of joints when indicated and make recommendations for any additional joints or suggestions for new locations. Lack of joints or misplacement of joints will not constitute justification of pavement cracking.

B. Place expansion joints at not to exceed 20 foot intervals to correct elevation and profile. Align curb, gutter, and sidewalk joints.

C. Place joint filler between paving components and building or other appurtenances. Recess top of filler for sealant placement by Section 07900.

D. Provide control joints at not to exceed 4 foot intervals.

E. Saw cut control joints 3/16 inch wide at an optimum time after finishing. Cut 1/3 into depth of slab.

F. Provide keyed joints as indicated.

G. Finish each edge of joint with radiused jointer tool.

H. Form isolation joints where paving abutts curbs, catch basins, manholes, inlets, structures, and other fixed objects.

3.8 FINISHING

A. Uniformly spread, screed and consolidate concrete. Do not spread concrete by vibration.

B. Smooth Form Finish:

1. Coordinate as necessary to secure form construction using smooth, hard, uniform surfaces, with number of seams kept to a practical minimum and in a uniform, orderly pattern.

2. Patch tie holes and defects.

3. Trowel to smooth even finish.

4. Use for curbs, gutters, and mowstrips.

C. Medium Broom Finish:

1. Float surface and trowel to smooth even finish.

2. While surface is still plastic draw a soft fiber bristle broom uniformly over surface in perpendicular direction to traffic.

3. Use for sidewalks utility slabs which have a slope of 6 percent or less.

D. Slip Resistant/Heavy Broom Finish:

1. Float surface and trowel to smooth even finish.

2. While concrete is still plastic, uniformly broadcast aluminum oxide particles onto surface at the rate of 25 pounds per 100 sq. ft.

3. Trowel particles into surface of concrete to provide embedment. Do not force below surface.

4. While surface is still plastic, draw a stiff fiber bristle broom uniformly over surface in perpendicular direction of traffic.

5. Use for ramps with slope of 6 percent or greater, stair treads, and areas indicated.

3.9 DETECTABLE WARNING PAVEMENT

A. Install detectable warning pavement on curb ramps and other areas indicated on the drawings.

B. Install detectable warning pavement in accordance with manufacturer's requirements and the ADAAG and CBC requirements.

3.10 CURING

A. Cure concrete surfaces in accordance with ACI 301.

B. Apply curing compound on finished slab surfaces in accordance with manufacturer's instructions.

3.11 PAVEMENT STRIPING

A. Lay out line markings and other painting in accordance with Drawings. Lines shall be 4 inches wide.

B. Clean surfaces to be painted.

C. Apply paint in accordance with manufacturer's directions.

D. Apply only when weather conditions permit proper application.

E. Machine apply paint in as many coats as are required to provide opaque markings.

3.12 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01458.

B. Owner's Inspector will take cylinders and perform slump and air entrainment tests in accordance with ACI 301 and will arrange for pick-up of cylinders by Testing Laboratory.

C. Three concrete test cylinders will be taken for every 50 or less cu yds of each class of concrete placed each day.

D. One slump test will be taken for each set of test cylinders taken.

E. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.13 TOLERANCES

A. Provide tolerances under provisions of Section 01450 in accordance with ACI 117.

B. Maximum Variation of Surface Flatness: 1/4 inch in 10 feet.

C. Maximum Variation from True Position: 1/4 inch.

D. Variation of Pavement Thickness: Plus 3/8 inch, minus 1/4 inch.

E. Maximum Variation of Pavement Joints: 1/8 inch vertical alignment.

3.14 PROTECTION

A. Immediately after placement, protect concrete under provisions of Section 01600 from premature drying, excessive hot or cold temperatures, and mechanical injury.

B. Do not permit traffic over pavement for 7 days after finishing.

END OF SECTION

SECTION 03100

CONCRETE FORMWORK

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Formwork for cast-in-place concrete, with shoring, bracing, and anchorage.

B. Openings for other affected work.

C. Form accessories.

D. Stripping forms.

1.2 REFERENCES

A. 2010 CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, Chapter 19A.

B. ACI 301 - Specifications for Structural Concrete for Buildings.

C. PS 1-95 - Construction and Industrial Plywood.

1.3 SYSTEM DESCRIPTION

A. Design, engineer, and construct formwork, shoring, and bracing to meet design and code requirements, so that resultant concrete conforms to required shapes, lines, and dimensions.

1.4 QUALITY ASSURANCE

A. Construct and erect concrete formwork in accordance with ACI 301.

1.5 REGULATORY REQUIREMENTS

A. Conform to 2010 CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2.

2. PART 2 PRODUCTS

2.1 FORM MATERIALS

A. Plywood: PS1-95, BB Plyform grade, Class I, Exterior classification.

B. Lumber: Douglas Fir species; construction grade; with grade stamp clearly visible.

C. Tubular Column: Round, smooth, fiber reinforced tube with plastic coated paper lining, of sizes required.

2.2 FORMWORK ACCESSORIES

A. Form Ties: Snap-off metal of adjustable length; cone type; 1 inch break back dimension; free of defects that will leave holes no larger than one inch diameter in concrete surface.

B. Form Release Agent: Colorless material which will not stain concrete, absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.

C. Fillets for Chamfered Corners: Wood strips type; 3/4 x 3/4 inch size; maximum possible lengths.

D. Dovetail Anchor Slots: Minimum 22 gage galvanized steel; foam filled; release tape sealed slots; bent tab anchors; securable to concrete formwork; manufactured by Heckmann Building Products Co., www.heckmannbuildingprods.com.

E. Flashing Reglets: 26 gage thick galvanized steel; longest possible lengths; release tape sealed slots; with alignment splines for joints; securable to concrete formwork; Type CO reglet manufactured by Fry Reglet www.fryreglet.com.

F. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required; of strength and character to maintain formwork in place while placing concrete.

3. PART 3 EXECUTION

3.1 INSPECTION

A. Verify lines, levels, and measurements before proceeding with formwork.

3.2 PREPARATION

A. Obtain Architect's approval for use of earth forms for footings.

B. Minimize form joints. Symmetrically align joints and make watertight to prevent leakage of mortar.

C. Arrange and assemble formwork to permit stripping, so that concrete is not damaged during its removal.

D. Arrange forms to allow stripping without removal of principal shores, where required to remain in place.

3.3 ERECTION

A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.

B. Provide bracing to ensure stability of formwork. Strengthen formwork liable to be overstressed by construction loads.

C. Provide chamfer strips on external corners of walls.

D. Obtain approval before framing openings in structural members which are not indicated on Drawings.

E. Do not displace or damage vapor barrier placed by Section 03300.

F. Construct formwork to maintain tolerances in accordance with ACI 301.

3.4 APPLICATION OF FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's instructions. Apply prior to placing reinforcing steel, anchoring devices, and embedded items.

B. Do not apply form release agent where concrete surfaces are scheduled to receive applied coverings which may be affected by agent. Soak contact surfaces of untreated forms with clean water. Keep surfaces wet prior to placing concrete.

3.5 INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Provide formed openings where required for work embedded in or passing through concrete.

B. Coordinate work of other Sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.

C. Install accessories in accordance with manufacturer's instructions, level and plumb. Ensure items are not disturbed during concrete placement.

3.6 FORM REMOVAL

A. Do not remove forms and bracing until concrete has sufficient strength to support its own weight and imposed loads.

B. Do not damage concrete surfaces during form removal.

C. Store reusable forms for exposed architectural concrete to prevent damage to contact surfaces.

D. Remove formwork in same sequence as concrete placement to achieve similar concrete surface coloration.

3.7 CLEANING

A. Clean forms to remove foreign matter as erection proceeds.

B. Ensure that water and debris drain to exterior through clean-out ports.

3.8 EARTH FORMS

A. Construct wood edge strips at top sides of excavations as indicated on drawings.

B. Provide forms for footings and foundation walls wherever concrete cannot be placed against solid earth.

C. Remove loose dirt and debris from form area prior to concrete placement.

D. Concrete for foundations may be placed directly into neat excavations provided the foundation trench walls are stable as determined by the Architect (Structural Engineer) subject to the approval of The Division of the State Architect.

E. When earth formed foundations are used, the minimum formwork shown on the drawings is mandatory to insure clean excavations prior to and during concrete placement.

F. Provide 3-1/2 inch high starter wall for all concrete and masonry walls below grade.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Reinforcing steel bars, welded steel wire fabric fabricated steel bar or rod mats for cast-in-place concrete.

B. Support chairs, bolsters, bar supports, and spacers, for supporting reinforcement.

C. Fibrous secondary reinforcement for slabs-on-grade.

1.2 REFERENCES

A. 2010 CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, Chapter 19A (ACI 318).

B. ACI 301 - Specifications for Structural Concrete for Buildings.

C. ACI 315 (SP-66) - Details and Detailing of Concrete Reinforcement.

D. ACI 318 - Building Code Requirements for Reinforced Concrete.

E. ASTM A82 - Cold Drawn Steel Wire for Concrete Reinforcement.

F. ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.

G. ASTM A615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

H. ASTM A706 - Standard Specification for Low Alloy Steel Deformed Bars for Concrete Reinforcement.

I. ASTM C1116 - Specification for Fiber-Reinforced Concrete and Shotcrete.

J. AWS D1.4 - Structural Welding Code Reinforcing Steel.

K. CRSI - Manual of Practice.

L. CRSI - Placing Reinforcing Bars.

1.3 QUALITY ASSURANCE

A. Perform concrete reinforcement work in accordance with CRSI Manual of Standard Practice.

B. Conform to ACI 301 and ACI 315 (SP-66).

C. Conform to 2010 CBC California Building Code, (CCR) California Code of Regulations, Title 24, Part 2.

1.4 CERTIFICATES

A. Submit mill test certificates of supplied concrete reinforcing, indicating physical and chemical analysis.

2. PART 2 PRODUCTS

2.1 MATERIALS

A. Reinforcing Steel: ASTM A615, Grade 40 for No. 4 bars and smaller, Grade 60 for No. 5 bars and larger. Billet-steel deformed bars, uncoated finish.

B. Welded Reinforcement: ASTM A706, Grade 60, deformed bars, unfinished.

C. Welded Steel Wire Fabric: ASTM A185 plain type; coiled rolls; uncoated finish.

D. Steel Wire: ASTM A82, plain, cold drawn steel.

E. Fibrous Reinforcement:

1. Collated, fibrillated, polypropylene fibers with length varying from 1-1/2 to 2 inches; nylon filamentized fibers of 3/4 inch length; cellulose fibers of 1/8 inch length; cellulose fibers of 1/8 inch length meeting requirements of ASTM C1116, Type III.

2. Manufacturers:

(a) Forta Mono or Forta, Forta Corp., www.fortacorp.com.

(b) Fibermix or Fibermesh, SI Concrete Corp., www.fibermesh.com.

(c) Nycon, Nycon, Inc., www.nycon.com.

(d) Grace Fibers or Micro Fibers, W.R. Grace and Co., www.graceconstruction.com.

(e) Buckeye Building Fibers, www.ultrafiber500.com.

3. Substitutions: Under provisions of Section 01630.

2.2 ACCESSORY MATERIALS

A. Tie Wire: Minimum 16 gage annealed type.

B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during installation and placement of concrete including load bearing pad on bottom to prevent vapor barrier puncture.

C. Chairs, Bolsters, Bar Supports, Spacers Adjacent to Architectural Concrete Surfaces: Plastic coated sized and shaped as required.

2.3 FABRICATION

A. Fabricate in accordance with ACI 315 (SP-66), providing concrete cover specified in Section 03300.

B. Locate reinforcing splices not indicated on Drawings at points of minimum stress.

C. Weld reinforcing bars in accordance with AWS D1.4.

3. PART 3 EXECUTION

3.1 INSTALLATION

A. Before placing concrete, clean reinforcement of foreign particles or coatings.

B. Place, support, and secure reinforcement against displacement. Do not deviate from alignment or measurement.

C. Mix fibrous reinforcement into concrete material according to Section 03300.

D. Do not displace or damage vapor barrier required by Section 03300.

3.2 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01458 and as required by the Division of the State Architect and District Inspector.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cast-in-place concrete foundation walls, and footings.

B. Floors and slabs on fill on vapor barrier.

C. Control, expansion, and contraction joint devices associated with concrete work.

D. Curing and sealing compound.

E. Building floors.

F. Retaining walls and utility slabs.

G. Equipment pads, thrust blocks, and light pole bases.

1.2 REFERENCES

A. 2010 CBC - California Building Code, (CCR) California Code of Regulations Title 24, Part 2, Chapter 19A.

B. 2010 CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, California State Accessibility Standards.

C. ADAAG - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities.

D. ACI 301 - Specifications for Structural Concrete for Buildings.

E. ACI 302.1R - Guide for Concrete Floor and Slab Construction.

F. ACI 305R - Hot Weather Concreting.

G. ACI 306.1 - Standard Specification for Cold Weather Concreting.

H. ASTM C33 - Concrete Aggregates.

I. ASTM C94 - Ready-Mixed Concrete.

J. ASTM C109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars.

K. ASTM C150 - Portland Cement.

L. ASTM C289 - Potential Reactivity of Aggregate.

M. ASTM C309 - Liquid Membrane Forming Compound.

N. ASTM C330 - Lightweight Aggregates for Structural Concrete.

O. ASTM C494 - Standard Specifications for Chemical Admixtures for Concrete.

P. ASTM C567 - Unit Weight of Structural Lightweight Concrete.

Q. ASTM C618- Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture for Concrete.

R. ASTM C932 - Surface-Applied Bonding Agents.

S. ASTM C1315 - Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.

T. ASTM D226 - Asphalt Saturated Organic Felt used in Roofing and Waterproofing.

U. ASTM D1751 - Preformed Expansion Joint Filler for Concrete Paving and Structural Construction.

V. ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials.

W. ASTM E154 - Standard Test Methods for Water Vapor Retardants used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.

X. ASTM E1643 - Installation of Water Vapor Retarders used in Contact with Earth or Granular Fill Under Concrete Slab.

Y. ASTM E1155 - Determining Floor Flatness and Levelness Using the F-Number System.

Z. ASTM E1745 - Standard Specifications for Plastic Water Vapor Retarders Used in Contact with Soil Or Granular Fill Under Concrete Slabs.

AA. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

BB. National Ready Mix Concrete Association - Plant Certification Program.

CC. Stormwater Best Management Practice Handbook (BMP Handbook), Construction Edition, as published by the California Storm Water Quality Association.

1.3 QUALITY ASSURANCE

A. Perform work in accordance with ACI 301.

B. Obtain materials from same source throughout the Work.

1.4 QUALIFICATIONS

A. Manufacturer: Manufacturer of ready-mix concrete products complying with ASTM C94 requirements for production facilities and equipment. Certified according to National Ready Mix Concrete Associates Plant Certification Program.

1.5 DESIGN MIX

A. Submit design mix for each class of concrete, prepared by a California Registered Civil Engineer, to Testing Laboratory and Architect for review.

1.6 REGULATORY REQUIREMENTS

A. Conform to 2010 CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2.

B. Conform to 2010 CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, and ADAAG for access requirements for individuals with disabilities.

1.7 SUBMITTALS

A. Submit product data and manufacturer's instructions under provisions of Section 01330.

1.8 PRE-INSTALLATION CONFERENCE

A. Convene a conference two weeks prior to commencing placement of floor slab work of this section, under provisions of Section 01310.

B. Require attendance of parties directly affecting the work of this Section.

C. Agenda:

1. Placement of subgrade beneath floor slab.
2. Testing of subgrade beneath floor slab.
3. Delivery and placement of concrete.
4. Testing and inspection procedures for concrete.
5. Submittal of mix design for concrete.
6. Hot and cold weather concreting procedures.
7. Vapor barrier location and installation.
8. Placement of control and expansion joints.
9. Steel reinforcement installation.
10. Installation of inserts and embedded items.
11. Finishes and finishing.
12. Forming and form removal limitations.
13. Floor slab flatness and levelness requirements.
14. Curing process and procedures.
15. Protection of finished floor slabs.
16. Floor slab joint and crack repair.
17. Moisture vapor transmission testing.

1.9 WARRANTY

A. Provide fifteen year warranty from curing, hardening and vapor barrier compound manufacturer under provisions of Section 01770.

B. Warranty: Include coverage for removal and replacement of finish floor materials that delaminate from interior floor slabs due to moisture migration and excessive vapor emissions or due to presence of efflorescence and alkali contaminates.

1. Subfloor Moisture Conditions: Moisture emission rate of no more than 3 lb/1000 sq. ft./24 hours when tested by Quantitive Anhydrous Calcium Chloride Test, ASTM F1869, with subfloor temperature not less than 65 degrees F.

2. Subfloor Alkalinity Conditions: A pH range of between 5 to 9 when subfloor is wetted with potable water and pHdrion paper is applied.

3. December 17, 2012Warranty to be supported by $1,000,000.00 product liability insurance policy issued directly to the Owner.

C. Provide ten year warranty from waterproofing admixture manufacturer that surfaces treated with crystalline waterproofing admixture will remain free from water leakage.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Provide concrete curing, finishing, and waste management techniques as defined in Section 4 of the Storm Water Best Management Practice Handbook, (BMP Handbook) Construction Edition.

2. PART 2 PRODUCTS

2.1 FORMWORK

A. As specified in Section 03100.

2.2 REINFORCEMENT

A. Reinforcing steel as specified in Section 03200.

2.3 CONCRETE MATERIALS

A. Cement: ASTM C150, Type I or Type II Portland type; low alkali; grey color.

B. Fine and Coarse Aggregates Normal Weight Concrete: ASTM C33, non reactive when tested in accordance with ASTM C289 and Appendix X-1 of ASTM C33.

C. Fine and Coarse Aggregate, Light Weight Concrete: ASTM C330.

D. Water: Clean and not detrimental to concrete.

2.4 ADMIXTURES

A. Water Reducing Admixture: ASTM C494, Type A.

B. Calcium chloride, or any other admixtures not allowable.

2.5 VAPOR BARRIER

A. Material: 15 mil thick polyethylene film meeting the requirements of ASTM E1745, Class A, with a minimum permeance of 0.01 perms in accordance with ASTM E96/E154, Section 7.

B. Accessories: Minimum 4 inch wide polyethylene tape with pressure sensitive adhesive.

C. Manufacturers:

1. Fortifiber Building Products, www.fortifiber.com.

2. Reef Industries, www.reefindustries.com.

3. Stego Industries, www.stegoindustries.com.

4. Substitutions: Under Provisions of Section 01630.

2.6 ACCESSORIES

A. Underlayment: ASTM D226, Type I (No. 15) asphalt saturated roofing felt.

B. Bonding Agent: ASTM C932; Weld-Crete as manufactured by Larsen Products Corp., www.larsenproducts.com.

C. Non-shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 7000 psi in 28 days.

D. Joint Filler: ASTM D1751, 1/2 inch thick.

E. Sand Fill: Manufactured "crusher run" sand free of silt, clay, loam, friable or soluble materials or organic matters, all passing the No. 4 sieve and only 5 percent passing the No. 200 sieve.

F. Curing, Hardening and Vapor Barrier Compound: ASTM C1315, Type I, Class A and ASTM C309, Type 1, Class A, with maximum volatile organic compound (VOC) content rating as required to suit regulatory requirements. Material to have no less than 34 percent penetrating solids, have no visible sheen and be compatible with floor finish materials and overlayments. Provide the following:

1. PMC 3300 Penetrating Sealer manufactured by Curranseal, www.curranseal.com.

G. Sealing Compound: Ashford Formula manufactured by Curecrete Distribution, Inc., www.ashfordformula.com.

H. Slip Resistant Aggregate: 95 percent minimum fused homogeneous aluminum oxide.

I. Chemical Concrete Stain: Penetrating reactive concrete stain and clear sealer of color selected by Architect. Subject to compliance with requirements provide one of the following:

1. Blush-Tone Acid Stain as manufactured by Rafco Products Co., www.brickform.com.

2. Lithochrome Chemstain as manufactured by L.M. Scofield Co., www.scofield.com.

3. ChlorStain as manufactured by Super Stone, Inc., www.superstone.com.

4. Patina Stain System as manufactured by the Symons Corporation, www.symons.com.

5. SGS Concrete Stain as manufactured by Solomon Grind Chemical Services, www.solomoncolors.com.

J. Concrete Floor Slab, Saw Cut, Joint, Crack, Repair Material: Cement-based, polymer-modified product that can be feathered at edges to match adjacent floor elevations. Compressive strength not less than 4,200 psi at 28 days when tested according to ASTM C109. Equivalent to ARDEX SD-F Feather Finish, www.ardex.com. Epoxy base to be equivalent to Simpson ET-22 semi-rigid epoxy, www.strongtie.com.

K. Substitutions: Under provisions of Section 01630.

2.7 CONCRETE MIX

A. Mix concrete in accordance with ASTM C94 and CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, Section 1905A.3.

B. Footings: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 3,500 psi at 28 days.

2. Maximum Water-Cement Materials Ratio: 0.50.

3. Aggregate Size: 1 inch maximum.

4. Slump Limit: 4 inch minimum, 6 inch maximum.

C. Slabs-On-Grade: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4,000 psi at 28 days.

2. Minimum Cement Materials Content: 540 lb./cu. yd.

3. Maximum Water-Cement Materials Ratio: 0.45.

4. Aggregate Size: 3/4 inch maximum.

5. Slump Limit: 3 inch minimum, 5 inch maximum.

6. Fly Ash: Maximum 25 percent by weight.

3. PART 3 EXECUTION

3.1 INSPECTION

A. Verify anchors, seats, plates, reinforcement, and other items to be cast into concrete are accurately placed, held securely, and will not cause difficulty in placing concrete.

3.2 PREPARATION

A. At locations where new concrete is dowelled to existing work, drill holes in existing concrete, insert steel dowels, and pack solid with non-shrink grout.

B. Place 2 inch thick sand fill over subgrade.

C. Compact sand fill as specified in Section 02316.

D. Install underlayment over wood subfloor. Lap joints 6 inches. Fasten in place.

3.3 VAPOR BARRIER

A. Install vapor barrier in compliance with ASTM E1643 under interior slabs over sand subgrade.

B. Lay vapor barrier with long dimension parallel with long dimension of space.

C. Lap vapor barrier over footing and seal to vertical surface of foundation wall.

D. Overlap all joints in vapor barrier 6 inches and seal with tape.

E. Seal all pipe penetrations of vapor barrier with pipe boot fabricated from vapor barrier material and tape.

F. Repair damaged areas with vapor barrier, overlapping damaged area by 6 inches and taping all four sides.

3.4 PLACING CONCRETE

A. Notify Architect minimum 24 hours prior to commencement of concreting operations.

B. Place concrete in accordance with ACI 301.

C. Hot Weather Placement: ACI 305R.

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water.

2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete in hot weather. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

D. Cold Weather Placement: ACI 306.1.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 306.1

E. Ensure reinforcement, inserts, embedded parts and formed joints are not disturbed during concrete placement.

F. Do not disturb or damage vapor barrier while placing concrete. Repair damage as required to maintain integrity of barrier.

G. Place concrete continuously between predetermined construction and control joints. Do not break or interrupt successive pours such that cold joints occur.

H. Place interior floor slabs on fill in a strip sequence pattern.

I. Excessive honeycomb or embedded debris in concrete is not acceptable.

3.5 SEPARATE FLOOR TOPPING

A. Prior to placing floor topping roughen existing substrate concrete surface and remove deleterious material. Broom and vacuum clean.

B. Apply bonding agent to substrate concrete in accordance with manufacturer's instructions.

C. Place edge strips reinforcing and other items to be cast into topping.

D. Place topping to required lines and levels.

E. Screed topping level, maintain surface flatness.

3.6 JOINTS

A. Saw cut control joints at an optimum time after finishing. Use 3/16 inch thick blade, cutting 1/3 into depth of slab thickness.

B. Provide control joints at 15 feet on center unless otherwise indicated.

C. Separate slabs from vertical surfaces with joint filler. Extend joint filler from bottom of slab to within 1/4 inch of finished slab surface.

3.7 FLOOR SLAB JOINT FILLING AND CRACK REPAIR

A. Prepare, clean, and install joint repair material according to manufacturer's written instructions.

B. Defer joint filling and crack repair until concrete has aged a minimum of 60 days.

C. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

D. Mechanically V-groove as necessary all saw cuts, joints and cracks, to a minimum width of 1/4 inch and a minimum depth of 5/8 inch.

E. Fill bottom of joint to a depth of at least 3/16 inch with semi-rigid epoxy.

F. Place silica sand over epoxy filler.

G. Fill all saw cuts, joints, and cracks with cement based joint repair material to top of concrete surface.

H. Steel trowel edges of joint repair material to a feather edge to match adjacent floor elevation.

3.8 FINISHING OF FORMED SURFACES

A. Rough form finish:

1. Leave surfaces with the texture imparted by forms, except patch tie holes and defects.

2. Remove fins exceeding 1/4 inch in height.

3. Use for below grade foundation walls and concealed spaces.

B. Smooth form finish:

1. Coordinate as necessary to secure form construction using smooth, hard, uniform surfaces, with number of seams kept to a practical minimum and in a uniform and orderly pattern.

2. Patch tie holes and defects.

3. Remove fins completely.

4. Use for exposed finish surfaces to receive paint.

C. Smooth rubbed finish:

1. Produce on newly hardened concrete no later than the day following form removal.

2. Wet the surfaces, and rub with carborundum brick or other abrasive until uniform color and texture are produced.

3. Do not use a cement grout other than the cement paste drawn from the concrete itself by the rubbing process.

4. Use for exposed finish surfaces to receive clear sealer.

D. Grout cleaned finish:

1. Do not start cleaning operations until all contiguous surfaces to be cleaned are completed and accessible.

2. Do not permit cleaning as the work progresses.

3. Mix one part Portland cement and 1-1/2 parts fine sand with sufficient water to produce a grout having the consistency of thick paint.

4. Wet the surface of the concrete sufficiently to prevent absorption of water from the grout and apply the grout uniformly with brushes or spray gun.

5. Immediately after applying the grout, scrub the surface vigorously with a cork float or stone to coat the surface and fill all air bubbles and holes.

6. While the grout is still plastic, remove all excess grout by working the surface with a rubber float, sack, or other means.

7. After the surface whites from drying (about 30 minutes at normal temperatures), rub vigorously with clean burlap.

8. Keep the surface damp for at least 36 hours after final rubbing.

9. Use for repair of exposed finish surfaces to receive paint or clear sealer.

E. Medium Sandblast Finish:

1. Concrete must have cured a minimum of 14 days prior to sandblasting.

2. Perform sandblasting finishing in as continuous an operation as possible, utilizing same work crew to maintain continuity of finish on each surface or area of work.

3. Maintain depth of cut and general aggregate exposure to match field sample.

4. After sandblasting to required finish, wash to clean exposed aggregate surfaces to match Architect's sample.

3.9 FINISHING SLABS

A. Uniformly spread, screed and consolidate concrete. Do not spread concrete by vibration.

B. Float Finish: Float with hand float or with a powered disc float. High spots to be cut down and low spots to be filled. Use as preparation for further finishing.

C. Scratched Finish: Mechanically float surfaces. Roughen with stiff brushes before final set. Use for ceramic tile with full bed setting systems substrate slab beneath topping and where indicated.

D. Troweled Finish: After floating, steel trowel to smooth, mark free surface. Use for exposed floors and slabs to receive carpeting and where indicated.

E. Fine Broom Finish: After floating and while the surface is still plastic, provide a fine textured finish by drawing a fine fiber bristle broom uniformly over the surface in one direction only. Use for exposed floors and slabs where indicated.

F. Slip Resistant Finish: After floating and while the surface is still plastic, uniformly broadcast aluminum oxide particles onto surface at the rate of 25 pounds per 100 sq. ft. Trowel particles into surface to provide embedment but do not force below surface. Use for exposed floors and slabs which constitute ramps with slope of 6 percent or greater, exposed stair treads, and as indicated.

G. Polished Concrete Finish: As specified in Section 03365.

3.10 SLAB TOLERANCES

A. Maintain slab tolerance as defined in ACI 302.1R of (SOV) F_F35 and F_L25 and (MLV) F_F24 and F_L17 as measured by ASTM E1155 for slabs on grade.

B. Correct the slab surface if the actual F_F/F_L number for the floor installation measures less than required.

C. In areas of floor drains, maintain floor levels at the walls and slope surface uniformly to drains at 1/8 inch per foot.

3.11 CURING

A. Apply curing, hardening and vapor barrier compound on all floor slabs that are not exposed and indicated to be sealed.

B. Cure concrete surfaces in accordance with ACI 301.

C. Spray apply curing, hardening and vapor barrier compound on finished slab surfaces located below grade, at grade, and above grade in two "wet on wet" flood coats at the total rate of 200 sq. ft./gallon in accordance with manufacturer's instructions.

D. Application of compound shall be by a trained applicator acceptable to compound manufacturer.

E. After application of curing, hardening, and vapor barrier compound, moist cure concrete using the following method:

1. Spraying: Fog spray clean, potable water over floor slab areas and maintain moist for 10 days.

2. Polyethylene Film: Spread over floor slab areas, lap edges and sides, maintain in place for 10 days.

3.12 SEALING

A. Apply sealing compound on finished floor slab surfaces that are not to receive a finished floor covering and are indicated to be exposed and sealed.

B. Apply sealing compound immediately following finishing operation.

C. Apply sealing compound in sufficient quantities to keep entire surface wet for a minimum of 30 minutes.

D. Lightly mist surface with water as compound is absorbed into surface.

E. Flush surface with water and squeegee surface free of excess compound.

F. Burnish final concrete surface with propane burnisher.

3.13 PATCHING

A. Notify Architect immediately upon removal of forms to determine areas that will require patching.

B. Surface defects shall include color and texture irregularities, stains, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections and discolorations in the surface that cannot be removed by cleaning.

C. Patch imperfections in accordance with ACI 301.

3.14 DEFECTIVE CONCRETE

A. Modify or replace concrete not conforming to required levels and lines, details, and elevations.

B. Repair or replace concrete not properly placed or of the specified type.

3.15 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01458 and as required by the Division of the State Architect and District Inspector.

B. Owner's Inspector will take cylinders and perform slump and air entrainment tests in accordance with ACI 301 and will arrange for pick-up by Testing Laboratory.

C. Three cylinders will be taken for every 50 yards, or fraction thereof, for each class of concrete for each day.

D. Tests of cement and aggregates will be performed by Testing Laboratory to ensure conformance with requirements stated herein.

E. Slab tolerance as measured by ASTM E1155 shall be performed within 72 hours of floor slab installation.

F. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.16 PROTECTION

A. Protect finished work under provisions of Section 01600.

B. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

C. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

END OF SECTION

SECTION 05500

METAL FABRICATION

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Shop fabricated ferrous metal items, galvanized and prime painted.

B. Schedule of metal fabrications.

1.2 REFERENCES

A. ASTM A36 - Structural Steel.

B. ASTM A53 - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

C. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

D. ASTM A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

E. ASTM A307 - Carbon Steel Externally Threaded Standard Fasteners.

F. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

G. ASTM A780 - Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

H. AWS A2.4 - Standard Welding Symbols.

I. AWS D1.1 - Structural Welding Code - Steel.

J. SSPC - The Society for Protective Coatings.

1.3 SUBMITTALS

A. Submit under provisions of Section 01330.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

C. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

1.4 QUALIFICATIONS

A. Welders' Certificates: Submit under provisions of Section 01330, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.

1.5 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on Drawings.

2. PART 2 PRODUCTS

2.1 MATERIALS

A. Steel Sections: ASTM A36.

B. Steel Tubing: ASTM A500, Grade B.

C. Plates: ASTM A36.

D. Pipe: ASTM A53, Grade B, Schedule 40.

E. Bolts, Nuts, and Washers: ASTM A307 galvanized to ASTM A153 for galvanized components.

F. Welding Materials: AWS D1.1; type required for materials being welded.

G. Shop and Touch Up Primer: SSPC 15, Type 1, red oxide.

H. Touch-Up Primer for Galvanized Surfaces: SSPC 20.

2.2 FABRICATION, GENERAL

A. Fit and shop assemble in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Continuously seal joined members by continuous welds unless indicated otherwise.

D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.3 FINISHES

A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

B. Do not prime surfaces in direct contact with concrete or where field welding is required.

C. Prime paint items with one coat.

D. Galvanize assembled items to minimum 1.25 oz/sq ft zinc coating in accordance with ASTM A123.

E. Repair damaged galvanized surfaces in accordance with ASTM A780 Method A2.

F. Finish: Site paint exposed to view prime painted and galvanized items under provisions of Section 09900.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Beginning of installation means erector accepts existing conditions.

3.2 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply items required to be cast into concrete or embedded in masonry with setting templates, to appropriate sections.

3.3 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Field weld components indicated on Drawings.

D. Perform field welding in accordance with AWS D1.1.

E. Obtain Architect approval prior to site cutting or making adjustments not scheduled.

F. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

3.4 SCHEDULE

A. The Schedule is a list of principal items only. Refer to Drawing details for items not specifically scheduled.

B. Miscellaneous Framing and Supports: Steel not a part of structural steel framework as required to complete work; galvanized finish.

C. Bumper Posts and Guard Rails: As detailed; galvanized finish.

D. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; prime paint finish.

E. Joist Hangers: Joist strap anchors, galvanized finish.

F. Ledge and Shelf Angles, Channels and Plates Not Attached to Structural Framing: For support of metal decking, joists prime paint finish.

G. Lintels: As detailed; prime paint finish.

H. Opening Frames for Overhead Doors and Wall Openings: Structural sections; prime paint finish.

I. Burglar Bars in Wall Openings: Fabricated as detailed; prime paint finish.

J. Bicycle Racks: Tubular Steel; prime paint finish.

K. Metal Gates and Fences: Welded tubular steel as detailed, complete with all necessary hardware; prime paint finish.

END OF SECTION

SECTION 05520

HANDRAILS AND RAILINGS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Steel tube handrails, balusters, and fittings.

1.2 REFERENCES

A. ADAAG - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities.

B. ASTM A36 - Specifications for Structural Steel.

C. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

D. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

E. ASTM A269 - Seamless and Welded Austentitic Stainless Steel Tubing for General Service.

F. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.

G. ASTM B429 - Aluminum-Alloy Extruded Structural Pipe and Tube.

H. ASTM E985 - Permanent Metal Railing Systems and Rails for Buildings.

I. AWS D1.1 - Structural Welding Code - Steel.

J. AWS D1.2 - Structural Welding Code - Aluminum.

K. AWS D1.6 - Structural Welding Code - Stainless Steel.

L. NAAMM - Metal Finishes Manual.

M. 2010 CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, California State Accessibility Standards.

N. SSPC - The Society for Protective Coatings.

1.3 DESIGN REQUIREMENTS

A. Design, engineer, fabricate and install railing assembly, wall rails, and attachments to resist force of 200 lbs applied in any direction at any point on the rail without damage or permanent set.

B. Conform to 2010 CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 2 and ADAAG for accessibility requirements.

C. Fabricate railing assembly, wall rails, and attachments to ASTM E985 requirements.

1.4 SUBMITTALS

A. Submit under provisions of Section 01330.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

1.5 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on Drawings.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Craneveyor Corp., www.craneveyor.com.

B. R and B Wagner, Inc., www.rbwagner.com.

C. Substitutions: Under provisions of Section 01630.

2.2 STEEL RAILING SYSTEM

A. Rails and Posts: ASTM A500, Grade B, 1-1/2 inch diameter steel tubing, 3/16 inch wall thickness, welded joints with steel inserts for casting in concrete.

B. Structural Plates, Shapes, and Bars: ASTM A36.

C. Fittings: Elbows, T-shapes, flanges, escutcheons; machined steel.

D. Wall Brackets: Julius Blum No. 1378, www.juliusblum.com.

E. Splice Connectors: Steel welding collars.

F. Welding Materials: AWS D1.1.

2.3 FABRICATION

A. Fit and shop assemble components in largest practical sizes, for delivery to site.

B. Fabricate components with joints tightly fitted and secured.

C. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

D. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

E. Continuously seal joined pieces by continuous welds in accordance with AWS requirements.

F. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

G. Accurately form components to suit ramps, stairs and landings, to each other and to building structure.

2.4 FINISHES

A. Apply bituminous paint to separate dissimilar metals and metal surfaces in contact with cementitious materials.

B. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

C. Do not prime surfaces in direct contact with concrete or where field welding is required.

D. Galvanizing: 1.25 oz/sq ft zinc coating in accordance with ASTM A123.

E. Touch-Up Primer for Galvanized Surfaces: SSPC 20.

F. Finish: Site paint under provisions of Section 09900.

G. Stainless Steel: No. 4 finish.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Beginning of installation means erector accepts existing conditions.

3.2 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply items required to be cast into concrete and embedded in masonry with setting templates, to appropriate Sections.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install components plumb and level, accurately fitted, free from distortion or defects.

C. Provide anchors required for connecting railings to structure. Anchor railing to structure.

D. Field weld anchors as indicated on Drawings. Grind welds smooth. Touch-up welds with primer.

E. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

F. Install wall mounted handrail brackets to bottom of handrail.

G. Install wall mounted handrails with a 1-1/2 inch space between wall and inside face of handrail.

H. Extend handrail at top of stairs a minimum of 1'-0" past face of riser. Extend handrail at bottom of stairs a minimum distance of 1'-0" plus depth of one stair tread. The 1'-0" handrail extensions to be level and parallel with the landing surface.

I. Extend handrails at top and bottom of ramps a minimum of 1'-0". The 1'-0" handrail extensions to be level and parallel with the landing surface.

END OF SECTION

SECTION 06100

ROUGH CARPENTRY

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Structural floor, wall, and roof framing.

B. Built-up structural beams and columns.

C. Floor, wall, and roof sheathing.

D. Plywood underlayment over all wood subfloors.

E. Combination subfloor - underlayment.

F. Wood furring, backing and grounds.

G. Preservative treatment of wood.

H. Fire retardant treatment of wood.

1.2 REFERENCES

A. 2010 CBC - California Building Code, (CCR) California Code of Regulations Title 24, Part 2.

B. ALSC - American Lumber Standards Committee: Softwood Lumber Standards.

C. ANSI/AF & PA NDS-05 - National Design Specifications for Wood Construction.

D. ANSI/SDPWS - Special Design Provisions for Wind and Seismic.

E. APA - The Engineered Wood Association.

F. ASTM D6109 – Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastic Lumber.

G. ASTM E84 - Standard Test Method for Surface burning Characteristics of Building Materials.

H. AWPA - American Wood Preservers' Association: Book of Standards.

I. FSC – Forest Stewardship Council.

J. MS MIL-L-19140 - Fire Retardant Wood Preservative Chemicals.

K. National Bureau of Standards - Product Standard PS-1-95 for Construction and Industrial Plywood.

L. WCLIB - West Coast Lumber Inspection Bureau: Standard Grading Rules for West Coast Lumber.

M. WWPA - Western Wood Products Association.

1.3 QUALITY ASSURANCE

A. Lumber Grading Agency: Certified by ALSC.

B. Plywood Grading Agency: Certified by APA.

1.4 REGULATORY REQUIREMENTS

A. Conform to 2010 CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, Chapter 23.

B. Allowable stress design values shall be in compliance with the 2010 CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, Section 2306, ANSI/AF & PA NDS-05 - National Design Specifications for Wood Construction, and ANSI/SDPWS - Special Design Provisions for Wind and Seismic.

1.5 SUBMITTALS

A. Submit product data under provisions of Section 01330.

B. Provide technical data on wood preservative materials and application instructions.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store and protect products under provisions of Section 01600.

B. Deliver materials free from pest infestation. Protect materials on site to prevent termite, beetle or other wood boring insect attacks.

C. Stack lumber flat, off grade, with spacers between each bundle to promote air circulation. Provide for air circulation around and under coverings.

2. PART 2 PRODUCTS

2.1 LUMBER MATERIALS

A. Lumber Grading Rules: WCLIB and WWPA. Lumber shall bear WCLIB grade stamp.

B. Beam Framing: Douglas Fir species, Dense No. 1 grade.

C. Joist Framing: Douglas Fir species, No. 1 grade.

D. Rafter Framing: Douglas Fir species, No. 1 grade.

E. Structural Framing, Studs, Plate and Blocking: Douglas Fir Species, No. 1 grade.

F. Non-structural Light Framing Studs, Plate and Blocking: Douglas Fir species, construction grade.

G. Plank and Decking: Douglas Fir species, Com Dex.

2.2 MOISTURE CONTENT

A. 2x and 3x material, 19 percent moisture content, S-Dry. Structural and non structural framing, beam, rafters, joists, studs, plates and blocking.

B. 4x and 6x material, 19 percent moisture content at time of application of Architectural finishes. 22 percent maximum moisture content at time of delivery to project site. Materials to be air dried as required to achieve 22 percent moisture content prior to delivery to site. Structural and non structural faming, beam, rafters, joists, studs, plates and blocking.

C. Lumber materials with a moisture content above 19 percent and less than 22 percent at the time of installation shall be tested for moisture content prior to covering with Architectural finishes. Moisture tests shall be performed under the provisions of Section 01458.

D. No lumber shall be covered with an Architectural finish until the moisture content of the lumber is 19 percent or below.

2.3 PLYWOOD MATERIALS

A. Roof Sheathing: APA Structural I, Grade C-D, Exposure 1 minimum 5-ply construction, meeting product Standard PS-1-95.

B. Wall Sheathing: APA Structural I, Grade C-D, Exposure 1 minimum 5-ply construction, meeting product standard PS-1-95.

C. Floor Sheathing: APA Structural I, Grade C-D, Exposure 1; Minimum 5-ply construction, meeting Product Standard PS-1-95.

D. Telephone and Electrical Panel Boards: APA Grade C-D with exterior glue, minimum 5 ply, 3/4 inch thick, meeting PS-1-95.

2.4 ORIENTED STRAND BOARD (OSB)

A. OSB sheathing shall conform to Division of the State Architect (DSA) Acceptance Criteria AC 23-2.

B. Roof Sheathing: APA rated sheathing, Exposure 1, Structural 1, meeting PS-2 and PRP-108 with radiant aluminum foil barrier. Nominal thickness not less than 1/2 inch. Span rating of 32/16.

C. Wall Sheathing: APA rated sheathing, Exposure 1, Structural 1, meeting PS-2 and PRP-108. Nominal thickness not less than 1/2 inch. Span rating of 32/16.

2.5 ACCESSORIES

A. Fasteners: Hot-dipped galvanized steel for exterior, high humidity, and treated wood locations; plain finish elsewhere; size and type to suit condition.

B. Connectors: As indicated.

C. Joist Hangers: Galvanized steel, sized to suit joists and framing conditions; manufactured by Simpson, USP Connectors or KC Metals.

D. Anchors: Thru bolt or anchor bolt to concrete or masonry unless otherwise noted. Bolt for anchorage to steel unless otherwise noted.

E. Building Paper: No. 15 asphalt felt. Plain untreated cellulosic building paper.

2.6 WOOD TREATMENT

A. Preservative Treatment: Where lumber or plywood is indicated as treated or is specified herein to be treated, comply with applicable requirements of AWPA Standards C2 (Lumber) and C9 (Plywood).

B. Pressure treat all lumber in contact with ground. After treatment kiln-dry lumber to a maximum moisture content of 19 percent.

C. Pressure treat above ground items as indicated. After treatment, kiln-dry lumber and plywood to a maximum moisture content, respectively, of 19 percent and 15 percent. Treat indicated items and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping and similar members in connection with roofing, flashing, vapor barriers and waterproofing.

2. Horizontal wood sills, sleepers, blocking, furring, stripping and similar concealed members in contact with masonry or concrete.

3. Horizontal wood framing members less than 18 inches above grade.

4. Wood floor plates installed over concrete slabs directly in contact with earth.

5. Ends of wood girders entering masonry or concrete walls.

6. Framing members used in exterior door, window, or louver openings.

D. Complete fabrication of treated items prior to treatment, where possible. If cut or drilled after treatment, coat cut or drilled surfaces with heavy brush coat of same chemical used for treatment and to comply with AWPA M4. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

2.7 FIRE RETARDANT TREATMENT

A. Fire retardant wood to have a flame spread of less than 25 when tested in an extended 30-minute tunnel test according to ASTM E84.

B. Dimensional lumber to be kiln dried to a maximum moisture content of 19 percent after treatment.

C. Plywood to be kiln dried to a maximum moisture content of 15 percent after treatment.

D. Fire retardant wood to comply with AWPA Standard C20 for lumber and C27 for plywood.

E. Fire retardant chemicals to comply with FR-1 of AWPA Standard P-17 and shall be free of halogens, sulfates and ammonium phosphate.

F. Carbon steel, galvanized steel, aluminum, copper, and red brass in contact with fire retardant wood shall exhibit corrosion rates less than one mil per year when tested in accordance with FS MIL-L-19140, Paragraph 4.6.5.2.

G. Fire retardant chemicals must be registered for use as a wood preservative buy the U.S. Environmental Protection Agency.

H. Fire retardant treat indicated items and the following:

1. Roof sheathing.

2. Wall sheathing.

3. Wood studs, plates and blocking.

4. Wood nailers, curbs, equipment support bases, and similar members in connection with roofing and flashing.

3. PART 3 EXECUTION

3.1 FRAMING

A. Erect wood framing members level and plumb.

B. Place horizontal members laid flat, crown side-up.

C. Construct framing members full length without splices.

D. Double members at openings over 1 sq ft. Space short studs over and under opening to stud spacing.

E. Construct double joist headers at floor and ceiling openings. Frame rigidly into joists.

F. Construct double joists under wall studding.

G. Bridge joists in excess of 8 feet span at mid-span members. Fit solid blocking at ends of members.

3.2 FURRING, BLOCKING AND GROUNDS

A. Provide wherever shown and where required for attachment of other work. Coordinate with work of other sections.

B. Item locations include but are not limited to toilet accessories, toilet partitions, door frames, window frames, hardware, access doors and ladders, cabinetry, miscellaneous equipment locations and mechanical, plumbing and electrical item locations and all other locations of wall mounted items.

C. Install plywood backboards for telephone, data and other electrical equipment.

D. 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.

E. Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise indicated.

F. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.

G. Install plumb and level with closure strips at edges and openings. Shim with wood as required for tolerance of finished work.

H. Firestop all concealed spaces of wood stud walls, ceilings and floor levels at 10 foot intervals both vertically and horizontally.

I. Firestop all concealed vertical and horizontal spaces as occur at soffits, vents, stair stringers, pipes and similar openings in compliance with CBC, (CCR) Title 24, Part 2, Section 717.

J. Firestopping shall consist of closely fitted wood blocks of 2 inch nominal thickness lumber of same width as framing members.

3.3 SHEATHING

A. Secure roof sheathing perpendicular to framing members with ends staggered. Secure sheet edges over firm bearing. Provide solid edge blocking between sheets. Space panels 1/8 inch apart at ends and edges. Install radiant barrier towards interior of roof.

B. Secure wall sheathing perpendicular to wall studs, with ends staggered, over firm bearing.

C. Secure subfloor perpendicular to floor framing with end joints staggered. Secure sheet edges over firm bearing. Attach sheathing with subfloor glue and screws. Space panels 1/8 inch apart at ends and edges.

D. Place building paper between underlayment and subflooring.

E. Secure flooring underlayment with screws. Install after dust and dirt generating activities have ceased and prior to application of finished flooring. Apply perpendicular to subflooring. Stagger end joints of underlayment. Space panels 1/32 inch apart at ends and edges.

F. Install telephone and electrical panel back boards where required. Size of backboards to be 12 inches beyond size of electrical panel boards.

3.4 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01458.

B. Lumber materials will be inspected for compliance with material grading rules, limitations for moisture content and pest infestation prior to any materials being concealed from view or being covered with an architectural finish.

3.5 TOLERANCES

A. Framing Members: 1/4 inch maximum from true position.

B. Surface Flatness of Floor: 1/4 inch in 10 feet maximum.

END OF SECTION

SECTION 06200

FINISH CARPENTRY

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Finish carpentry items, other than shop prefabricated casework.

B. Hardware and attachment accessories.

1.2 REFERENCES

A. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.

B. ASTM E152 - Methods for Fire Tests of Door Assemblies.

C. AWPA - American Wood Preservers Association.

D. FSC - Forest Stewardship Council.

E. NFPA 80 - Fire Door and Windows.

F. 2010 CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2.

G. UL - Underwriters' Laboratories, Inc.

H. WI - Woodwork Institute: Architectural Woodwork Standards.

1.3 QUALITY ASSURANCE

A. Manufacture millwork and finish carpentry items in accordance with quality standards of the Architectural Woodwork Standards of the Woodwork Institute.

B. All millwork and the installation of millwork shall be monitored for compliance under the scope of the WI Monitored Compliance Program (MCP).

C. Fees charged by the Woodwork Institute for their monitored compliance service are the responsibility of the millwork manufacturer.

D. Provide WI Certified Compliance Labels on all items of millwork.

E. Provide WI Inspection Service at the job site prior to installation. Provide to Architect a written report showing results of the reinspection.

F. Upon completion of the installation, provide a WI Monitored Compliance Certificate.

1.4 REGULATORY REQUIREMENTS

A. Conform to CBC and UL requirements for fire ratings.

B. Conform to Flame Spread Classifications of Interior Millwork for flame spread ratings as tested according to ASTM E84.

1.5 SUBMITTALS

A. Submit shop drawings under provisions of Section 01330.

B. Indicate materials, component profiles, fastening methods, jointing details, finishes, and accessories to a minimum scale of 1-1/2 inch to one foot. Provide WI Certified Compliance label on first page of each set.

C. Submit samples under provisions of Section 01330.

D. Submit two samples 6 x 12 inch in size illustrating wood grain, species, and specified finish.

E. Submit two samples 18 inch long of wood trim.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and protect products under provisions of Section 01600.

B. Conform to Section 2 of Architectural Woodwork Standards.

C. Store materials in ventilated, interior locations under constant minimum temperatures of 60 degrees F and maximum relative humidity of 25 to 55 percent.

2. PART 2 PRODUCTS

2.1 FABRICATORS

A. Active member of the Woodwork Institute, licensed by WI to provide the WI certified Compliance Certificates and Labels for the products and materials specified in this section, www.woodworkinstitute.com.

B. Substitutions: Under provisions of Section 01630.

2.2 MATERIALS

A. Materials specified under Millwork Manual Section Numbers refer to lumber grades in the Architectural Woodwork Standards as follows: Section 3, Lumber - Hardwood/Softwoods; Section 4, Plywood - Hardwood/Softwood; Section 6, Exterior Trim; and Interior Trim; Section 7, Stair Work and Rails.

2.3 INTERIOR TRIM

A. Fabricate in accordance with Section 6 of the Architectural Woodwork Standards.

Item	Species	Grade	Intended Finish
Base, Casing & Trim	Red Oak	Custom	Transparent
Tackboard Frames, Chalk Rail & Frame	Red Oak	Custom	Transparent

2.4 MISCELLANEOUS INTERIOR MILLWORK

A. Fabricate in accordance with Section 6 of the Architectural Woodwork Standards.

Item	Species	Grade	Intended Finish
1x6 T&G Vee Joint Wainscot	Red Oak	Custom	Transparent
Handrails	Red Oak	Custom	Transparent
Prefinished Waiscot	Medium Density Fiberboard	Custom	Plastic Laminate

2.5 PLASTIC LAMINATE MATERIALS

A. Plastic Laminate: 0.028 inch minimum thickness, color to be selected by Architect from manufacturer's standard line; manufactured by Wilsonart.

B. Fire Retardant Plastic Laminate: 0.032 inch minimum thickness, [_____] color, [_____] pattern, [_____] surface finish; capable of providing a maximum flame spread/smoke development rating of 20/10 in accordance with ASTM E84; manufactured by [_____,] [_____,] or [_____]:

C. Plastic Laminate Backing: High pressure paper base laminate without a decorative finish; 0.020 inch thick.

2.6 ADHESIVE

A. Adhesives: Type 1 adhesive recommended by WI to accommodate application in accordance with the Appendix A to the Architectural Woodwork Standards.

B. Formulation: Exterior type per AWPA C20, consisting of organic-resin solution, insoluble in water, thermally set in wood by kiln drying.

C. Wall Adhesive: Solvent release, cartridge type, compatible with wall substrate, capable of achieving durable bond.

2.7 WOOD TREATMENT PROCESS

A. Fire Retardant Type: Listed by Underwriters' Laboratories, Inc. (UL).; capable of providing a maximum flame spread/smoke development rating of 20/25 in accordance with ASTM E84.

B. The following items are to be treated:

1. 1 x 6 T&G Vee Joint Wainscot.

2. 1 x 6 T&G Vee Joint Ceiling.

3. Medium Density Fiberboard.

2.8 ACCESSORIES

A. Nails: Size and type to suit application, galvanized finish for interior use, stainless steel for exterior use.

B. Bolts, Nuts, Washers, Blind Fasteners, Lags, and Screws: Size and type to suit application; galvanized finish for interior use, stainless steel for exterior use.

C. Lumber for Shimming and Blocking: Softwood lumber of Douglas Fir species.

D. Primer: Alkyd primer sealer.

E. Wood Filler: Solvent base, tinted to match surface finish color.

2.9 FABRICATION

A. Fabricate work in accordance with WI Custom grade standards.

B. Shop assemble work for delivery to site, permitting passage through building openings.

C. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

D. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners.

E. Cap exposed plastic laminate finish edges with material of same finish and pattern.

F. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces and openings are ready to receive work and field measurements are as instructed by the fabricator.

B. Verify mechanical, electrical, and building items affecting work of this Section are placed and ready to receive this work.

C. Verify adequacy of backing and support framing.

D. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

A. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials or that will be permanently concealed from view.

3.3 INSTALLATION

A. Install work in accordance with the WI Architectural Woodwork Standards Custom quality standard.

B. Install fire rated door frames in accordance with NFPA 80.

3.4 TOLERANCES

A. Maximum Variation from True Position: 1/16 inch.

B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

3.5 PREPARATION FOR FINISHING

A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.

3.6 FINISHING

A. Site finish under provisions of Section 09900.

3.7 PROTECTION

A. Protect finished installation under provisions of Section 01600.

END OF SECTION

SECTION 06412

LAMINATE-CLAD WOOD CASEWORK

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Special fabricated cabinet units.

B. Countertops.

C. Preparation for utilities.

D. Cabinet hardware.

E. Glass for cabinet units.

1.2 REFERENCES

A. WI - Woodwork Institute of California: Architectural Woodwork Standards.

B. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

C. ASTM A653 - Steel Sheet, Zinc Coated, (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

D. ASTM A924 - General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.

E. ASTM C615 – Standard Specification for Granite Dimension Stone.

F. ASTM E84 – Test Method for Surface Burning Characteristics of Building Materials.

G. 2010 CBC – California Building Code, (CCR) California Code of Regulations, Title 24, Part 2.

1.3 QUALITY ASSURANCE - MONITORED COMPLIANCE PROGRAM

A. Manufacture casework items in accordance with quality standards of the Architectural Woodwork Standards of the Woodwork Institute.

B. All millwork and the installation of millwork shall be monitored for compliance under the scope of the WI Monitored Compliance Program (MCP).

C. Fees charged by the Woodwork Institute for their monitored compliance service are the responsibility of the casework manufacturer.

D. Provide WI Inspection Service at the millwork fabricator. Provide to Architect a written report showing the results of the inspection.

E. Provide WI Certified Compliance Labels on all items of casework and countertops.

F. Provide WI Inspection Service at the job site. Provide to Architect a written report showing the results of the inspection.

G. Self Certification by the millwork fabricator or inspection by other than an authorized representative of The Woodwork Institute is not acceptable.

H. Upon completion of the installation, provide a WI Monitored Compliance Certificate.

1.4 QUALITY ASSURANCE - CERTIFIED SEISMIC INSTALLATION PROGRAM

A. Install casework items in accordance with the Woodwork Institute's Certified Seismic Installation Program (CSIP).

B. Install casework in accordance with the Office of Statewide Health Planning and Development (OSHPD) Preapproval of Fixed Equipment Anchorages (OPA-2649-10).

C. Prior to walls being closed up and covered, provide a written Woodwork Institute Certified Seismic Installation report confirming that backing is provided in all locations required for casework installation. Identify those areas where backing is missing or improperly located.

D. On completion of installation of casework provide a Woodwork Institute Certified Seismic Installation Program Certificate. Identify the work covered and certify that the work as installed is in compliance with the requirements of the Woodwork Institute's Certified Seismic Installation Program (CSIP).

E. Fees charged by the Woodwork Institute for monitoring and compliance for their Certified Seismic Installation Program (CSIP) are the responsibility of the casework manufacturer and installer.

1.5 REGULATORY REQUIREMENTS

A. Conform to CBC requirements for flame spread classification in accordance with CBC Section 803 and Table 803.5.

B. Conform to Flame Spread Classifications for Interior Millwork for flame spread ratings as tested according to ASTM E84.

1.6 MOCKUP

A. Prepare mockup under provisions of Section 01450.

B. Provide full size base cabinet and upper cabinet of each type indicated, in specified finish with hardware installed.

C. Units will be examined to ascertain quality and conformity to WI standards.

D. Units will establish a minimum standard of quality for this work.

E. Approved units may be used as part of the Work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and protect products to site under provisions of Section 01600.

B. Delivery of casework shall be made only when the area of installation is enclosed, all plaster and concrete work is dry, the area is broom clean and environmental conditions are as specified.

1.8 ENVIRONMENTAL CONDITIONS

A. Area of casework installation shall be fully enclosed, well ventilated, and protected from direct sunlight, excessive heat, rain or moisture.

B. Relative humidity of the area of casework installation shall be maintained between 25 percent and 55 percent with a temperature range of between 60 degrees F to 90 degrees F.

C. Casework shall be acclimated to the area of installation for a minimum of 72 hours prior to installation.

1.9 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01330.

B. Include materials, component profiles, fastening methods, assembly methods, joint details, accessory listings, and schedule of finishes.

C. Provide WI Certified Compliance Label for the Certified Seismic Installation Program on the first page of shop drawings.

D. Provide WI Certified Compliance Label on first page of shop drawings. Include WI inspector's signature.

E. Provide WI certificates of compliance and inspection reports.

2. PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Active member of the Woodwork Institute licensed by WI to provide WI Certified Compliance Certificates and Labels for the products and materials specified in this section www.woodworkinstitute.com.

B. Substitutions: Under provisions of Section 01630.

2.2 CABINET DESIGN

A. Individual cabinets are indicated on the drawings by the WI Cabinet Design Series (CDS) numbering system, Appendix A.

2.3 MODULAR CASEWORK - LAMINATED PLASTIC COVERED

A. Fabricate in accordance with Section 10 of the Manual of Millwork:

1.	WI Grade:	Custom.
2.	Core Material:	Medium Density Fiberboard (MDF).
3.	Type:	Type A.
4.	Construction:	Style A-Frameless.
5.	Joinery:	Doweled Joints.
6.	Cabinet Backs:	Blind Dadoed.
7.	Cabinet Door Type:	Interface Style 1, Type A, flush overlay.
8.	Shelves:	1-M-2 particle board, 1 inch thick, MOE of 950, capable of supporting 50 lb/sq ft load with deflection of L/144.
9.	Shelf Edge Bands	0.028 inch high pressure plastic laminate in color to match shelf. All 4 edges of adjustable shelves to receive banding.
10.	Door and Drawer Edge Bands:	0.028 inch high pressure plastic laminate the same as exposed faces.
11.	Exposed Surfaces (Including shelves and interior of open front cabinets):	0.028 inch high pressure plastic laminate, color and pattern as selected by Architect. A maximum of 5 colors and patterns to be selected. A minimum of 3 color combinations per room may be selected.
12.	Semi-Exposed Surfaces (Behind doors and inside drawers):	Low pressure decorative polyester or melamine laminate ALA-85.
13.	Security and Dust Panels:	Particle board, 3/4 inch thick at all lockable drawers.

2.4 LAMINATED PLASTIC COUNTERTOPS

A. Fabricate in accordance with Section 11 of the Architectural Woodwork Standards.

1.	WI Grade:	Premium.
2.	Core Thickness:	0.75 inch minimum.
3.	Laminate Thickness:	0.050 inch or .042 inch for postformed use. 0.060 inch colorcore or solicor.
4.	Front Edge Covering:	Full round.
5.	Backsplash at Top:	Horizontal butt.
6.	Top of Back Splash:	Square with scribe.
7.	Construction Type:	Assembly 2, deck mount, manufacturer assembled.
8.	Plastic Colors and Pattern:	To be selected from standard patterns, satin finish.

2.5 JANITOR ROOMS

A. Provide economy grade casework.

2.6 GLAZING

A. Glass Doors: 1/4 inch thick clear laminated safety glazing with all exposed edges ground.

B. Glass Shelves: 5/8 inch thick laminated safety glazing with all exposed edges ground.

2.7 HARDWARE

A. Finish: Satin Aluminum.

B. Shelf Supports: Metal or molded polycarbonate clips set in drilled holes spaced 32 mm on center. Clips to have vertical locating pin for retention of shelf.

C. Drawer and Door Pulls: Epco, MC-402 U-shaped wire pull.

D. Cabinet Locks: Olympus 700S/800S or CompXNational.

E. Drawer Slides for Drawers 24 inch Wide or Less: Accuride 7432.

F. Drawer Slides for Drawers over 24 inch Wide: Accuride 3640.

G. Drawer slides for File Drawers: Accuride 4034.

H. Hinges: Hafele, Aximat hinge. Hinges per leaf: 3'-0" high doors - 2 hinges, 3'-0" to 5'-0" high doors - 3 hinges, 5'-0" to 7'-4" high doors - 4 hinges, 7'-0" to 8'-0" - 5 hinges.

I. Sliding Door Track Assemblies: Grant 2023N sheaves and Grant 2011 track.

J. Grommets: Doug Mockett and Company, Inc., www.mockett.com. LO Series; plastic 6 x 3 inch 5 required. Colors as selected by Architect.

K. Hanger Rods: 1-1/16 inch diameter tubing, stainless steel.

L. Countertop Support Bracket: 24 inch x 24 inch x 1/8 inch thick pre-manufactured angled steel bracket, black paint finish, minimum 1,000 lb. load support capability, with 7 predrilled anchor holes per bracket leg. Manufactured by A & M Hardware, Inc. www.aandmhardware.com

M. Remainder of hardware required shall meet requirements of ANSI/BHMA Grade 1.

N. Substitutions: Under the provisions of Section 01630.

2.8 FABRICATION

A. Shop assemble casework for delivery to site in units easily handled and to permit passage through building openings.

B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

C. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, and other fixtures and fittings. Verify locations of cutouts from on-site dimensions. Seal contact surfaces of cut edges.

D. Install plastic grommets in the field in plastic laminate casework and Owner furnished furniture as directed by the Owner's Representative and/or Architect.

E. Install one adjustable shelf for each 1'-0" of height for all wall mounted cabinets.

F. Provide stretcher at top face of all door and drawer fronts.

G. Provide locks as indicated at location shown on drawings for both doors and drawers.

3. PART 3 EXECUTION

3.1 INSPECTION

A. Verify adequacy of backing and support framing.

3.2 INSTALLATION

A. Set and secure casework in place rigid, plumb, and level.

B. Install casework in accordance with Section 10 and Appendix B of the Architectural Woodwork Standards.

C. Install casework items in accordance with the Woodwork Institute's Certified Seismic Installation Program (CSIP).

D. Install countertops in accordance with Section 11 and Appendix B of the Architectural Woodwork Standards.

3.3 ADJUSTING AND CLEANING

A. Adjust doors, drawers, hardware, fixtures and other moving or operating parts to function smoothly and correctly.

B. Clean casework, counters, shelves, hardware, fittings and fixtures.

END OF SECTION

SECTION 07120

BUILT-UP BITUMINOUS WATERPROOFING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cold applied asphalt bitumen waterproofing.

B. Fabric reinforcement.

C. Protective covering.

D. Application Schedule.

1.2 REFERENCES

A. ASTM C578 - Preformed, Cellular Polystyrene Thermal Insulation.

B. ASTM D41 - Asphalt Primer Used in Roofing, Dampproofing and Water proofing.

C. ASTM D1227 - Emulsified Asphalt Used as a Protective Coating for Roofing.

D. ASTM D1668 - Glass Fabrics (Woven and Treated) for Roofing and Water proofing.

E. NRCA (National Roofing Contractors Association) - Waterproofing Manual.

1.3 SYSTEM DESCRIPTION

A. Waterproofing System: Prevent moisture migration to interior.

B. System: Capable of resisting water head of 6 feet.

1.4 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing products specified in this Section with a minimum of five years documented experience.

B. Applicator: Company specializing in bituminous waterproofing systems with five years minimum experience.

C. Perform work in accordance with NRCA Waterproofing Manual.

1.5 SUBMITTALS

A. Submit manufacturer's certificate under provisions of Section 01330 that installed materials meet or exceed specified requirements.

1.6 WARRANTY

A. Provide five year warranty under provisions of Section 01770.

B. Warranty: Include coverage of waterproofing failing to resist penetration of water except where such failures are the result of structural failures of building. Hairline cracking of concrete due to temperature change or shrinkage is not considered as structural failure.

C. Include coverage during warranty period for removal and replacement of materials concealing waterproofing.

2. PART 2 PRODUCTS

2.1 BITUMEN MATERIALS

A. Asphalt Primer: ASTM D41, compatible with substrate.

B. Asphaltic Emulsion: ASTM D1227, Type II, Class 1, with fiberglass fibers.

2.2 SHEET MATERIALS

A. Glass Fiber Fabric: ASTM D1668, Type III, woven.

2.3 ACCESSORIES

A. Protection Board: ASTM C578, 1/2 inch thick expanded polystyrene board.

2.4 SUMMARY OF MATERIALS PER 100 SQUARE FEET

A.	Asphalt Primer (1-1/2 gallons)	15 lbs.
B.	First Course Coating (3 gals)	30 lbs.
C.	Glass Fabric (1 ply)	1 lb.
D.	Second Course Coating (3 gals)	30 lbs.
E.	Third Course Coating (3 gals)	30 lbs.

F. Protection Course: 1/2 inch thick protection board.

3. PART 3 EXECUTION

3.1 INSPECTION

A. Verify surfaces are solid, free of frozen matter, loose particles, cracks, pits, rough projections, and foreign matter detrimental to adhesion and application of waterproofing.

B. Do not apply waterproofing to damp, frozen, dirty, dusty, or deck surfaces unacceptable to manufacturer.

C. Verify items which penetrate surfaces to receive waterproofing are securely installed.

D. Beginning of installation means acceptance of substrate.

3.2 PREPARATION

A. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions.

B. Apply emulsion to seal penetrations, small cracks, and honeycomb in substrate.

3.3 APPLICATION

A. Conform to drawing details included in NRCA - Waterproofing Manual.

B. Prime surfaces with brush or spray coat.

C. Apply brush coat of emulsion at 3 gallons per 100 sf and embed 12 inch wide ply of glass fabric extending out 6 inches on each surface at vertical wall angles and angles at footings and offsets.

D. Apply brush or spray coat of emulsion at 3 gallons per 100 square feet. While wet, embed fabric, lapping 2 inches on sides and 4 inches on ends, butting all angles and corners. Brush surface to eliminate wrinkles and voids and allow to dry.

E. Apply 18 inches wide reinforcing strip of fabric to vertical angles and angles at footings and offsets.

F. Apply second and third courses of emulsion at rate of 3 gallons per 100 sf. Allow each course to dry before application of next course.

3.4 PROTECTION

A. Protect finished membrane from damage during backfill operations by adhering protection board with mastic over treated surfaces.

B. Scribe boards around pipes and projections.

3.5 APPLICATION SCHEDULE

A. Exterior vertical face of below grade building walls and grade beams.

END OF SECTION

SECTION 07213

BATT INSULATION

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Batt insulation and vapor barrier in exterior wall and roof construction.

B. Batt insulation for filling perimeter window and door shim spaces crevices in exterior wall and roof.

C. Batt sound insulation in interior walls and partitions and above ceiling.

1.2 REFERENCES

A. ASTM C665 - Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

B. ASTM C1320 - Installation of Mineral Fiber Batt and Thermal Insulation for Light Frame Construction.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

D. 2010 CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 6.

E. Business and Professions Code.

1.3 PERFORMANCE REQUIREMENTS

A. Materials of this Section shall provide continuity of thermal and moisture barrier at building enclosure elements.

B. Materials of this Section shall provide continuity of sound control where indicated or scheduled.

1.4 REGULATORY REQUIREMENTS

A. Installation of insulation may only commence if insulation meets mandatory manufacturer certification to the California Energy Commission required by Title 24, Part 6, Section 118 of the CBC - California Building Code, (CCR) California Code of Regulations that insulation complies with Title 20, Chapter 4, Article 3 of the California Quality Standards for Insulating Materials.

B. Insulation materials to be certified in compliance with Business and Professions Code Section 19165.

C. Insulation manufacturer to be licensed by the California Department of Consumer Affairs, Bureau of Home Furnishing and Thermal Insulation according to Business and Professions Code, Section 19059.7.

1.5 SUBMITTALS

A. Submit manufacturer's certificates under provisions of Section 01330 that materials meet or exceed specified regulatory requirements.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS - INSULATION MATERIALS

A. Certain Teed Corp., www.certainteed.com.

B. Johns Manville Corp., www.jm.com.

C. Knauf Insulation, www.knaufusa.com.

D. Owens-Corning Fiberglass Corporation, www.owenscorning.com.

E. Substitutions: Under provisions of Section 01630.

2.2 MATERIALS

A. Thermal Batt Insulation: ASTM C665 preformed glass fiber batt, Type III, Class A, with reflective membrane faced surface with a flame spread of 25 or less, and a smoke density of 50 or less when tested in accordance with ASTM E-84. Category 1 with stapling flanges for attachment of blanket to applicable construction. Equivalent continuous roll membrane facing may be utilized in lieu of individual faced glass fiber batts. Provide R30 at ceilings and roofs, R19 at walls.

B. Acoustical Batt Sound Insulation, Walls: ASTM C665 preformed glass fiber batt, Type I unfaced, with flame spread of 25 or less, and a smoke density of 450 or less when tested in accordance with ASTM E84. Provide 3-1/2 inch min. thickness.

C. Acoustical Batt Sound Insulation, Ceiling: ASTM C665 preformed glass fiber batt, Type III Class A with reflective membrane faced surface with a flame spread of 25 or less, and a smoke density of 50 or less when tested in accordance with ASTM E-84. Category 2. Provide 3-1/2 inch min. thickness.

D. Nails or Staples: Steel wire; electroplated; type and size to suit application.

E. Tape: Bright aluminum self-adhering type, mesh reinforced, 2 inch wide.

F. Support Wire: 16 gauge steel wire.

G. Support Rods: 13 gauge, pointed spring steel length as required for stud spacing.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation are dry and ready to receive insulation.

B. Verify that enclosed spaces are ventilated to dissipate humidity.

C. Maximum relative humidity level of less than 50 percent shall be maintained during installation of insulation.

3.2 INSTALLATION

A. Install insulation in accordance with insulation manufacturer's instructions and ASTM C1320.

B. Install batt insulation in exterior walls and roof spaces without gaps or voids.

C. Fill any small spaces around door frames, window frames, skylight frames, and other wall or roof openings with insulation.

D. Fill hollow space of steel door frame, steel window and other wall or roof frame with insulation.

E. Fill hollow space created by wall or roof framed headers and jamb spaces with insulation.

F. Install batt sound insulation in interior walls full height of wall.

G. Install batt sound insulation above ceilings in areas as indicated. Extend a minimum of 4'-0" beyond face of vertical dividing partitions of space to be insulated where partition terminates at ceiling.

H. Trim insulation neatly to fit spaces.

I. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation. Leave no gaps or voids.

J. Install with factory applied membrane facing warm side of building spaces.

K. Lap ends and side flanges of vapor barrier membrane over face of framing members.

L. Extend vapor barrier on to any adjacent construction and tape seal edge of vapor barrier.

M. Seal butt ends, lapped flanges, and tears or cuts in membrane with tape or another layer of membrane.

N. Seal joints in vapor barrier caused by pipes, conduits, electrical boxes, and similar items penetrating vapor barrier.

O. Face staple flange over flange of adjacent blanket to wood studs at maximum 6 inches oc.

P. Friction fit sound insulation between studs and fill as required to completely fill space between the wall finishes.

Q. Where wall finish does not occur, use support rods spaced not-to-exceed 16 inches oc vertically at wood studs.

R. Retain unsupported roof insulation to metal or concrete substrate with spindle fasteners at 24 inches on center.

END OF SECTION

SECTION 07550

MODIFIED BITUMINOUS MEMBRANE ROOFING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cleaning deck surface.

B. Membrane roofing and base flashings.

C. Spray applied elastomeric acrylic coating.

D. Expansion joint covers.

1.2 REFERENCES

A. ASTM B370 - Standard Specification for Copper Sheet and Strip for Building Construction.

B. ASTM B749 - Standard Specification for Lead and Lead Alloy Strip, Sheet, and Plate Products.

C. ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.

D. ASTM C728 - Perlite Thermal Insulation Board.

E. ASTM D312 - Asphalt Used in Roofing.

F. ASTM D412 - Rubber Properties in Tension.

G. ASTM D2523 - Testing Load-Strain Properties of Roofing Membranes.

H. ASTM D4601 - Asphalt-Coated Glass Fiber Base Sheet Used in Roofing.

I. ASTM D6083 – Standard Specification for Liquid Applied Acrylic Coating Used in Roofing.

J. ASTM D6162 - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements.

K. ASTM D6163 - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements.

L. ASTM D6164 - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reniforcement.

M. ASTM D6221 - Standard Specification for Reinforced Bituminous Flashing Sheets on Roofing and Waterproofing.

N. ASTM E408 – Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection – Meter Techniques.

O. ASTM E903 – Standard Test Method for Solar Absorption, Reflectance, and Transmittance of Materials Using Inspection - Meter Techniques.

P. CBC – California Building Code, (CRC) California Code of Regulations, Title 24, Part 6.

Q. CRRC – Cool Roof Rating Council – Product Rating Program CRRC-1.

R. FM (FM Global) - Roof Assembly Classifications.

S. NRCA - National Roofing Contractors Association.

T. UL (Underwriters Laboratories) - Fire Hazard Classifications.

1.3 SYSTEM DESCRIPTION

A. Modified Bitumen Conventional Roofing System: Three layer SBS membrane system having a spray applied acrylic surfacing.

1.4 SUBMITTALS

A. Submit manufacturer's product data, summary of weights of materials and installation instructions under provisions of Section 01330.

B. Submit documentation of conformance of roofing system with regulatory requirements specified under provisions of Section 01330.

1.5 QUALITY ASSURANCE

A. Perform Work according to roofing system manufacturer's written instructions and applicable recommendations of the NRCA Roofing and Waterproofing Manual and the NRCA Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing.

B. Maintain a copy of the manufacturer's written instructions and the applicable recommendations of the referenced NRCA publications on site.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products specified in this Section with five years documented experience.

B. Applicator: Company specializing in performing the Work of this Section with five years documented experience and approved by system manufacturer.

C. Work of this Section to conform to manufacturer's instructions.

1.7 REGULATORY REQUIREMENTS

A. Conform to applicable UL and FM requirements for roof assembly requirements.

B. Fire Hazard Classification: UL Class B.

C. Conform to CBC – California Building Code, (CCR) California Code of Regulations, Title 24, Part 6 requirements for a Cool Roof under the Product Rating Program CRRC-1 of the Cool Roof Rating Council.

D. Windstorm Rating: FM I-90.

1.8 PRE-INSTALLATION CONFERENCE

A. Convene two weeks prior to commencing Work of this Section, under provisions of Section 01310.

B. Review installation procedures and coordination required with related Work.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Section 01600.

B. Deliver products in manufacturer's original containers, dry, undamaged, seals and labels intact.

C. Store products in weather protected environment, clear of ground and moisture.

D. Store products in a manner to avoid significant or permanent deflection of roof deck.

E. Stand roll materials on end.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Do not apply roofing membrane during inclement weather.

B. Do not apply roofing membrane to damp or frozen deck surface.

C. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.

1.11 COORDINATION

A. Coordinate work under provisions of Section 01310.

B. Coordinate the work with installation of associated metal flashings as the work of this Section proceeds.

C. Notify roofing manufacturer 72 hours prior to commencing work to arrange for inspection of roof application.

1.12 WARRANTY

A. Provide 10 year manufacturer's warranty under provisions of Section 01770.

B. Manufacturer's Warranty: No Dollar Limit Warranty covering roof membrane, base flashings, and workmanship equivalent to Signature Series Guarantee offered by the Johns Manville Corporation. Warranty to include repair of roof membrane damage due to windstorms less than or equal to 64 mph.

C. Provide 2 year roofing installers warranty under provisions of Section 01770.

D. Roofing Installers Warranty: Warranty shall cover the Work of this section, including installation of all components of roofing system to include roofing membrane, base flashings, fasteners, coatings, sealants, and all penetrations of roofing membrane.

1.13 INSPECTION SERVICE

A. Manufacturer of the roofing materials shall provide the following services:

1. Application start-up inspection.

2. Periodic inspections during application.

3. Certification of materials used and application.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS - MEMBRANE MATERIALS

A. Johns Manville Corp., System 3C NC, www.jm.com.

B. Other acceptable manufacturers offering equivalent products:

1. GAF, www.gaf.com.

2. Certain Teed, www.certainteed.com.

C. Substitutions: Under provisions of Section 01630.

2.2 MANUFACTURERS – ACRYLIC COATING

A. National Coatings Corporation, Acryshield A503 Primer with Acryshield A420 Top Coat, CRRC Product ID No. 0626-0004, UL No. R11754 , www.nationalcoatings.com.

B. Other acceptable manufacturers offering equivalent products:

1. CertainTeed Corporation, Flintcoat-W, CCRC Product No. 0668-0016a, UL No. R11656, www.certainteed.com.

2. Everest Coatings, Inc., EverCoat 710 Primer with EverCoat 500/510 Top Coat, CRRC Product ID No. 0624-0009, UL No. R13336 , www.everestcoatings.com.

3. GAF, manufacturer's recommended primer with Matrix 322 Top Coat, CRRC No. 0676-0010, UL No. R1306, www.gaf.com.

4. General Coatings, Ultraflex 1500 Base Coat with Ultraflex 1600 Top Coat, CRRC ID No. 0684-0006, UL No. 14330, www.generalcoatings.net.

5. Henry Company, 291 Base Coat with HE 280 Top Coat, CRRC ID No. 0620-0004, UL No. R10185, www.henry.com.

6. Johns Manville, manufacturers recommended primer with TopGard 4000 Top Coat, CRRC ID No. 0662-0002, UL No. R10167, www.jm.com.

7. Republic Powdered Metals, Inc., Solarguard Ultra Prime WB with Solarguard Ultra Top Coat, CRRC ID. No. 0650-0003. UL No. R8480, www.rpmrepublic.com.

C. Substitutions: Under provisions of Section 01630.

2.3 BITUMINOUS MATERIALS

A. Asphalt Bitumen: ASTM D312, Type III.

B. Flashing Compound: Elastomeric adhesive specially formulated to be compatible to SBS modified bitumen roll goods; asbestos free.

2.4 BASE FLASHINGS

A. Base Flashing: Flexible sheet flashing, ASTM D6221, Type 1, modified bitumen, granule surfaced, equivalent to Dynaflex, as manufactured by the Johns Manville Corporation.

2.5 CANT STRIPS

A. ASTM C728, fire resistant expanded Perlite, preformed to 45 degree angle, 4 inch minimum face dimension.

2.6 ACCESSORIES

A. Roofing Nails: Galvanized or non-ferrous type, size as required to suit application.

B. Expansion Joint Covers: Expand-O-Flash roof expansion joint covers as manufactured by the Johns Manville Corporation, size and type as detailed.

C. Lead Sheet: ASTM B749, Type L51121, copper-bearing lead sheet, 2-1/2 to 4 lbs./sq. ft.

D. Copper Sheet: ASTM B370, Temper H00 of H01, cold-rolled copper sheet, 16 oz./sq. ft.

E. Slip Sheet: 0.05 lb/sq. ft. rosin sized building paper.

F. Acrylic Coating Accessories: Acrylic prime coat, 3.0 oz./sq. yd. polyester reinforcing fabric, adhesives, elastomeric caulking compounds and similar materials shall be as approved by the coating manufacturer. Sealants and adhesives shall meet South Coast Air Quality Management District (SCAQMD) Rule 1168.

2.7 SUMMARY OF MATERIALS PER 100 SQUARE FEET

A.	Base sheet (1 ply)	28 lbs.
B.	Intermediate sheet (1 ply)	56 lbs.
C.	Asphalt moppings (2 @ 23 lbs.)	46 lbs.
D.	Cap sheet (1 ply)	116 lbs.
E.	Acrylic Prime Coat (1-1/2 gal/coat)	18 lbs.
F.	Acrylic Top Coat (2 @ 1-1/2 gal/coat)	36 lbs.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces and site conditions are ready to receive work.

B. Verify that deck is supported and secured.

C. Verify deck is clean and smooth, free of depressions, waves, or projections, properly sloped to drains, valleys, or eaves.

D. Verify that deck surfaces are dry and free of snow or ice.

E. Confirm dry deck by moisture meter with 15 to 19 percent moisture maximum.

F. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, and reglets are in place.

G. Beginning of installation means installer accepts existing surfaces.

3.2 PROTECTION

A. Protect building surfaces against damage from roofing work.

3.3 PREPARATION

A. Verify flatness and tight joints of wood decking. Fill knot holes with latex filler.

B. Loose lay slip sheet.

C. Prime metal flashings with asphalt primer.

D. Install tapered edge strips, 1-1/2 inch thick x 24 inch wide, at all roof penetrations and at all intersections of roof with vertical surfaces.

E. Nail cants 2 feet o.c. to roof deck. Fit flush at ends and to vertical surfaces. Apply cant 2 inches back from flange and bevel 8 inches from ends at scuppers.

3.4 ASPHALT

A. Mop Application: Apply asphalt at a temperature range of between 400 degrees to 450 degrees F or per manufacturer's printed EVT range.

B. Mechanical Spreader: Apply asphalt at a temperature range of between 425 degrees to 475 degrees F or per manufacturer's printed EVT range.

C. Asphalt shall not be heated above maximum temperature. Asphalt which has been overheated shall be rejected.

D. Kettle shall be equipped with an accurate thermostat and thermometer.

3.5 BASE SHEET APPLICATION

A. Lay a strip of base sheet, 8 inches wide, over metal straps and mechanical anchors exposed on deck surface. Fasten in place.

B. Lay base sheet; lap side edges 3 inches, end laps 4 inches. Nail laps 9 inches o.c. Nail the field area with two rows of nails at 11 inches o.c. staggered, on 18 inch centers.

3.6 MEMBRANE APPLICATION

A. Temperature of Bitumen at Point of Application: Within 25 degrees F of bitumen rating labeled on bitumen container.

B. Lap intermediate sheet edges 3 inches, cap sheet edges 4 inches.

C. Apply membrane in bitumen; seal seams and ends permanently waterproof.

D. Apply membrane smooth, free from air pockets, wrinkles, or tears.

E. Reinforce valleys with an additional ply of base sheet 36 inches wide, center over valley. Apply in direction of slope of valley, lapping 4 inches on ends. Solid mop to base sheet.

F. Extend membrane up cant strips.

G. Install waterproof cut-off to membrane at end of day's operation. Remove cut-off before resuming roofing.

H. Mop and seal membrane around roof penetrations.

3.7 FLASHINGS AND ACCESSORIES

A. Coordinate installation of roof drains and related flashings.

B. Set base sheet at roof drains in flashing compound 9 inches wide around ring and flange. Provide a minimum 30 inch square, lead or copper flashing set in flashing compound over base sheet. Strip in flashing with two plies of intermediate membrane extending 4 inches and 6 inches beyond the outside edge of flashing. Solid mop flashings, and while hot, embed cap sheet, install clamp ring and tighten entire assembly while membrane is hot.

C. Seal flashings and flanges of items penetrating membrane.

D. Install prefabricated roofing expansion joint covers to isolate roof areas as indicated on drawings and in accordance with manufacturer's recommendations.

E. Apply granule surfaced membrane base flashings to seal membrane to vertical elements. Extend a minimum of 8 inches up vertical surfaces and 4 inches out onto field membrane.

F. Secure to nailing strips at 6 inches o.c.

G. Repair edge seams of membrane base flashing with emulsion and granules where bitumen extends beyond seam.

3.8 ACRYLIC ROOF COATING

A. Repair imperfections in roof field or flashing areas with sealant.

B. Apply prime coat approximately 3'-10" wide at all valleys, waterways, drain areas, junctions of vertical wall surfaces, mechanical equipment and roof penetrations at the rate of 2 gallons per 100 square feet.

C. Immediately embed a 3'-4" wide polyester reinforcing fabric into the wet prime coat.

D. Lap joints in fabric a minimum of 3 inches. Extend fabric up vertical wall and curb surfaces a minimum of 6 inches.

E. Apply a second prime coat immediately onto polyester fabric at the rate of 1 gallon per 100 square feet. Extend prime coat a minimum of 2 inches beyond edge of fabric.

F. Allow prime coat to dry for 24 hours.

G. Apply roof prime coat over entire roof surface at the rate of 1-1/2 gallons per 100 square feet.

H. Extend prime coat up vertical wall surface 3 inches minimum above termination of base flashing.

I. Allow prime coat to dry for 24 hours.

J. Apply first application of roof top coating at the rate of 1-1/2 gallons per 100 square feet.

K. Allow first application of roof top coating to dry for a minimum of 12 hours.

L. Apply second application of roof top coating in a perpendicular pattern to first application at the rate of 1-1/2 gallons per 100 square feet.

M. Cut edges of final roof top coating application evenly and uniformly.

3.9 FIELD QUALITY CONTROL

A. Field inspection will be performed under provisions of Section 01458.

B. Correct identified defects or irregularities.

C. Site attendance of roofing materials manufacturers during installation of the Work is required.

3.10 CLEANING

A. Remove bituminous and acrylic spray markings from finished surfaces.

B. In areas where finished surfaces are soiled by Work of this Section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.

C. Repair or replace defaced or disfigured finishes caused by Work of this Section.

3.11 PROTECTION

A. Protect building surfaces against damage from roofing work.

B. Upon completing roofing, including associated work, institute appropriate procedures for surveillance and protection of roofing during remainder of construction period.

C. Where traffic must continue over finished roof membrane, protect surfaces.

D. At end of construction period, or at a time when remaining construction will in no way affect or endanger roofing, inspect roofing and prepare a written report with copies to Architect describing nature and extent of deterioration or damage found.

E. Repair or replace, as required, deteriorated or defective work found at time of above inspection to a condition free of damage and deterioration at time of Substantial Completion according to requirements of specified warranty.

END OF SECTION

SECTION 07620

SHEET METAL FLASHING AND TRIM

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pre-coated coping parapet and cap flashings.

B. Fascias and scuppers.

C. Counter flashing at piping penetrations, vent pipes, and conduits.

D. Counterflashings over bituminous base flashings.

E. Counterflashings at roof mounted equipment, curbs and supports.

F. Counterflashings for roof hatches.

1.2 REFERENCES

A. ASTM A653 - Steel Sheet, Zinc-Coated, (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

B. ASTM A755 - Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.

C. ASTM A792 – Steel Sheet, Aluminum-Zinc Alloy. Coated by the Hot-Dip Process, General Requirements.

D. ASTM A924 - General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.

E. ASTM B32 - Solder Metal.

F. ASTM B101 - Standard Specifications for Lead-Coated Copper Sheet and Strip for Building Construction.

G. ASTM D4586 - Asphalt Roof Cement, Asbestos Free.

H. SMACNA - Architectural Sheet Metal Manual.

1.3 SYSTEM DESCRIPTION

A. Work of this Section is to physically protect membrane roofing and base flashings, from damage that would permit water leakage to building interior.

1.4 QUALITY ASSURANCE

A. Applicator: Company specializing in sheet metal flashing work with five years minimum experience.

B. Perform work in accordance with SMACNA standard details and requirements.

1.5 SUBMITTALS

A. Submit shop drawings, product data, and samples under provisions of Section 01330.

B. Submit shop drawings of sheet metal items indicating profiles, jointing, terminations and installation details. Indicate type and spacing of fasteners.

C. Submittal of specific plates from the SMACNA Architectural Sheet Metal Manual constitutes acceptable documentation of installation details.

D. Submit product data for pre-coated galvanized steel.

E. Submit two samples, 4 x 4 inch in size illustrating metal finish color for pre-coated steel.

F. Submit product data for flashing accessories.

G. Submit warranty for water tightness.

H. Submit warranty for metal finish.

1.6 STORAGE AND HANDLING

A. Store products under provisions of Section 01600.

B. Stack preformed material to prevent twisting, bending, or abrasion, and to provide ventilation.

C. Prevent contact with materials during storage which may cause discoloration, staining, or damage.

1.7 WARRANTY

A. Provide warranty under provisions of Section 01770.

B. Provide 2-year warranty coverage for degradation of water tightness and integrity of seals.

C. Provide 20-year warranty coverage for metal finish from all defects.

2. PART 2 PRODUCTS

2.1 SHEET MATERIALS

A. Pre-Coated Galvanized Steel: ASTM A755 on zinc-coated galvanized substrate, ASTM A653, Grade 33, G90 zinc coating in accordance with ASTM A924 or ASTM A792, Grade 50, AZ55 aluminum zinc coating; 0.0299 inch thick core steel.

2.2 ACCESSORIES

A. Lead-Coated Copper: ASTM B101, Temper H00 and H01, cold-rolled copper sheet, coated both sides with lead weighing not less than 12 lb/100 sq. ft. or more than 15 lb./100 sq. ft. total weight of copper sheet with lead applied to both sides.

B. Fastener: Galvanized steel or stainless steel with soft neoprene washers at exposed fasteners. Finish exposed fasteners same as pre-coated metal.

C. Underlayment: Spunbound reinforced polypropylene coated fabric sheet.

1. Tri-Flex 30 as manufactured by W.R. Grace and Co., www.graceconstruction.com.

2. Typar Roof Wrap 30 as manufactured by BBA Fiberweb, www.typarhousewrap.com.

3. Substitutions: Under provisions of Section 01630.

D. Metal Primer: As specified in Section 09900.

E. Protective Backing Paint: Zinc chromate alkyd.

F. Slip Sheet: 0.05 lb./sq. ft., rosin sized building paper.

G. Sealant: Type specified in Section 07900.

H. Bedding Compound: Rubber-asphalt type.

I. Plastic Cement: ASTM D4586, Type I.

J. Metal Flashing System: Two piece pre-coated galvanized steel similar to Springlok Flashing System, manufactured by Fry Reglet, www.fryreglet.com, type as indicated. Include fabricated end closures and mitered corners.

K. Solder for Lead-Coated Copper: ASTM B32, Grade SN 60 percent tin, 40 percent lead.

L. Solder for Zinc: ASTM B32; 50/50 tin/lead type, with rosin flux.

2.3 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. Fabricate concealed cleats of galvanized steel, ASTM A653, Grade 33, G90 zinc coating, 0.0478 inch thickness, interlockable with sheet.

C. Fabricate exposed cleats and coverplates of same material as sheet, interlockable with sheet.

D. Form pieces in longest practical lengths.

E. Hem exposed edges on underside 1/2 inch. Miter and seam corners.

F. Form material with flat lock seam.

G. Solder and seal metal joints. After soldering, remove flux. Wipe and wash solder joints clean.

H. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.

I. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

J. Fabricate flashings to allow toe to extend 2 inches over bituminous base flashings. Return and brake edges.

K. Fabricate vent pipe and roof penetration flashings of lead-coated copper with clamping ring.

2.4 FINISH

A. Kynar 500 or Hylar 5000 shop pre-coated finish with 0.2 mil baked on primer and 0.8 mil baked on topcoat for a 1.0 mil dry film thickness. Color to be selected by Architect from manufacturer's entire range of standard and custom colors.

3. PART 3 EXECUTION

3.1 INSPECTION

A. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, cant strips and reglets are in place, and nailing strips located.

B. Verify membrane termination and base flashings are in place, sealed, and secure.

C. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

A. Field measure site conditions prior to fabricating work.

B. Install starter and edge strips, and cleats before starting installation.

C. Install surface mounted reglets true to line and level. Seal top with sealant.

D. Install underlayment with protective slip sheet over parapets, caps, copings, gravel stops and curbs.

3.3 INSTALLATION

A. Conform to indicated details on the drawings and the recommendations included in the SMACNA Architectural Sheet Metal Manual.

B. Provide for thermal expansion of exposed sheet metal work. Space movement joints at 10 feet - 0 inches o.c. maximum with no joints within 2 feet - 0 inches of corners.

C. Form expansion joints of intermeshing hooked flanges filled with sealant.

D. Insert flashings into reglets to form tight fit. Secure in place with lead wedges at maximum 12 inches on center. Pack remaining spaces with lead wool. Seal flashings into reglets with sealant.

E. Secure flashings in place using concealed fasteners. Use exposed fasteners only where indicated.

F. Lap, lock, seam and seal all joints.

G. Apply plastic cement compound between metal flashings and felt flashings. Apply bituminous coating between dissimilar metals where occurs.

H. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.

I. Roof-Penetration, Vent Pipe Flashing: Turn lead flashing down inside vent piping. Clamp flashing to other pipes penetrating roof except for vent piping. Seal with elastomeric sealant.

J. Seal metal joints watertight.

3.4 FIELD QUALITY CONTROL

A. Conform to SMACNA Architectural Sheet Metal Manual.

B. Field observation will involve surveillance of Work during installation to ascertain compliance with specified requirements.

END OF SECTION

SECTION 07631

GUTTERS AND DOWNSPOUTS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Galvanized steel gutters and downspouts.

B. Steel pipe downspouts.

C. Precast concrete splash blocks and sheet metal splash pans.

1.2 REFERENCES

A. ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc-Coated Welded and Seamless.

B. ASTM A123 - Zinc (Hot-Dip Galvanized) Coating on Iron and Steel Products.

C. ASTM A653 - Steel Sheet, Zinc Coated, (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

D. ASTM A755 - Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.

E. ASTM A792 - Steel Sheet, Aluminum-Zinc Alloy. Coated by the Hot-Dip Process, General Requirements.

F. ASTM A924 - General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.

G. SMACNA - Architectural Sheet Metal Manual.

1.3 SUBMITTALS

A. Submit shop drawings, product data, and samples under provisions of Section 01330.

B. Submit shop drawings of metal items indicating profiles, jointing, terminations, and installation details. Indicate type and spacing of fasteners.

C. Submittal of specific plates from the SMACNA Architectural Sheet Metal Manual constitutes acceptable documentation of installation details.

D. Submit product data for pre-coated galvanized steel.

E. Submit two samples 4 x 4 inch in size illustrating metal finish color for pre-coated steel.

F. Submit warranty for metal finish.

1.4 QUALITY ASSURANCE

A. Applicator: Company specializing in sheet metal work with five years minimum experience.

B. Perform work in accordance with SMACNA standard details and requirements.

1.5 STORAGE AND HANDLING

A. Store products under provisions of Section 01600.

B. Stack preformed material to prevent twisting, bending, or abrasion and to provide ventilation.

C. Prevent contact with materials during storage which may cause discoloration, staining or damage.

1.6 WARRANTY

A. Provide warranty under provisions of Section 01770.

B. Provide 20-year warranty coverage for metal finish from all defects.

2. PART 2 PRODUCTS

2.1 MATERIALS

A. Pre-coated Galvanized Steel: ASTM A755 on zinc-coated galvanized substrate, ASTM A653, Grade 33, G90 zinc coating in accordance with ASTM A924, or ASTM A792, Grade 50, AZ55 aluminum zinc coating. thickness as specified.

2.2 COMPONENTS

A. Downspouts: ASTM A53, Grade B, Schedule 40 steel pipe, standard weight, Type S, one piece without joints, galvanized according to ASTM A53; 1.8 oz./sq. ft.

B. Splash Blocks: Precast concrete type, of sizes and profiles indicated; minimum 3000 psi at 28 days, with minimum 5 percent air entrainment.

C. Splash Pans: Same metal as for gutters.

2.3 ACCESSORIES

A. Anchorage Devices: Meet SMACNA requirements.

B. End Caps, Downspout Outlets and Strainers, Rain Diverters, Straps, Support Brackets, Joint Fasteners. Profiled to suit gutters and downspouts.

C. Sealant: Silicone type as specified in Section 07900.

2.4 FABRICATION

A. Form gutters and downspouts of profiles and sizes indicated.

B. Field measure site conditions prior to fabricating work.

C. Fabricate with required connection pieces.

D. Form sections square, true, and accurate in size, in maximum possible lengths and free of distortion or defects detrimental to appearance or performance.

E. Hem exposed edges of metal.

F. Seal metal joints.

G. Fabricate gutter and downspout accessories; seal watertight.

H. Form splash pans to size as detailed with rolled edges.

2.5 FINISHING

A. Shop prepare and prime exposed ferrous metal surfaces.

B. Back-paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mils.

C. Kynar 500 or Hylar 5000 shop pre-coated finish on flat sheet metal stock. Finish with 0.2 mil baked on primer and 0.80 mil baked on topcoat for a 1.0 mil dry film thickness. Color to be selected by Architect from manufacturer's entire range of standard and custom colors.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are ready to receive work.

B. Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION

A. Install gutters, downspouts, and accessories in accordance with SMACNA requirements.

B. Join lengths with seams sealed watertight. Flash and seal gutters to downspouts and accessories.

C. Seal metal joints watertight.

D. Set splash blocks and pans under downspouts.

END OF SECTION

SECTION 07810

APPLIED FIREPROOFING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fireproofing, spray applied.

1.2 REFERENCES

A. ASTM E84 - Surface Burning Characteristics of Building Materials.

B. ASTM E119 - Fire Tests of Building Construction and Materials.

C. ASTM E605 - Thickness and Density of Sprayed Fire-Resistive Materials Applied to Structural Members.

D. ASTM E736 - Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members.

E. ASTM E759 - Deflection of Sprayed Fire-Resistive Materials Applied to Structural Members.

F. ASTM E760 - Effect of Impact on Bonding of Sprayed Fire-Resistive Materials Applied to Structural Members.

G. ASTM E761 - Compressive Strength of Sprayed Fire-Resistive Materials Applied to Structural Members.

H. ASTM E859 - Air Erosion of Sprayed Fire-Resistive Materials Applied to Structural Members.

I. ASTM E937 - Corrosion of Steel by Sprayed Fire-Resistive Material Applied to Structural Members.

J. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

K. 2010 CBC - California Building Code, Title 24 Part 2 of the California Code of Regulations (CCR).

L. ICC ES - International Code Council/Evaluation Service, Inc.

M. UL - Underwriters Laboratories: Fire Hazard Classifications.

N. 40 CFR Part 763, Subpart F(7-1-90 Edition) - Asbestos Hazardous Emergency Response Act, Friable Asbestos-Containing Materials in Schools.

1.3 SUBMITTALS

A. Submit product data under provisions of Section 01330.

B. Manufacturer's Data: Submit manufacturer's specifications and include certification from materials manufacturer to show material compliance with Contract Documents. Include certification from manufacturer, signed by an officer of the firm, stating that the proposed material is free of all forms of asbestos, including actionlite, amosite, anthophyllite, chrysotile, crocidolite and tremolite.

C. Test Data: Submit laboratory test results for sprayed fireproofing for the following:

1. Deflection per ASTM E759.

2. Bond Impact per ASTM E760.

3. Compressive Strength per ASTM E761.

4. Bond Strength per ASTM E736.

5. Air Erosion per ASTM E859.

6. Surface Burning Characteristics per ASTM E84.

7. Corrosion Resistance per ASTM E937.

8. Mold Resistance per ASTM G21.

D. Submit laboratory test reports in accordance with ASTM E119, indicating fire resistance as required to satisfy codes. Submit extracts of classified listings of tests performed by Underwriters Laboratories, Inc.

1.4 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum five years documented experience.

B. Applicator: Company specializing in applying the Work of this Section with minimum three years documented experience, approved by manufacturer.

C. Provide fireproofing products containing no detectable asbestos as determined according to the method specified in 40 CFR, Part 763, Subpart F, Appendix A, Section 1.

D. Products, execution, and fireproofing thicknesses shall conform to CBC and UL requirements for the required fire-resistance ratings.

1.5 REGULATORY REQUIREMENTS

A. Conform to applicable codes for fire resistance ratings.

B. Submit certification of acceptability of fireproofing materials to authority having jurisdiction.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Do not apply fireproofing when temperature of substrate material and surrounding air is below 40 degrees F.

B. Provide ventilation to allow proper drying of the sprayed fire-proofing during and subsequent to its application.

C. Maintain non-toxic, unpolluted working area. Provide temporary enclosure to prevent spray from contaminating air.

1.7 SEQUENCING AND SCHEDULING

A. Sequence Work in conjunction with placement of ceiling hanger tabs, mechanical component hangers, and other related sections.

1.8 DELIVERY, STORAGE AND PROTECTION

A. Deliver, store and protect products under provisions of Section 01600.

1.9 WARRANTY

A. Provide warranty that fireproofing will remain free from cracking, checking, dusting, flaking, spalling, separation, and blistering. Reinstall or repair such defects or failures.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Construction Products Division, W.R. Grace & Co., ICC ES No. ER4607, Monokote Type MK-6, www.graceconstruction.com

B. Isolatek International, BlazeShield II, ICC ES No. ER4818, www.cafco.com.

C. Substitutions: Under provisions of Section 01630.

2.2 MATERIALS

A. Fireproofing: Factory mixed, asbestos free, material blended for uniform texture conforming to the following requirements:

1. Bond Strength: ASTM E736, 200 lb./sq.ft. when set and dry.

2. Bond Impact: ASTM E760, no cracking, flaking, or delamination.

3. Dry Density: ASTM E605, minimum average density of 15 lb./cu. ft.

4. Compressive Strength: ASTM E761, Minimum 500 lb./sq.ft.

5. Surface Burning Characteristics: In accordance with ASTM E84:

Flame Spread 0

Smoke Developed 0

6. Air Erosion: Maximum allowable weight loss of the fireproofing material shall be 0.025 grams per square foot when tested in accordance with ASTM E859.

7. Corrosion Resistance: Tested in accordance with ASTM E937 and shall not promote corrosion of steel.

8. Resistance to Mold: Formulated at time of manufacturing with mold inhibitor. Tested in accordance with ASTM G21 and shall show resistance to mold growth when inoculated with aspergillus niger.

2.3 ACCESSORIES

A. Provide accessories to comply with manufacturer's recommendations and to meet fire resistance design requirements.

B. Accessories include, but are not limited to, any required or optional items such as bonding agents, mechanical attachments, application aids such as metal lath, scrim or netting and accelerators.

C. Bond seal coating for all exposed to view fireproofing that is to receive a subsequent field applied painted finish under the provisions of Section 09900.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are ready to receive Work.

B. Verify that clips, hangers, supports, sleeves, and other items required to penetrate fireproofing are in place.

C. Verify that ducts, piping, equipment, or other items which would interfere with application of fireproofing are not positioned until fireproofing work is complete.

D. Verify that voids and cracks in substrate are filled and projections are removed where fireproofing is exposed to view as a finish material.

E. Do not apply fire-resistive material to metal roof deck substrates until concrete topping, if any, has been applied.

F. For metal roof decks without concrete topping, do not apply fire-resistive material to metal deck substrates until roofing has been completed. Prohibit roof traffic during application and drying of fire-resistive material.

G. Do not apply fire-resistive material to metal floor deck substrates until concrete topping has been completed.

H. Beginning of installation means installer accepts existing surfaces.

3.2 PREPARATION

A. Clean substrate of dirt, dust, grease, oil, loose material, paints, primers, or other matter which may affect bond of fireproofing.

B. Remove incompatible materials which affect bond by scraping, brushing, scrubbing, or sandblasting.

3.3 PROTECTION

A. Protect workmen and public, as required under the regulations of the U.S. Occupational Safety and Health Act (OSHA) and applicable local ordinances and/or code regulations.

B. Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting.

3.4 APPLICATION

A. Equipment and application procedure shall conform to the material manufacturer's application instructions.

3.5 FIELD QUALITY CONTROL

A. Field Inspection and testing will be performed under provisions of Section 01458.

B. Random sampling to verify thickness and density of fireproofing will be conducted in accordance with provisions of ASTM E605 or CBC, Section 1704A.10.

C. Reinspect the installed fireproofing for integrity of fire protection, prior to concealment of work.

D. Correct unacceptable work and provide further inspection to verify compliance with requirements.

E. Trade responsible for any damage to fireproofing shall be held responsible for its replacement and/or repair.

3.6 CLEANING

A. Clean work under provisions of 01770.

B. Remove excess material, overspray, droppings, and debris.

C. Remove fireproofing from materials and surfaces not specifically required to be fireproofed.

END OF SECTION

SECTION 07840

FIRESTOPPING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Penetrations through fire-resistance-rated floor and roof construction including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.

B. Penetrations through fire-resistance-rated walls and partitions including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.

C. Penetrations through smoke barriers and construction enclosing compartmentalized areas involving both empty openings and openings containing penetrating items.

D. Sealant joints in fire-resistance-rated construction.

E. Fireproof firestopping and firesafing materials and accessories.

1.2 REFERENCES

A. ASTM C920 - Elastomeric Joint Sealants.

B. ASTM C1193 - Use of Joint Sealants.

C. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.

D. ASTM E119 - Method for Fire Tests of Building Construction and Materials.

E. UL - Fire Hazard Classifications.

F. UL 1479 - Fire Tests of Through-Penetration Firestops.

G. 40 CFR Part 763, Subpart F (7-1-90 Edition) - Asbestos Hazardous Emergency Response Act, Friable Asbestos - Containing Materials in Schools.

1.3 DEFINITION

A. Firestopping (Firesafing): A sealing or stuffing material or assembly placed in spaces between building materials to arrest the movement of smoke, heat, gases, or fire through wall or floor openings.

1.4 SYSTEM DESCRIPTION

A. F-Rated Through Penetration Firestop Systems: F-ratings as required according to UL 1479, but not less than that equaling or exceeding fire resistance rating of assembly penetrated where the following conditions exist:

1. Penetrations larger than 4 inch nominal pipe size or 16 square inches in overall cross-sectional area.

B. T-Rated Through Penetration Firestop Systems: T-ratings, in addition to F-ratings, as required according to UL 1479, where the following conditions exist:

1. Through penetrations of fire rated walls above corridor ceilings which are not part of a fire-resistive assembly.

2. Through penetrations of fire rated walls below any ceiling.

3. Penetrations larger than 4 inch nominal pipe size or 16 square inches in overall cross-sectional area.

C. Penetrations not larger than 4 inch nominal pipe size or 16 square inches in overall cross-sectional area shall have the annular space between the penetrating item and the wall/floor assembly filled with a material which will prevent passage of flame and hot gases sufficient to ignite cotton waste when subjected to ASTM E119 under a minimum positive pressure differential of 0.01 inch water column for the time period at least equal to the fire resistance rating of the wall/floor assembly.

D. Surface Burning: ASTM E84 with a flame spread/smoke developed rating of 25/450.

E. Firestop all interruptions and terminations of fire rated assemblies.

F. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.

G. For floor penetrations with annular spaces exceeding 4 inches or more in width and exposed to possible loading and traffic, provide firestop systems capable of supporting the floor loads involved either by installing floor plates or by other means.

H. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

1.5 SUBMITTALS

A. Submit under provisions of Section 01330.

B. Product Data: Provide data on product characteristics, performance and limitation criteria.

C. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.

D. Certification: Submit firestopping manufacturer's certificate that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs) and are nontoxic to building occupants.

1.6 QUALITY ASSURANCE

A. Through penetration firestop systems to correspond to those penetration firestop system designations listed by UL in their Fire Resistance Directory.

1.7 REGULATORY REQUIREMENTS

A. Conform to CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 2 and UL requirements for fire resistance ratings and surface burning characteristics.

B. Firestopping products shall contain no detectable asbestos as determined by 40 CFR, Part 763, Subpart F, Appendix A, Section 1, Polarized Light Microscopy.

1.8 SEQUENCING AND SCHEDULING

A. Coordinate Work under provisions of Section 01310.

B. Coordinate construction of openings and penetrating items to ensure that through penetration firestop systems are installed per manufacturer's instructions and regulatory requirements.

C. Do not cover up installations that will become concealed behind other construction until District Inspector, if required, has examined each installation.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Do not apply materials when temperature of substrate material and ambient air is below 60 degrees F.

B. Maintain this minimum temperature before, during, and for 3 days after installation of materials.

C. Provide ventilation in areas to receive solvent cured materials.

2. PART 2 PRODUCTS

2.1 FIRESTOPPING, GENERAL

A. Provide firestopping components that are compatible with each other, substrates of openings, and items penetrating firestopping.

B. Provide accessories for each firestopping system that are needed to comply with designated fire-resistance-rated systems specified by firestopping manufacturer.

2.2 ACCEPTABLE MANUFACTURERS

A. AD Fire Protection Systems, Inc., www.adfire.com.

B. Hilti Construction Chemicals, Inc., www.us.hilti.com.

C. Minnesota Mining and Mfg. Co., www.3m.com/firestop.

D. Rector Seal Corporation, www.rectorseal.com.

E. Specified Technologies, Inc., www.stifirestop.com.

F. Tremco, www.tremcosealants.com.

G. United States Gypsum Co., www.usg.com.

H. Substitutions: Under provisions of Section 01630.

2.3 FILL MATERIALS

A. Intumescent Wrap: Single-component, elastomeric sheet.

B. Vinyl Compound: Vinyl-based powder product mixed on site with water to produce a paintable compound with flame-spread and smoke-developed rating of 0 per ASTM E84.

C. Silicone Foam: Two-component, silicone based liquid elastomer that, when mixed, expands and cures in place to produce a flexible nonshrinking foam.

D. Silicone Sealant: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealant either in a self-leveling or non-sag grade for opening condition.

E. Fiber Stuffing: Mineral fiber stuffing with a minimum density of 3.5 lbs./cu. ft.

2.4 JOINT SEALANTS

A. Manufacturer's standard chemically curing elastomeric sealant that complies with ASTM C920.

B. Provide selections from manufacturer's full range of colors.

C. Single-Component, Neutral Curing Silicone Sealant: Type S; Grade NS; Class 25; exposure-related use NT; and joint substrate related uses M, G, A, and O, as applicable to substrate assembly condition.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify site conditions under provisions of Section 01310.

B. Verify openings are ready to receive the work of this Section.

3.2 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter which may affect bond of firestopping material.

B. Remove laitance and form release agents from concrete.

C. Remove incompatible materials which may affect bond.

D. Install backing materials to arrest liquid material leakage.

3.3 APPLICATION OF THROUGH-PENETRATION FIRESTOPS

A. Install material at walls or partition openings which contain penetrating sleeves, piping, ductwork, conduit and other items, requiring firestopping.

B. Comply with through-penetration firestop manufacturer's installation instructions and drawings pertaining to products and applications required.

C. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce shapes and depths required to achieve fire ratings.

D. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop system.

E. Apply primer and materials in accordance with manufacturer's instructions.

F. Apply firestopping material in sufficient thickness to achieve rating.

3.4 APPLICATION OF FIRE-RESISTIVE JOINT SEALANT

A. Comply with ASTM C1193 and manufacturer's installation instructions and drawings pertaining to products and applications required.

B. Install joint fillers to provide support and at a position required to produce depth to joint widths that allow development of fire-resistance rating required.

C. Install sealant to completely fill recesses provided. Install sealant at same time as joint filler.

D. Tool non-sag sealants after application to form smooth uniform bead to configuration required to produce fire-resistance rating.

3.5 FIELD QUALITY CONTROL

A. Do not cover up installations that will become concealed behind other construction until District Inspector has examined each installation.

B. Where deficiencies are found, repair or replace firestopping to required condition.

3.6 CLEANING

A. Clean Work under provisions of Section 01770.

B. Clean adjacent surfaces of firestopping materials.

3.7 PROTECTION OF FINISHED WORK

A. Protect finished Work under provisions of Section 01600.

B. Protect adjacent surfaces from damage by material installation.

3.8 SCHEDULES

	LOCATION	UL NO.	F RATING
A.	Stud wall, metallic pipe, and conduit.	U371	2 hour
B.	Stud wall, non-metallic pipe, and conduit.		1 hour

END OF SECTION

SECTION 07900

JOINT SEALERS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Preparing sealant substrate surfaces.

B. Sealant and backing.

1.2 SUMMARY OF SEALANT LOCATIONS

A. Joints in horizontal surfaces.

1. Expansion and isolation joints in cast-in-place concrete slabs.
2. Expansion and isolation joints in masonry paving.
3. Joints in precast concrete paving units.
4. Joints in stone paving units.
5. Control and expansion joints in ceramic and quarry tile.
6. Control and expansion joints in soffits, ceilings and overhead surfaces.
7. Joints on underside of precast beams and planks.
8. Perimeter joints in exterior openings.
9. Joints between ceiling surfaces and frames for doors and windows.
10. Joints in flashing and sheet metal.
11. Perimeter joints of plumbing fixtures.
12. Acoustical isolation joints between head and sill of walls and floor and ceiling surfaces.
13. Joints between countertops and wall surfaces.
14. Joints in skylights and framing.
15. Joints between thresholds and floors.
16. Isolation joints in plaster soffits and ceilings.
17. Joints between dissimilar materials and those listed above.
18. Other joints as indicated.

B. Joints in vertical surfaces:

1. Expansion and isolation joints in cast-in-place concrete.
2. Expansion and isolation joints in masonry.
3. Joints in precast concrete.
4. Expansion and isolation joints in stonework.

5. Control and expansion joints in ceramic and quarry tile.

6. Perimeter joints in exterior openings.

7. Joints in flashing and sheet metal.

8. Perimeter joints of plumbing fixtures.

9. Acoustical isolation joints of walls.

10. Joints between cabinets and walls.

11. Joints between wall surfaces and door and window frames.

12. Joints in skylights and framing.

13. Isolation joints in plaster walls.

14. Joints between dissimilar materials and those listed above.

15. Other joints as indicated.

1.3 REFERENCES

A. ASTM C834 - Latex Sealing Compounds.

B. ASTM C919 - Practices for Use of Sealants in Acoustical Applications.

C. ASTM C920 - Elastomeric Joint Sealants.

D. ASTM C1193 - Standard Guide for Use of Joint Sealants.

E. ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.

F. FS TT-S-001657 - Sealing Compound, Single Component, Butyl Rubber Based, Solvent Release Type.

G. SWRI - (Sealant, Waterproofing and Restoration Institute) - Sealant and Caulking Guide Specification.

1.4 SUBMITTALS

A. Submit product data under provisions of Section 01330.

B. Submit product data indicating sealant chemical characteristics, performance criteria, limitations, and color availability.

C. Submit samples under provisions of Section 01330.

D. Submit two samples 4 inches long in size illustrating colors selected.

1.5 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum five years documented experience.

B. Applicator: Company specializing in applying the Work of this Section with minimum three years documented experience, approved by sealant manufacturer.

C. Conform to Sealant, Waterproofing, and Restoration Institute (SWRI) requirements for materials and installation.

D. Perform Work in accordance with ASTM C1193.

E. Perform acoustical sealant application work to provide maximum STC values in accordance with ASTM C919.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Do not install solvent curing sealants in enclosed building spaces.

B. Do not install sealant when temperature is less than 40 degrees F.

C. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.7 OPERATION AND MAINTENANCE DATA

A. Submit maintenance data under the provisions of Section 01770.

B. Submit recommended inspection intervals for sealant joints.

C. Submit instructions for repairing and replacing failed sealant joints.

1.8 WARRANTY

A. Provide 5 year warranty under provisions of Section 01770.

B. Include coverage for installed sealants and accessories which fail to achieve air and water seal and exhibit loss of adhesion or cohesion or do not cure.

2. PART 2 PRODUCTS

2.1 MATERIALS

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.

B. VOC Content of Interior Sealants: Provide interior sealants and sealant primers that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Sealants: 250 g/L.

2. Sealant Primers for Nonporous Substrates: 250 g/L.

3. Sealant Primers for Porous Substrates: 775 g/L.

2.2 MANUFACTURERS

A. Manufacturers and their products are listed for each type of sealant. Acceptable manufacturers include the following:

1. Dow Corning Corp., www.dowcorning.com.

2. General Electric Co., www.gesealants.com.

3. Pecora Corp., www.pecora.com.

4. Sika Corp., www.sikausa.com.

5. Sonneborn/ChemRex, www.chemrex.com.

6. Tremco, Inc., www.tremcosealants.com.

7. United States Gypsum Co., www.usg.com.

8. W.R. Meadows, Inc., www.wrmeadows.com.

B. Substitutions: Under provisions of Section 01630.

2.3 SEALANTS

A. Type A - Acrylic Latex: One-part, non-sag, mildew resistant acrylic emulsion compound complying with ASTM C834, Type S, Grade NS, formulated to be paintable.

1. Tremco, Inc., Acrylic Latex Caulk.

2. Pecora Corporation, AC-20.

3. Sonneborn, Chemrex, Sonolac.

B. Type B - Butyl Sealant: One-part, non-sag solvent-release-curing sealant complying with FS TT-S-001657 for Type 1 and formulated with a minimum of 75 percent solids.

1. Tremco, Inc., Tremco Butyl Sealant.

2. Pecora Corporation, BC-158.

3. Sonneborn, Chemrex, Multi-Purpose Sealant.

C. Type D - Non-Sag Polyurethane Sealant: Single component sealant complying with ASTM C920, Type S, Grade NS, Class 25:

1. Pecora Corp., Dynatrol I-XL.

2. Tremco, Inc., Vulkem 921.

3. Sika Corp., Sikaflex 1a.

4. Sonneborn/ChemRex, Sonolastic NP-1.

D. Type E - Neutral-Curing Silicone Sealant: One part medium modulus neutral-curing silicone sealant complying with ASTM C920, Type S, Grade NS, Class 25.

1. Dow Corning Corp., Dow Corning 795.

2. General Electric Co., Ultraglaze 4000.

3. Tremco, Inc., Spectrum 3.

4. Pecora Corp., 895.

E. Type F - One-Part Mildew-Resistant Silicone Sealant: Complying with ASTM C920, Type S, Grade NS, Class 25.

1. Dow Corning Corp., Dow Corning 786.

2. General Electric Co., Sanitary 1700.

3. Tremco, Inc., Tremsil 200.

4. Pecora Corp., 863 or 898 White.

F. Type G - Multi-Part Pourable Sealant: Complying with ASTM C920, Type M, Grade P, Class 25. Shore A hardness +40.

1. Tremco, Inc., THC900/901.

2. Pecora Corp., Dynatred or Urexpan NR-200.

3. Sika Corporation, Sikadur 51xNS/SL.

4. W.R. Meadows, Pourthane.

G. Type H - Acoustical Sealant: Nondrying, nonhardening permanently flexible conforming to ASTM C834.

1. Pecora Corp., AIS-919 Acoustical Sealant.

2. Tremco, Inc., Tremco Acoustical Sealant.

3. United States Gypsum Co., Sheetrock Acoustical Sealant.

2.4 ACCESSORIES

A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.

B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

C. Joint Backing: ASTM D1056; round, closed cell polyethylene foam rod; oversized 30 to 50 percent larger than joint width.

D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that joint openings are ready to receive Work and field measurements are as shown on Drawings and recommended by the manufacturer.

B. Beginning of installation means installer accepts existing substrate.

3.2 PREPARATION

A. Clean and prime joints in accordance with manufacturer's instructions. Prime if recommended by manufacturer.

B. Remove loose materials and foreign matter which might impair adhesion of sealant.

C. Verify that joint backing and release tapes are compatible with sealant.

D. Perform preparation in accordance with ASTM C1193.

E. Protect elements surrounding the Work of this Section from damage or disfiguration.

3.3 INSTALLATION

A. Install sealant in accordance with manufacturer's instructions.

B. Measure joint dimensions and size materials to achieve required width/depth ratios.

C. Install joint backing to achieve a neck dimension no greater than 1/3 the joint width.

D. Install bond breaker where joint backing is not used.

E. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

G. Tool joints concave unless otherwise detailed.

3.4 CLEANING AND REPAIRING

A. Clean work under provisions of Section 01770.

B. Clean adjacent soiled surfaces.

C. Repair or replace defaced or disfigured finishes caused by Work of this Section.

3.5 PROTECTION OF FINISHED WORK

A. Protect sealants until cured.

3.6 SCHEDULE

Type	Location	Color
A. Type A - Acrylic Latex Cure	All interior joints not otherwise scheduled	To match adjacent surfaces
B. Type B - Butyl	Under thresholds	Black
C. Type D - Non-Sag Polyurethane Sealant	Exterior door, entrance and window frames.	To match adjacent surface.
D. Type E - Neutral-Curing Silicone	Joints within aluminum entrance system glass and glazing.	Translucent
E. Type F - Mildew-Resistant Silicone	Interior joints in ceramic tile and at plumbing fixtures.	Almond
F. Type G - Multi-part Pourable Urethane	Exterior and interior joints in horizontal surfaces of concrete.	To match adjacent material
G. Type H - Acoustical Sealant	Interior walls between stud track/runner and adjacent construction. Between outlet boxes and gypsum board.	White

END OF SECTION

SECTION 08110

STEEL DOORS AND FRAMES

1. PART 1 GENERAL

1.1 WORK INCLUDED

A. Non-rated and fire rated rolled steel doors and frames.

B. Interior and exterior light frames.

C. Louvers.

1.2 REFERENCES

A. ANSI A250.8 - Recommended Specification for Standard Steel Doors and Frames.

B. ANSI A250.3 - Test Procedure and Acceptance Criteria for Factory-Applied Finish Painted Steel Surfaces for Steel Doors and Frames.

C. ANSI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.

D. ASTM A653 - Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

E. ASTM A924 - General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.

F. CEC - California Energy Commission.

G. NFPA 80 - Fire Doors and Windows.

H. SDI-105 - Recommended Erection Instructions for Steel Frames.

I. DHI - Door and Hardware Institute.

J. 2010 CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2 and Part 6.

K. UL 9 - Fire Tests of Window Assemblies.

L. UL 10C - Fire Tests of Door Assemblies.

1.3 QUALITY ASSURANCE

A. Conform to requirements of ANSI A250.8.

B. Fire rated door, panel and frame construction to conform to UL 9 and UL 10C.

C. Installed frame and door assembly to conform to NFPA 80 for fire rated class indicated on Drawings.

D. Installed exterior frame and door assembly to be weather tight.

E. Manufacturer shall have both fabrication and assembly plant located within the continental United States or Canada. Products that are either fabricated or assembled outside the continental United States or Canada are not acceptable.

1.4 PERFORMANCE REQUIREMENTS

A. Thermal Performance: Glazed exterior borrowed lite, sidelite and transom lite frames shall have an overall minimum U-value of 0.71 as rated in accordance with the default table method approved by the California Energy Commission (CEC). Provide Label Certificate FC-1, Figure 3-3, from the Nonresidential Compliance Manual documenting compliance with the CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 6, Section 116, Table 116-A.

B. Solar Heat Gain Coefficient: Glazed exterior borrowed lite, sidelite and transom lite frames shall have an overall maximum solar heat gain coefficient of 0.60 as rated in accordance with default table method approved by the California Energy Commission (CEC). Provide Label Certificate FC-1, Figure 3-3, from the Nonresidential Compliance Manual documenting compliance with the CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 6, Section 116, Table 116-B.

1.5 REGULATORY REQUIREMENTS

A. Conform to CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 2 for fire rated frames and doors.

B. Conform to CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 6, for U-value and solar heat gain coefficient.

1.6 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01330.

B. Indicate frame configuration, anchor types and spacings, location of cutouts for hardware, reinforcement, and finish.

C. Indicate door elevations, internal reinforcement, closure method, and cut outs for glazing and louvers.

D. Submit two samples of exterior frame profile at mullion intersection.

E. Submit Label Certificate FC-1, Figure 3-3, from the Nonresidential Compliance Manual documenting compliance with the CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 6, Section 116, Table 116-A and 116-B.

1.7 DELIVERY, STORAGE AND PROTECTION

A. Deliver, store, protect, and handle products under provisions of Section 01600.

B. Store products on site under cover.

C. Place products on at least 4 inch wood sills to prevent rust and damage.

D. Protect doors and frames with resilient packaging.

1.8 SEQUENCING AND SCHEDULING

A. Sequence Work under the provisions of Section 01110.

B. Schedule Work under the provisions of Section 01329.

C. Schedule delivery of all doors and frames so as not to delay progress of other trades.

2. PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Curries Mfg., Inc., www.curries.com.

B. Door Components, Inc., www.doorcomponents.com.

C. Fleming, www.flemingdoor.com.

D. Krieger Steel Products Company, www.kriegersteel.com.

E. Republic Builders Products Corporation, www.republicdoor.com.

F. Security Metal Products, www.secmet.com.

G. Steelcraft, www.steelcraft.com.

H. Stiles Custom Metal, Inc., www.hollowmetal.com.

I. Titan Metal Products, Inc., www.titanmetalproducts.com.

J. Substitutions: Under provisions of Section 01630.

2.2 DOORS AND FRAMES

A. Steel: Commercial quality cold rolled steel conforming to ASTM A653 galvanized to A60 or G60 coating class or Type B, A40 (ZF120) according to ASTM A924 with minimized spangle, mill phosphatized.

B. Exterior Doors: ANSI A250.8, Level 3, extra heavy-duty, Model 2, continuous welded seam, beveled edges, minimum 0.053 inch thick faces.

C. Interior Doors: ANSI A250.8, Level 2 heavy duty, Model 1, beveled edges, minimum 0.042 inch thick faces.

D. Exterior Frames: ANSI A250.8, Level 3, 0.067 inch thick material, core thickness.

E. Interior Frames: ANSI A250.8, Level 2, 0.053 inch thick material, core thickness.

2.3 DOOR CORE

A. Exterior Core: Polystyrene insulation.

B. Interior Door Core: Impregnated cardboard honeycomb.

2.4 ACCESSORIES

A. Louvers: Roll formed steel, prime coated, inverted 'Y' blade, sightproof, with countersink, tamperproof fasteners.

B. Rubber Silencers: Resilient rubber as supplied by Section 08710.

C. Glazing Stops: Rolled steel channel shape, mitered corners; prepared for countersink style tamperproof screws at door installations, square butt at light frames.

2.5 FRAME ANCHORS

A. Masonry Anchors: Adjustable T-strap, 0.053 inch thick steel, corrugated, 2 inch x 10 inch size. Fire rated frames to have UL listed perforated strap anchor permanently anchored to frame.

B. Metal Stud Anchor: Z type anchor, welded to frame, 0.053 inch thick steel, UL listed as required for fire rating.

C. Wood Stud Anchor: U-shaped anchor, welded to frame, 1 inch wide, 0.053 inch thick steel, with 2 pre-punched holes in nailing flange. UL listed as required for fire rating.

D. Existing Wall Anchor: 0.053 inch thick pipe spacer with 2 inch x 0.053 inch thick steel plate sized to accommodate a 3/8 diameter countersunk flathead expansion anchor. UL listed as required for fire rating.

E. Floor Clip: Angle anchor, full width of frame, 0.067 inch thick steel.

2.6 PROTECTIVE COATINGS

A. Primer: Clean and treat with three stage iron phosphate process. Provide baked-on shop coat of EPA compliant gray synthetic rust - inhibitive enamel primer meeting acceptance criteria of ANSI 250.10.

B. The frame underneath the glazing stops and the inside of the glazing stop area shall be treated for maximum paint adhesion and prime painted with a rust inhibitive primer prior to installation of the frame.

2.7 HARDWARE REINFORCEMENT

A. Fabricate frames and doors with hardware reinforcement plates welded in place.

B. Hinge reinforcing shall be full width of frame profile.

C. Provide spacers for all thru-bolted hardware.

D. Reinforcement components shall be the following minimum thickness:

1.	Hinge (door and frame)	3/16 inch
2.	Mortise Lock or Deadbolt	0.093 inch
3.	Bored Lock or Deadbolt	0.093 inch
4.	Flush Bolt Front	0.093 inch
5.	Surface Bolt	0.093 inch
6.	Surface Applied Closer	0.093 inch
7.	Hold Open Arm	0.093 inch
8.	Pull Plates and Bars	0.067 inch
9.	Surface Exit Device	0.093 inch
10.	Floor Checking Hinge	0.167 inch
11.	Pivot Hinge	0.167 inch

2.8 FABRICATION

A. When shipping limitations so dictate, frames for large openings shall be fabricated in sections designed for splicing.

B. All spliced joints shall occur on the interior side of exterior frames.

C. Fabricate frames as full profile welded units.

D. All face, rabbet and soffit joints between abutting members shall be continuously welded and finished smooth when exposed to exterior.

E. Corner joints shall have all contact edges closed tight, with faces mitered and continuously welded.

F. Frames with multiple openings shall have mullion members fabricated with no visible seams or joints. All face, rabbet and soffit joints between abutted members shall be continuously welded and finished smooth when exposed to exterior.

G. Provide 3/8 inch back bend return on frames where gypsum board wall material occurs whether on one or both sides.

H. Mullions for Double Doors: Removable type supplied by Section 08710.

I. Dust cover boxes or mortar guards of 0.016 inch thick steel shall be provided at all hardware mortises on frames.

J. Reinforce frames wider than 48 inches with roll formed, 0.093 inch thick steel channels fitted tightly and welded into frame head, inverted U-shape profile.

K. Prepare frame for silencers except for frames which receive weatherstripping. Provide three single rubber silencers for single doors on strike side, and two single silencers on frame head at double doors without mullions.

L. Provide steel spreader temporarily attached to feet of both jambs as a brace during shipping and handling. Spreader is not to be used for installation purposes.

M. Attach fire rated label to each frame and door unit.

N. Close top edge of exterior door flush with inverted steel channel closure. Weld all joints watertight.

2.9 MANUFACTURING TOLERANCE

A. Manufacturing tolerance shall be maintained within the following limits:

1.	Frame width	+1/16 inch -1/32 inch
2.	Frame height	+-3/64 inch
3.	Frame face	+-1/32 inch
4.	Frame stop	+-1/32 inch
5.	Frame rabbet	+-1/64 inch
6.	Frame depth	+-1/32 inch
7.	Frame throat	+-1/16 inch
8.	Door width and height	+-3/64 inch
9.	Door thickness	+-1/16 inch
10.	Hardware location	+-1/32 inch
11.	Door flatness	+-1/16 inch

2.10 FINISH

A. Primer: Baked on rust-inhibitive enamel.

B. Finish: Site paint under provisions of Section 09900.

3. PART 3 EXECUTION

3.1 INSTALLATION

A. Install frames in accordance with SDI-105.

B. Install doors in accordance with DHI.

C. Install fire doors and frames in accordance with NFPA 80.

D. Installation of exterior doors and frames to be weathertight and waterproof.

E. Seal penetration of all surface applied screws on exterior face of frames at glass stops and hardware attachments.

F. Coordinate with wall construction and details for anchor placement. Provide anchors as follows:

1. Frames up to 7'-6" height - 4 anchors each jamb.

2. Frames 7'-6" to 8'-0" height - 5 anchors each jamb. Plus an additional anchor for each 2' or fraction thereof over 8'-0".

3. Frames for Double Doors: Minimum of 2 anchors in head approximately 12 inches from each jamb.

4. Borrowed Lite Frames: 2 anchors each jamb plus 1 for each 18 inches or fraction thereof over 3'-0". Minimum 2 anchors in head and sill approximately 12 inches from each jamb plus 1 for each 30 inches of length or fraction thereof.

5. Floor anchors - 1 anchor each jamb for interior doors. Where wall construction will not allow placement of floor anchor, provide one additional jamb anchor as close to floor as possible. At exterior doors set frames 2 inches into blocked out recess and grout flush with floor.

6. Existing wall anchors shall be welded to provide non-removable condition. Welded bolt head to be ground, dressed and finished smooth.

G. Frames installed in masonry walls to be fully grouted with masonry grout.

H. Exposed field welds to be finished smooth and touched up.

I. Primed or painted surfaces which are scratched or marred shall be touched up.

J. Hardware to be applied in accordance with hardware manufacturer's templates and instructions.

K. Coordinate installation of glass and glazing.

L. Install door louvers.

M. Install roll formed steel reinforcement channels between two abutting frames. Anchor to structure and floor.

3.2 INSTALLATION TOLERANCES

A. Edge clearance for swinging doors shall not exceed the following:

1.	Between door and frame at head and jamb	1/8 inch
2.	Between edge of pair of doors	1/8 inch
3.	At door sill with threshold (From bottom of door to top of threshold)	3/8 inch
4.	At door sill with no threshold	1/2 inch
5.	At door bottom and rigid floor covering per NFPA 80	1/2 inch
6.	At door bottom and nominal floor covering per NFPA 80	5/8 inch

B. Frame installation tolerance shall not exceed the following:

1.	Squareness	+-1/16 inch
2.	Alignment	+-1/16 inch
3.	Plumbness	+-1/16 inch
4.	Diagonal Distortion	+-1/32 inch

END OF SECTION

SECTION 08210

WOOD DOORS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Flush faced wood doors and panels fire rated and non-rated.

B. Light frames.

C. Door louvers.

1.2 REFERENCES

A. ANSI/WDMA - Wood Door Manufacturers Association I.S. 1-A-04-Architectural Wood Flush Doors.

B. 2010 CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2.

C. NFPA 80 - Fire Doors and Windows.

D. NWWDA I.S.1 - Industry Standard For Wood Flush Doors (Includes Standards I.S.1.1 through I.S.1.7).

E. FSC - Forest Stewardship Council.

F. UL 10C - Fire Tests of Door Assemblies.

G. WI - Woodwork Institute: Architectural Woodwork Standards.

1.3 QUALITY ASSURANCE

A. Conform to requirements of The WI Architectural Woodwork Standards, Section 9 Custom Grade except where otherwise indicated.

B. All wood doors and the installation of wood doors shall be monitored for compliance under the scope of the WI Certified Compliance Program (CCP).

C. Issue a WI Certified Compliance Certificate prior to delivery of doors certifying that doors meet all requirements of WI Grade specified.

D. After completion issue a WI Certified Compliance Certificate for Installation.

E. Wood products shall be FSC Certified according to the rules of the Forest Stewardship Council. www.fscus.org.

F. Accredited certification bodies shall be one of the following:

1. Scientific Certification Systems, www.scscertified.com.

1.4 REGULATORY REQUIREMENTS

A. Conform to CBC - California Building Code, for fire rated doors and Transom Panels.

B. Fire Door and Transom Panel Construction: Conform to UL 10C, Category A.

C. Installed Doors and Transom Panels: Conform to NFPA 80 for fire rated class indicated.

1.5 SUBMITTALS

A. Submit shop drawings under provisions of Section 01330. Shop drawings shall bear the WI Certified Compliance Label on the first page of each set.

B. Indicate door elevations, stile and rail reinforcement, internal blocking for hardware attachment, and cutouts for glazing and louvers.

C. Submit samples under provisions of Section 01330.

D. Submit two samples 12 x 12 inch in size illustrating each species.

1.6 DELIVERY, STORAGE, AND PROTECTION

A. Protect products under provisions of Section 01600.

B. Package, deliver, and store doors in accordance with WI requirements as set forth in Section 2 and Appendix B of The Architectural Woodwork Standards.

1.7 WARRANTY

A. Provide manufacturer's standard lifetime warranty for interior doors and 1 year warranty for exterior doors under provisions of Section 01770 for solid core doors.

2. PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS, FLUSH FACED DOORS

A. Algoma Hardwoods, www.algomahardwoods.com.

B. Door America-American Building Supply, Inc., www.dooramerican.com.

C. Eggers Industries, www.eggersindustries.com.

D. Haley Architectural Doors, www.haleybros.com.

E. Oshkosh Door Co., www.oshkoshdoor.com.

F. Marshfield Door Systems, Inc., www.marshfielddoors.com.

G. V.T. Industries, www.vtindustries.com.

H. Substitutions: Under provisions of Section 01630.

2.2 ACCEPTABLE MANUFACTURERS, STILE AND RAIL DOORS

A. Door America-American Building Supply, Inc., www.dooramerican.com.

B. Eggers Industries, www.eggersindustries.com.

C. Pinecrest, www.pinecrestinc.com.

D. Simpson Door Co., www.simpsondoor.com.

E. Sun-Dor-Co., www.sundorco.com.

F. The Maiman Co., www.maiman.com.

G. Marshfield Door Systems, Inc., www.marshfielddoors.com.

H. Substitutions: Under provisions of Section 01630.

2.3 DOOR CONSTRUCTION

A. Lumber Materials: FSC - Forest Stewardship Council certified sustainable harvested wood.

B. Solid Non-rated Core: Solid wood block, framed block glued, or solid particleboard.

C. Hollow Core: NWWDA I.S.1; mesh or cellular core including lock blocks, vertical edge bands, and top and bottom rails.

D. Solid, Special Function Core: Labeled fire performance type, UL 10C, Category A. Intumescent seals concealed by outer stile in matching venner.

E. Construction: WI, Custom grade, ANSI/WDMA extra heavy duty, 5 ply, manufactured as an edge bonded, sanded core assembly, laminated in a one-step, hot pressed operation. Cold-press method is not acceptable.

F. Flush Interior Door Veneer: .028 inch plastic laminate finish. Satin sheen. Factory finish. Color to match casework, see Section 06200.

2.4 ADHESIVES

A. Exterior Doors: WI Type I.

B. Interior Doors: WI Type I.

2.5 ACCESSORIES

A. Louvers: Roll formed 20 gage galvanized steel; factory primed; inverted 'Y' blade; sightproof; lightproof.

2.6 FABRICATION

A. Fabricate non-rated wood doors to requirements of The WI Architectural Woodwork Standards, Section 9, in the WI Grade specified.

B. Fabricate fire rated doors per manufacturer's standard construction, and labeling agency requirements.

C. Premachine doors for finish hardware.

D. For fire rated doors with mineral cores, provide solid wood blocks for hardware reinforcement at lock edge and at top of door for closer.

E. For fire rated doors with mineral cores, provide solid wood blocking for thru-bolted hardware.

3. PART 3 EXECUTION

3.1 INSTALLATION

A. Install doors in accordance with The WI Architectural Woodwork Standards Section 9 and Appendix B.

B. Conform to WI and NFPA requirements for fit tolerances.

C. Coordinate installation of glass and glazing.

D. Install door louvers.

E. Adjust doors for smooth and balanced movements.

F. Install fire doors in accordance with NFPA 80.

3.2 INSTALLATION TOLERANCES

A. Edge clearance for swinging doors shall not exceed the following as required by WI and NFPA 80:

1.	Between door and frame at head and jamb	1/8 inch
2.	Between edge of pair of doors	1/8 inch
3.	Diagonal distortion	1/8 inch
4.	At door sill with threshold. (From bottom of door to top of threshold)	3/8 inch
5.	At door sill with no threshold	1/2 inch
6.	At door bottom and rigid floor covering per NFPA 80	1/2 inch
7.	At door bottom and nominal floor covering per NFPA 80	5/8 inch

END OF SECTION

SECTION 08311

ACCESS DOORS AND FRAMES

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fire resistive rated and non-rated access doors and frames.

B. Wall and ceiling locations.

C. Installation schedule.

1.2 REFERENCES

A. UL - Underwriters Laboratories.

1.3 QUALITY ASSURANCE

A. Manufacture fire rated access doors and frames to conform to UL requirements.

B. Provide labels indicating rating.

1.4 SUBMITTALS

A. Submit product data under provisions of Section 01330.

B. Include sizes, types, finishes, scheduled locations, and details of adjoining work.

2. PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Elmdor Manufacturing Co., www.elmdorstoneman.com.

B. Karp Associates Inc., www.karpinc.com.

C. J.L. Industries, www.jlindustries.com.

D. MIFAB, www.mifab.com.

E. Milcor Incorporated, www.milcorinc.com.

F. Nystrom Incorporated, www.nystrom.com.

G. Substitutions: Under provisions of Section 01630.

2.2 ACCESS UNITS

A. Fire Rated Wall and Ceiling Units: Equivalent to Milcor Flush Panel Universal Fire Rated access door, Model UFR, with sandwich type door panel with 1-1/2 hour B label fire rating.

B. Non-Rated Wall Units: Equivalent to Milcor Flush Panel Style M.

C. Non-Rated Gypsum Board Ceiling Units: Equivalent to Milcor recessed panel Style ATR.

D. Non-Rated Plaster Ceiling and Wall Units: Equivalent to Milcor flush panel Style K.

E. Non-Rated Applied Acoustic Tile Ceiling Units: Equivalent to Milcor recessed panel Style AT.

F. Non-Rated Floor Door Units: Equivalent to Milcor flush cover floor door Style FA.

G. Size: As required for proper access.

2.3 FABRICATION

A. Fire Rated Units: Fabricate frame of 0.0538 inch thick steel and door panels 0.0329 inch thick steel pans insulated with non-combustible filler.

B. Non-Rated Units: Fabricate frames of 0.0538 inch thick steel and door panels of 0.0329 inch thick steel.

C. Weld, fill, and grind joints to assure flush and square unit.

D. Hardware: Continuous type steel hinges with stainless steel pin, screw driver slot, quarter turn cam lock.

E. Anchors: Provide masonry anchors where required for wall construction.

2.4 FINISH

A. Prime coat units with baked on electrostatic primer.

B. Site paint primed metal surfaces under provision of Section 09900.

3. PART 3 EXECUTION

3.1 INSPECTION

A. Verify rough openings for door and frame are correctly sized and located.

B. Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION

A. Install frame plumb, level, and flush in wall floor and ceiling openings.

B. Position to provide convenient access to concealed work requiring access.

C. Secure rigidly in place in accordance with manufacturer's instructions.

D. Install sealant material around units as specified in Section 07900.

3.3 INSTALLATION SCHEDULE

A. Provide access doors in locations and in sizes required for all mechanical, plumbing and electrical equipment for proper adjustment, maintenance and general access required by code.

B. Provide access doors in the following quantities:

1. 15 non-rated, flush panel, prime painted wall access doors.

2. 15 fire-rated, flush panel, prime painted wall access doors.

C. Install prime painted units at all locations except at toilets, kitchens, showers and similar spaces.

D. Install stainless steel units at all toilets, kitchens, showers, and similar spaces.

END OF SECTION

SECTION 08333

OVERHEAD COILING DOORS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Standard overhead coiling doors; non-fire rated manual operated; pre-finished finish.

1.2 REFERENCES

A. ASTM A480 - Flat Rolled Stainless Heat Resisting Steel Plate, Sheet, and Strip.

B. ASTM A653 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron, Alloy-Coated (Galvannealed) by the Hot-Dip Process.

C. ASTM A924 - General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.

D. UL - Underwriters' Laboratories, Inc.

E. NFPA 80 - Fire Doors and Windows.

1.3 REGULATORY REQUIREMENTS

A. Fire-Rated Door Assemblies: Shall comply with NFPA 80 and be listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing according to NFPA 252.

B. Smoke Control: In corridors and smoke barriers, doors shall be listed and labeled with the letter "S" on the fire-rating label by a qualified testing agency for smoke- and draft-control based on testing according to UL 1784. Equip each fire-rated door with smoke-seal perimeter gaskets for smoke and draft control as required for door listing and labeling.

1.4 OPERATION AND MAINTENANCE DATA

A. Submit manufacturer's operation and maintenance data under provisions of Section 01770.

2. PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - OVERHEAD COILING DOORS

A. Atlas Door Corp./Cornell Iron Works, www.cornelliron.com.

B. The Cookson Company, www.cooksondoor.com.

C. Lawrence Roll-Up Doors, Inc., www.lawrencedoors.com.

D. Overhead Door Corp., www.overheaddoor.com.

E. Raynor, www.raynor.com.

F. Wayne Dalton Corp., www.wayne-dalton.com.

G. Windsor Door, www.windsordoor.com.

H. Substitutions: Under provisions of Section 01630.

2.2 MATERIALS - OVERHEAD COILING DOORS

A. Insulated Curtain: Minimum 0.0269 inch thick flat slats of steel with backpanels, ASTM A653, commercial steel, Type A, G60; galvanized coating in accordance with ASTM A924; 2-7/8 inches wide x required length; ends of alternate slats fitted with endlocks to act as wearing surface in guides and to prevent lateral movement; bottom fitted with aluminum extrusion to provide reinforcement and positive contact with floor in closed position. Slats to be filled with foamed-in-place polyurethane insulation.

B. Curtain Guides: Formed steel channels and angles for required sizes and configurations.

C. Roller Shaft (Counterbalance): Steel pipe and helical steel spring system capable of producing sufficient torque to assure easy operation of curtain from any position; adjustable spring tension.

D. Housing: 0.020 inch thick galvanized steel; internally reinforced to maintain rigidity and form.

E. Weatherstripping: Water and rot proof, resilient type; located along jamb edges, bottom of curtain, and within housing.

F. Hardware: As specified in Section 08710.

G. Manual Operation: Hand lift on bottom bar.

2.3 FINISH

A. Overhead Coiling Doors: Galvanized steel factory primed and pre-finished in powder-coat paint finish in color selected by Architect.

B. Counter Service Doors: Stainless steel, No. 4 finish.

3. PART 3 EXECUTION

3.1 INSTALLATION

A. Install overhead coiling doors in accordance with manufacturer's instructions.

B. Fit, align, and adjust door assemblies level and plumb; provide smooth operation.

C. Install fire-rated doors in compliance with NFPA 80.

D. Test door closing when activated by smoke-detector fire-release system. Reset door-closing mechanism after successful test.

END OF SECTION

SECTION 08411

ALUMINUM-FRAMED STOREFRONTS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Aluminum doors, frames and glazed lights.

B. Glass.

C. Anchors, brackets, and attachments.

D. Perimeter sealant.

1.2 REFERENCES

A. ASTM A36 - Structural Steel.

B. ASTM B221 - Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube.

C. ASTM E283 - Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors.

D. ASTM D2000 - Classification System for Rubber Products.

E. ASTM D2287 - Nonrigid Vinyl Chloride Polymer and Copolymer molding and Extrusion Compounds.

F. AAMA 701.2 - Voluntary Specification for Pile Weatherstripping.

G. AAMA SFM-1 - Aluminum Storefront and Entrance Manual.

H. NAAMM - Metal Finishes Manual.

I. 2010 CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2 and Part 6.

J. CEC - California Energy Commission.

1.3 PERFORMANCE

A. System to provide for expansion and contraction within system components caused by a cycling temperature range of 120 degrees F without causing detrimental effects to system or components.

B. Design and size members to withstand dead loads and live loads caused by pressure and suction of wind as calculated in accordance with the CBC, California Building Code.

C. Limit mullion deflection to 1/175, or flexure limit of glass with full recovery of glazing materials, whichever is less.

D. Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to exterior.

E. Limit air infiltration through assembly to 0.06 cu. ft/min./sq. ft. as measured in accordance with ASTM E283.

F. System to Accommodate, without Damage to System or Components, or Deterioration of Perimeter seal: Movement within system; movement between system and perimeter framing components; dynamic loading and release of loads; and deflection of structural support framing.

G. Thermal Performance: Glazed exterior borrowed lite, sidelite and transom lite frames shall have an overall minimum U-value of 0.71 as rated in accordance with the default table method approved by the California Energy Commission (CEC). Provide Label Certificate FC-1, Figure 3-3, from the Nonresidential Compliance Manual documenting compliance with the CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 6, Section 116, Table 116-A.

H. Solar Heat Gain Coefficient: Glazed exterior borrowed lite, sidelite and transom lite frames shall have an overall maximum solar heat gain coefficient of 0.60 as rated in accordance with default table method approved by the California Energy Commission (CEC). Provide Label Certificate FC-1, Figure 3-3, from the Nonresidential Compliance Manual documenting compliance with the CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 6, Section 116, Table 116-B.

1.4 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01330.

B. Include system and component dimensions; components within assembly; framed opening requirements and tolerances; anchorage and fasteners; glass and infills; door hardware requirements; and affected related work.

C. Submit manufacturer's installation instructions under provisions of Section 01330.

D. Submit samples under provisions of Section 01330.

E. Submit two samples, 12 x 12 inches in size, illustrating prefinished aluminum surface.

F. Submit Label Certificate FC-1, Figure 3-3, from the Nonresidential Compliance Manual documenting compliance with the CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 6, Section 116, Table 116-A and 116-B.

1.5 REGULATORY REQUIREMENTS

A. Conform to CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 6, for U-value and solar heat gain coefficient.

1.6 QUALITY ASSURANCE

A. Perform work in accordance with AMA SFM-1.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle system components under provisions of Section 01600.

B. Provide strippable coating to protect prefinished aluminum surfaces.

2. PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Arcadia, www.arcadiainc.com.

B. EFCO Corporation, www.efcocorp.com.

C. Kawneer Company, Inc., www.kawneer.com.

D. New Worldwest Inc, www.newworldwestinc.com.

E. Old Castle Building Envelope, www.oldcastlebe.com

F. TRACO, www.traco.com.

G. United States Aluminum, www.usalum.com.

H. Substitutions: Under provisions of Section 01630.

2.2 MATERIALS

A. Extruded Aluminum: ASTM B221; Alloy G.S. 10A-T5.

B. Brackets and Reinforcements: High strength aluminum.

C. Fasteners: Stainless steel, aluminum.

D. Compression Weatherstripping: Replaceable gaskets of molded neoprene complying with ASTM D2000 or molded PVC; complying with ASTM D 2287.

E. Sliding Weatherstripping: Replaceable wool, polypropylene or nylon woven pile; nylon fabric or aluminum strip backing; comply with AAMA 701.2.

2.3 FABRICATED COMPONENTS

A. Frames: 2 x 6 inch profile, flush glazing stops.

B. Narrow Stile Doors: 1-3/4 inches thick, 2-1/4 inch wide top rail, 2 inch wide vertical stiles, 10 inch wide bottom rail (nominal dimensions); bevelled glazing strips.

C. Reinforced Mullion: 4 x 6 inch profile of extruded aluminum cladding with internal reinforcement of steel shaped structural section.

2.4 GLASS AND GLAZING MATERIALS

A. Glass and Glazing Materials: As specified in Section 08800 and as indicated on drawings.

2.5 HARDWARE

A. Door Hardware: As specified in Section 08710.

2.6 FABRICATION

A. Fabricate doors and frames allowing for minimum clearances and shim spacing around perimeter of assembly, yet enabling installation.

B. Rigidly fit and secure joints and corners with internal reinforcement. Weld top and bottom rails of doors to reinforcement clips. Make joints and connections flush, hairline, and weatherproof.

C. Develop drainage holes with moisture pattern to exterior.

D. Prepare components to receive anchor devices. Fabricate anchorage items.

E. Arrange fasteners, attachments, and jointing to ensure concealment from view.

F. Prepare components with internal reinforcement for door hardware and door operator hinge hardware.

G. Reinforce framing members for imposed loads.

2.7 FINISHES

A. Natural Anodized Finish: NAAMM AA-M12-C22 A41, Class I clear anodic coating.

B. Apply bituminous paint to separate dissimilar metals and metal surfaces in contact with cementitious or dissimilar materials.

2.8 SEALANT MATERIALS

A. Sealant and Backing Materials: As specified in Section 07900.

3. PART 3 EXECUTION

3.1 INSPECTION

A. Verify wall openings and adjoining materials are ready to receive Work of this Section.

B. Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION

A. Install doors, frames, glazing and hardware in accordance with manufacturer's instructions and AAMA SFM-1.

B. Use anchorage devices to securely attach frame assembly to structure.

C. Attach to structure to permit adjustment to accommodate construction tolerances and other irregularities.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Install sill flashings.

F. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

G. Install sealant and backing materials as specified in Section 07900.

H. Install hardware using templates provided. Refer to Section 08710 for installation requirements.

I. Install glass in accordance with Section 08800, using exterior dry method of glazing.

J. Adjust operating hardware.

3.3 TOLERANCES

A. Variation from Plane: 0.03 inches per foot maximum or 0.25 inches per 30 feet, whichever is less.

B. Misalignment of Two Adjoining Members Abutting in Plane: 0.015 inches.

3.4 CLEANING

A. Remove protective material from prefinished aluminum surfaces.

B. Wash down exposed surfaces using a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

C. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

END OF SECTION

SECTION 08710

DOOR HARDWARE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Door hardware for hollow steel and wood doors.

B. Thresholds.

C. Weather, smoke and sound seals.

D. Hardware for miscellaneous applications, such as padlocks for roof hatch and gates.

1.2 RELATED SECTIONS

A. Section 05090 - Anchors and Fasteners: General requirements for anchors and fasteners to building substrates.

B. Section 06410 - Custom Casework: Cabinet locks.

C. Section 08110 - Steel Doors and Frames: Preparations for door hardware.

D. Section 08211 - Flush Wood Veneer Doors: Preparations for door hardware.

E. Section 08310 - Access Doors and Panels: Keyed locks in access doors and panels.

F. Section 10405 - Signage: Toilet room and other door signs; wheelchair accessibility symbol at entrance doors.

G. Section 10810 - Toilet Accessories: Built-in lock and padlock provisions.

1.3 REFERENCES

A. Door and Hardware Institute (DHI) - Recommended Locations for Builders' Hardware for Standard Steel Doors and Frames.

B. NFPA International (NFPA):

1. NFPA 80 - Standard for Fire Doors and Windows.

2. NFPA 105 - Recommended Practice for the Installation of Smoke-Control Door Assemblies.

3. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.

C. California Building Code (CBC): California Code of Regulations (CCR), Title 24 - State of California Building Code, Part 2, Chapter 11B - Accessibility.

1.4 SUBMITTALS

A. Product Data:

1. Submit catalog data for lever hardware for doors that are hand-activated and which are in the path of travel. Indicate compliance with requirement that exit doors shall be openable from the inside without use of key or any special knowledge or effort.

2. For other hardware products, submit catalog data if products are other than specified products of specified manufacturer.

B. Door Hardware Schedule: Submit for record purposes only. Schedule shall be prepared by certified Architectural Hardware Consultant (AHC). Indicate complete designations of every item for each door.

1. Cross-reference to designations in Contract Drawings and Specifications.

2. Indicate door and frame sizes and materials.

3. Explain all abbreviations, symbols, codes and other designator.

4. Indicate hardware mounting locations.

5. Include the following information for each item:

a. Type, style, function, size, and finish.
b. Name and manufacturer.
c. Fastenings.
d. Other pertinent information.

C. Keying Schedule:

1. After completion of door hardware schedule review, schedule and conduct a keying meeting to determine keying requirements and develop a keying schedule.

2. Meeting shall be between Architectural Hardware Consultant employed by hardware supplier, Architect, Owner and other involved parties to ensure that locksets are functionally correct and that keying fulfills Project requirements.

3. Prepare and submit keying schedule for record purposes only. Include in keying schedule all doors with locks, all padlocks and all lock cylinders using building keying system.

D. Certification: Inspection report and certification of completed installation by supplier's Architectural Hardware Consultant. See requirements specified following under Quality Assurance. Submit two copies of certification.

E. Operating and Maintenance Data: Submit lubrication, adjustment and inspection procedures for preventative maintenance. Submit repair instructions for products not requiring factory or factory-trained service.

1.5 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Company specializing in manufacture of door hardware with a minimum of three years experience.

B. Supplier's Qualifications: Company specializing in supplying architectural finish hardware, with warehousing facilities, who has been furnishing hardware for institutional projects in the vicinity of the Project for not less than three years and who is, or who employs, an Architectural Hardware Consultant.

C. Hardware Supplier's Personnel: Supplier shall employ a certified Architectural Hardware Consultant (AHC) certified by the Door and Hardware Institute to prepare the door hardware schedule utilizing products specified in this Section and complying with applicable Code requirements and requirements of the manufacturers. AHC shall also assist Owner with keying instructions.

D. Coordination: Coordinate door hardware with Work specified in other Sections, including internal reinforcements, templates and other preparations for door hardware, lock cylinders and padlocks.

E. Sequencing: Provide door hardware on building perimeter doors, with construction keying, to secure the project at the earliest date possible after close-in of the building. Coordinate installation with related Sections.

F. Submittals Coordination: Make submittals of doors, door frames and door hardware concurrent for coordinated review.

G. Regulatory Requirements: Conform to applicable requirements of authorities having jurisdiction, for fire-rated doors and frames and for wheelchair accessibility and dependent persons use, including the following:

1. NFPA International:

   a. NFPA 80 - Standard for Fire Doors and Windows.
   b. NFPA 105 - Recommended Practice for the Installation of Smoke-Control Door Assemblies.
   c. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.

2. California Building Code (CBC):

   a. Requirements for installation of fire door hardware, fire door frames and anchorage.
   b. Requirements for fire and smoke seals, including positive-pressure test.
   c. Requirements for exit door hardware.

3. California Building Code (CBC) (Title 24): Wheelchair accessibility regulations and door pull forces at accessible doors, including CBC Sections 1133B.2.1, 1133B.2.5.1 and 1003.3.1.8.1 and 1133B.2.5.1.

H. Fire Door Hardware: Tested for compliance with NFPA 80 and for positive pressure test of door frame and hardware assembly as required by UBC Standard 7-2 and UL-10C.

1. Provide door hardware for assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.

2. Listing in current classification publications of the following agencies will be considered evidence of acceptable testing:

   a. Underwriters Laboratories Inc. (UL).

b. Warnock Hersey International Inc. (WHI).
c. Factory Mutual System (FM).
d. Other agencies acceptable to authorities having jurisdiction.

3. Provide permanent labels on all hardware indicating the listing agency and conditions of the listing.

I. Installation Certification: Architectural Hardware Consultant (AHC) shall inspect completed installation and certify that door hardware has been provided in accordance with manufacturer's instructions, the Specifications and California Building Code (CBC).

1.6 WARRANTY

A. Manufacturer's Extended Guaranty, Door Hardware: Furnish manufacturer's extended guaranty for the following, agreeing to repair or replace defective products for specified period from date established by Notice of Completion, except for failures due to abnormal operation or abuse.

1. Door closers: Ten years.

2. Exit devices: Three years.

3. Mortise locksets: Five years.

4. Cylindrical locksets: Five years.

5. Butt hinges: Life of the building.

6. All other Hardware: Two years.

B. Contractor's Extended Warranty: Contractor and hardware supplier shall jointly provide extended warranty stating, "For a period of not less than two (2) years from date established by Notice of Completion, we [FIRM NAMES] will service and or replace, at no charge to the Owner, any part proving defective due to faulty materials or installation. This warranty does not cover abnormal operation or abuse."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Package hardware items individually, using original factory containers where feasible. Label and identify packages with door opening code to match hardware schedule. Maintain factory shipping cartons where feasible.

B. Key Delivery: Deliver keys and interchangeable cores to Owner by security shipment direct from hardware supplier, as directed by Owner.

C. Hardware Storage and Protection: Store hardware in dry location. Protect hardware from theft by cataloging and storing in secure area at Project site.

1.8 MAINTENANCE

A. Maintenance Materials: Provide special tools applicable to each door hardware product requiring such tools for maintenance and repair. Tools shall be as supplied or recommended by door hardware manufacturer.

B. Extra Materials: Refer to general requirements specified in Section 01770 - Contract Closeout Procedures. Provide extra materials for repair and replacement as specified in PART 2 and PART 3 herein.

C. Maintenance Service: Hardware supplier shall provide letter agreement to Owner that, approximately 6 months after Contract closeout, supplier shall return to the Project, accompanied by representatives of manufacturers of locking/latching devices and door closing control devices, and accomplish the following:

1. Check and readjust every item of hardware.

2. Consult with and instruct Owner's personnel in recommended additions to maintenance procedures.

3. Replace hardware items which have deteriorated or failed due to other than misuse or abuse.

4. Prepare a written report of current and predictable problems of substantial nature in the performance of door hardware.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Acceptable Manufacturers: Listed below are specified manufacturers, whose products are the basis of the design, and acceptable manufacturers, whose equivalent products the Contractor may use in accordance with the "or equal" provision specified in Section 01600 - Product Requirements. Other manufacturers will be considered in accordance with the substitution provision specified in Section 01600 - Product Requirements.

Product	Specified Manufacturer	Acceptable Manufacturer
Butt Hinges	H.B. Ives	Hager Hinge Company McKinney Products Company. Stanley Hardware Division/The Stanley Works
Continuous Hinges	Pemko	Hager Hinge Company
Mortise Latchsets and Locksets	Best Lock	No substitutions will be acceptable. Match existing locksets.
Lock Cylinders	Best Lock (patented (proprietary) lock cylinder type and keyway)	No substitutions will be acceptable.
Exit Devices	Von Duprin	None identified. No substitutions will be considered.

Product	Specified Manufacturer	Acceptable Manufacturer
Automatic Flush Bolts	H.B. Ives	Trimco Door Controls International
Coordinators	H.B. Ives	Trimco Door Controls International
Surface Overhead Door Closers	LCN Closers	None identified. No substitution will be considered.
Push/Pull Plates	H.B. Ives	Trimco Hager Hinge Company Rockwood
Kickplates	H.B. Ives	Trimco Hager Hinge Company Rockwood
Stops, Anchors	H.B. Ives	Trimco Hager Hinge Company Rockwood
Interior Stops	H.B. Ives	Trimco Hager Hinge Company Rockwood
Overhead Stops	Glynn-Johnson	None identified. No substitutions will be considered.
Thresholds	Pemko	National Guard Products. Reese Enterprises, Inc. Zero International
Weather Seals and Smoke Seals	Pemko	Reese Enterprises, Inc. National Guard Products. Zero International
Silencers	H.B. Ives	Trimco Hager Hinge Company Rockwood

2.2 DOOR HARDWARE, GENERAL

A. Door Hardware, General:

1. Provide all door hardware necessary to complete the Work.

2. Provide door hardware complying with accessibility requirements of California Building Code (CBC), including Sections 1133B.2.1, 1133B.2.5.1 and 1003.3.1.8.

3. Provide door hardware as scheduled in DOOR HARDWARE SCHEDULE located at the end of PART 3 of this Section.

B. Manufacturers: Obtain all items of each type from the same manufacturer.

1. Manufacturer's Name Plates: Do not use products which have manufacturer's name or trade name displayed in a visible location.

2. Exception: Required fire labels.

3. Exception: As directed by or acceptable to the Architect.

4. Exception: Manufacturer's identification on rim of lock cylinders.

C. Manufacturer's Catalog Numbers: Catalog numbers are indicated in the DOOR HARDWARE SCHEDULE to establish operation, function, quality, weight, size, pattern, design, material, and finish required.

D. Standards Conformance: Provide hardware manufactured to conform to published templates.

E. Templates: All hardware applied to metal doors or jambs shall be made to template and secured by machine screws. Furnish templates to the metal door and frame manufacturer for application at the factory, unless otherwise requested.

F. Scope: Provide all hardware necessary to complete Work. Products not specifically identified but necessary shall be provided of type and quality generally recognized in door hardware industry for service duty of Project type, location and usage, as selected by Contractor and subject to acceptance by Owner and Architect.

G. Adaptation: Should specified hardware conflict with configuration of doors, frames and surrounding construction, provide comparable alternative hardware which maintains intended function of door, as selected by Contractor and subject to review and acceptance by Owner and Architect.

2.3 FASTENERS

A. Fasteners, General: Furnish type, quality, size and quantity for long-life installation under hard usage. Conform to manufacturer's instructions and recommendations for fasteners and installation and the following minimum requirements. Provide fasteners which are suitable for the substrate.

B. Expansion Shields, Hex Bolts and Other Anchors: Provide anchors and fasteners as recommended by hardware manufacturer, subject to review by Architect and acceptance by Owner, and in conformance to fastener requirements specified in Section 05090 - Anchors and Fasteners. Do not use toggle anchors or powder-actuated driven fasteners.

C. Concrete and Masonry Substrates: Furnish hardware with machine screws and expansion anchors.

D. Fastener Finishes: Match hardware item, typically. Provide stainless steel fasteners at aluminum and stainless steel hardware. Provide corrosion-resistant (zinc-plated steel or stainless steel) at exterior exposure, unheated spaces and damp atmospheres.

E. Fasteners at Fire Doors: Conform to labelling requirements of door, frame and hardware. At wood doors, provide sex-nut through-bolts for operating hardware typically unless permitted otherwise by hardware listing.

2.4 HARDWARE FINISHES

A. Hardware Finishes, General: Provide finishes matching ANSI/BHMA A156.18 designations indicated in DOOR HARDWARE SCHEDULE.

1. Metal finishes: At Contractor's option, stainless steel may be provided instead of satin chrome plating. Where stainless steel is indicated, substitution of satin chrome plating will not be acceptable.

2. Plastic and painted finishes: Color shall be selected by Architect from manufacturer's full selection, if not otherwise indicated.

B. Chrome, Satin Finish: Scheduled as 626.

1. Plated on steel: BHMA 652 (US26D).

2. Plated on brass or bronze: BHMA 626 (US26D).

C. Stainless Steel: Scheduled as 630. Provide as scheduled and as alternative to Satin Finish Chrome finish at Contractor's option.

1. Polished: BHMA 629 (US32).

2. Brushed: BHMA 630 (US32D).

D. Aluminum:

1. Manufacturer's standard finish: Indicated as AL or ALUM, either satin anodized or clear coated as standard with product manufacturer.

2. Satin anodized, natural metal color: BHMA 628.

3. Clear coated: BHMA 673.

4. Manufacturer's standard finish: Indicated as ALUM, either satin anodized or clear coated as standard with product manufacturer.

5. Powder coated: Proprietary powdered stainless steel (PemKote).

E. Primer Coat:

1. Primer on steel: BHMA 600 (PC).

2. Primer on brass or bronze: BHMA 163 (PC).

F. Mill Finish: For brass and aluminum, as noted, MILL.

G. Colored Finishes:

1. Factory Colored Coatings: Color code as indicated, corresponding to specified manufacturer's coating type and color.

2. Surface Door Closers: Factory finished on exposed metal and plastic components, to match door hardware finish color, unless otherwise noted.

2.5 FIRE-RATED HARDWARE

A. Fire-Rated Door Assemblies: Tested for compliance with NFPA 80 and for positive pressure test of door frame and hardware assembly as required by UBC Standard 7-2 and UL-10C.

1. Provide door hardware for assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.

2. Provide permanent labels on all hardware indicating the listing agency and conditions of the listing.

3. Listing in current classification publications of the following agencies will be considered evidence of acceptable testing:

a. Underwriters Laboratories Inc. (UL).
b. Warnock Hersey International Inc. (WHI).
c. Factory Mutual System (FM).
d. Other agencies acceptable to authorities having jurisdiction.

B. Fire-Rated Hardware: Provide UL-listed and approved hardware for fire-labeled assemblies in compliance with NFPA 80.

1. Confirm that hardware provided conforms to fire tested assembly (coordinate with doors provided).

2. Where exit devices are provided on fire-rated doors, provide door with UL fire door label indicating, "Fire Door to be Equipped with Fire Exit Hardware", and provide door hardware with UL exit device label indicating "Fire Exit Hardware".

C. Hinges at Fire-Rated Assemblies: Steel base material only.

D. Closers: Bolted (not screwed) to door reinforcement or through-bolted with sex-nut fasteners.

E. Latchbolts: 1/2-inch minimum throw or as required for fire rated assembly label.

2.6 EXIT DOOR HARDWARE

A. Exit Door Hardware: Provide UL listed and approved hardware for exit (panic) door operation.

B. Exit Door Hardware Operation: Exit doors shall be openable at all times from the inside without use of key or special knowledge or effort.

C. Door Closers at Exit Doors: Closers shall comply with California Building Code (CBC), wheelchair accessibility regulations and door pull forces at accessible doors. See Article below titled "SURFACE OVERHEAD DOOR CLOSERS."

2.7 BUTT HINGES

A. Butt Hinges, General: Full-mortise, templated design. See DOOR HARDWARE SCHEDULE for specific products. Provide shims and shimming instructions for proper door adjustment.

1. Typical interior butt hinges: Standard weight, steel base metal, steel pin, plated.

2. Typical exterior butt hinges: Stainless steel, with stainless steel pin.

B. Non-Removable Pins (NRP) at Butt Hinges:

1. Exterior doors: Provide non-removable pins at all outswing exterior doors.

2. Interior doors: Provide non-removable pins at all interior doors with locksets where hinges are exposed on key side of door.

C. Low-Friction Hinges: Provide ball bearing hinges at all doors with closers.

D. Butt Hinge Height and Weight: As scheduled. If not scheduled or otherwise indicated, provide height and weight of butt hinges as follows:

Door Thickness	Door Width	Hinge Height	Hinge Weight
1-3/4 inches	to 36-inches	4-1/2 inches	Standard
1-3/4 inches	37-inches to 42-inches	5-inches	Heavy
1-3/4 inches	over 42-inches	5-inches	Extra heavy

E. Butt Hinge Width: Unless otherwise specified, width of butt hinges shall be sufficient to clear frame and trim projection when door swings 180 degrees. Provide swing-clear hinges where scheduled or necessary to clear obstructions.

F. Butt Hinge Quantity: As scheduled. If not scheduled or otherwise indicated, provide three hinges per leaf to 7'-6" height. Add one for each additional 30-inches in height or fraction thereof.

G. Hinge Tips: Standard flat tips.

2.8 CONTINUOUS HINGES

A. Continuous Hinges: PemkoHinge® as manufactured by Pemko, Ventura, CA (805/642-2600 or 800/283-9988), geared interlocking hinge, satin anodized aluminum finish. Equivalent products

of other manufacturers will be considered in accordance with the "or equal" provision specified in Section 01600 - Product Requirements. See DOOR HARDWARE SCHEDULE for specific products.

2.9 LATCHSETS AND LOCKSETS

A. Latchsets and Locksets, General: Exit doors shall be openable from the inside without the use of a key or any special knowledge or effort, in compliance with California Building Code (CBC) Section 1003.3.1.8.

B. Mortise Latchsets/Locksets: Best Lock, design to match existing campus standard latchsets and locksets, ANSI 156.3 Mortise series 1000 Operational grade 1, Security Grade 2. See DOOR HARDWARE SCHEDULE for latchset/lockset catalog numbers and functions.

C. Latchbolts: Throw shall conform to fire label requirements.

2.10 LOCK CYLINDERS, KEYING AND KEYS

A. Lock Cylinders: Best Lock Co., 7 pin patented keyway, interchangeable core.

B. Keying: Factory masterkeyed. Consult with Owner (District locksmith) for keying and ordering instructions.

1. Comply with Owner's instructions for key and lock core control.

2. Provide keying integrated into building masterkeying as directed by Owner, to suit keying of existing school campus.

3. Provide building masterkeying, key-alike and key-different keying as directed by Owner.

4. Keying shall be by Contractor.

C. Keys: Standard bow. Identify keys as directed by Owner.

D. Key Quantities:

1. Construction keys: Twenty.

2. Extractor keys: Two.

3. Key-alike set: Three keys per set.

4. Grand Master Key: Two.

5. Masterkeys: Two each.

E. Temporary Construction Keying: Provide temporary interchangeable lock cylinders in door locks as necessary for security during construction. Prior to Owner occupancy, exchange temporary lock cylinders with permanent interchangeable lock cylinders.

2.11 EXIT DEVICES

A. Exit Devices (Panic Hardware): Manufacturer and series as scheduled, lever handle to match building locksets, quiet return, deadlocking latchbolt, stainless steel touchpads, non-handed. See DOOR HARDWARE SCHEDULE for products.

1. Unlatching force for exit devices shall not exceed 15 pounds applied in the direction of travel, in compliance with UBC Standard 10-4.

2. Exit devices shall comply with CBC Section 1003.3.1.9.

3. Exit devices at non-fire rated doors shall have cylinder dogging.

B. Mullions: Exterior pairs of doors with exit devices shall have keyed, removable mullions.

2.12 FLUSH BOLTS

A. Manual Flush Bolts: Concealed screws, 8-inch length. See DOOR HARDWARE SCHEDULE for products. Manual flush bolts shall not be used on required (active) leaf of pairs of doors in path of travel.

B. Flush Bolt Strikes:

1. Head Strikes: Manufacturer's standard.

2. Sill Strikes: Dustproof.

2.13 COORDINATORS

A. Coordinators, General: Automatic coordinating device for sequential closing of paired doors; prevent active leaf from closing ahead of inactive leaf. See DOOR HARDWARE SCHEDULE for products.

B. Coordinators at Typical Locations: Provide at pairs of labeled fire doors, selection suitable for flush bolts and exit devices installed on doors. See DOOR HARDWARE SCHEDULE for products.

C. Accessories: Provide carry-bar and strike at exit doors, as appropriate. Provide additional hardware for stop (soffit) applied coordinator for complete and proper installation in accordance with UL labeling requirements.

2.14 SURFACE OVERHEAD DOOR CLOSERS

A. Surface Overhead Door Closers: Rack and pinion type with removable non-ferrous case and cast iron body. See DOOR HARDWARE SCHEDULE for products.

1. Provide closers non-handed, non-sized and adjustable.

2. Locate closers inside building and rooms.

3. Exterior door closers shall have been successfully tested to 100 hours of ASTM B117 salt spray test.

4. Exterior doors shall not require seasonal adjustments in temperatures from 120 degrees F to -30 degrees F.

5. Provide through-bolts at wood doors unless doors are furnished with blocking for closers.

6. Provide flush transom offset brackets where parallel arm closers are listed for doors with fixed panels over.

7. Provide drop brackets at narrow head rails.

8. Provide screw spacers as necessary for parallel-arm brackets.

B. Wheelchair and Persons with Disabilities Accessibility Provisions: Reduced operating force design, complying with California Building Code (CBC) for wheelchair accessibility and dependent persons use. See DOOR HARDWARE SCHEDULE for products.

1. Maximum effort to operate doors shall not exceed 5 pounds (38 n), such pull or push effort being applied at right angles to hinged doors and at the center plane of sliding or folding doors, in compliance with California Building Code (CBC) Section 1133B.2.5.

2. Compensating devices or automatic door operators may be utilized to meet the above standards.

3. If approved by Authority having Jurisdiction for fire doors, increase closing force as necessary to achieve positive latching but not exceeding 15 pounds (114 n), in accordance with California Building Code (CBC) Section 1133B.2.5.

4. Door closer shall be adjusted to that sweep period of door from open (70 degrees) position to point 3-inches from latch, measured on the landing side of the door, shall be minimum of 3 seconds, in compliance with California Building Code (CBC) Section 1133B.2.5.1.

C. Door Closer Finishes: Provide metal covers and exposed arms painted to approximate plated finish.

2.15 PUSH/PULL PLATES

A. Stainless Steel Push/Pull Plates: 0.050-inch, fully rounded top and bottom. See DOOR HARDWARE SCHEDULE for products and sizes.

B. Plated Brass Push/Pull Plates: Cold-forged, 0.050-inch. See DOOR HARDWARE SCHEDULE for products and sizes.

2.16 KICKPLATES

A. Kickplates: 0.64-inch thick stainless steel, with four beveled edges. Provide machine or wood screws of stainless steel. See DOOR HARDWARE SCHEDULE for products.

B. Kickplate Sizes:

1. Single doors: Door width less 2-inches.

2. Double doors: Door width less 1-inch.

3. Height: As scheduled, 10-inches typically.

2.17 DOOR BUMPERS AND DOOR STOPS

A. Door Bumpers and Door Stops: See DOOR HARDWARE SCHEDULE for products.

1. Unless otherwise noted in the DOOR HARDWARE SCHEDULE, provide floor type with appropriate fasteners.

2. Where floor type cannot be used, provide wall type.

3. If neither wall nor floor type can be used, provide overhead type.

B. Fasteners:

1. Anchors to concrete and masonry substrates: Provide expansion anchors. Refer to Section 05090 - Anchors and Fasteners.

2. Anchors to steel framing: Provide sheet metal screws into framing or into sheet metal backing. Provide expansion anchor.

3. Anchors to wood framing: Provide wood screws or sheet metal screws into framing or into solid wood backing.

4. Do not use toggle or molly-type anchors. Do not use powder-actuated driven fasteners.

2.18 THRESHOLDS

A. Thresholds, General: Wheelchair-accessible design, complying with California Building Code (CBC) Section 1133B.2.4.1. See DOOR HARDWARE SCHEDULE for products. Provide closed end returns where threshold extends beyond face of door frame.

B. Threshold Finish: Non-slip grit surfacing.

C. Fasteners:

1. Non-ferrous, 1/4-inch fasteners, Red-Head #SFS-1420 (or approved equivalent) Flat Head Sleeve Anchors (FHSL).

2. Provide countersunk, corrosion-resistant fasteners.

3. At concrete slab on grade, provide expansion anchors.

4. Fasteners shall comply with general requirements for anchors and fasteners specified in Section 05090 - Anchors and Fasteners.

2.19 WEATHER, SOUND AND SMOKE SEALS

A. Weather Seals: Provide at all exterior doors. See DOOR HARDWARE SCHEDULE for products.

B. Sound Seals: Provide at interior doors as scheduled. See DOOR HARDWARE SCHEDULE for products.

C. Smoke Seals: See DOOR HARDWARE SCHEDULE for products. Provide UL-listed and UL-labelled smoke seals at all fire-rated door assemblies.

1. Contractor shall provide intumescent seals complying with test requirements of door frame and door.

2. Intumescent seals shall be concealed when door is closed and not rely upon exposed fasteners.

2.20 SILENCERS

A. Silencers, General: Provide silencers (mutes) typically at all doors which do not have weather, sound or smoke seals. See DOOR HARDWARE SCHEDULE for products. Provide three silencers for single doors and two silencers at pairs of doors. Omit silencers at fire-rated door assemblies.

PART 3 - EXECUTION

3.1 HARDWARE LOCATIONS

A. Door Hardware Locations, General:

1. Conform to the mounting locations specified herein, except where otherwise shown on Drawings, otherwise indicated in reference standards or otherwise required by governing authorities having jurisdiction.

2. In case of conflict or variance with the mounting methods or locations specified herein, submit in writing to Architect a listing of all conflicts or variances, along with recommended mounting methods and locations for clarification and direction.

B. Door Hardware Locations, Specific:

1. Levers: 38-inches from finished floor to center of lever, in compliance with CBC Section 1133B.2.5.1.

2. Door Pulls, Pushplates and Push Bars: 44-inches maximum from finished floor to center line, in compliance with CBC Section 1133B.2.5.1.

3. Exit Device Crossbar: 38-inches from finished floor to centerline of crossbar, in compliance with CBC Section 1133B.2.5.1.

4. Floor stops (dome stops): Maximum 4-inches from the face of wall or partition, in compliance with California Building Code (CBC) Section 1121B and DSA Jurisdictional Policy #99-08 (Access).

3.2 HARDWARE INSTALLATION

A. Hardware Installation: Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing Work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.

2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

3. Ensure that all hardware on fire and exit doors bears appropriate UL label.

B. Hardware Installation at Steel Doors: Comply with DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

1. Install hardware in accordance with manufacturer's printed instructions and recommendations and in conformance with fire and exiting label requirements.

2. Fasten hardware to internal reinforcement of door with machine screws. Fasten light hardware to door face with sheet metal screws.

C. Hardware Installation at Wood Doors: Comply with DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors." Fasten hardware to door with full-thread wood screws or sheet metal screws, except at fire labelled doors use sex-nut through fasteners.

D. Hardware Installation at Fire Doors and Exit Doors: Install fire and exit door hardware in compliance with manufacturer's instructions and requirements of listing authority.

1. Install fire door hardware in conformance to NFPA 80.

2. Install exit door hardware in conformance to NFPA 101.

3. Ensure that all hardware on fire and exit doors bears appropriate UL label.

E. Hardware Installation to Walls and Floors: Refer to Section 05090 - Anchors and Fasteners for general requirements for anchors and fasteners to building substrates.

1. Coordinate backing requirements and installation at wood and metal stud framing.

2. Secure to solid blocking or sheet metal backing in walls, except for door bumpers and wall stops secure to solid blocking only.

3. Do not use toggle or wing-type anchors.

4. Do not use powder-actuated driven fasteners.

3.3 DEMONSTRATION

A. Hardware Demonstration: In the presence of Project Inspector, demonstrate proper operation of all doors.

B. Demonstrate that permanent keys operate applicable locks and deliver keys immediately to Owner.

C. Demonstrate that all fire and exit doors operate in proper sequence and with no greater than specified maximum force on operating hardware.

3.4 CLEANING, ADJUSTMENT AND PROTECTION

A. Cleaning: Clean hardware for Substantial Completion review.

B. Protection: Provide factory or field-applied protective coverings as necessary to prevent marring and soiling. Maintain factory protective coverings until ready for final cleaning.

C. Permanent Keying: Remove construction keying and install permanent keying immediately prior to hardware demonstration; provide key control as directed by Owner.

D. Adjustment: Adjust and check each item of hardware at each door, to ensure proper operation or function of every component. Replace components, which cannot be adjusted, to operate freely and smoothly. Where door hardware is installed more than 30 days prior to Substantial Completion review, re-inspect and adjust hardware immediately prior to demonstration.

E. Inspection:

1. Initial inspection: By hardware supplier within 10 days of Contractor's request, inspect and adjust hardware immediately prior to demonstration. Submit written confirmation by door hardware supplier that hardware is complete and correctly installed and adjusted. If corrections are necessary, perform adjustments and replacement of hardware prior to Substantial Completion review, at no change in Contract Time and Contract Sum.

2. Follow-up inspection: Door hardware supplier shall submit letter of agreement to Owner that approximately 6 months after Substantial Completion review, supplier shall visit the Project site and accomplish the following:

   a. Check and re-adjust all hardware.
   b. Evaluate maintenance procedures and recommend changes or additions, and instruct Owner's personnel.
   c. Identify items that have deteriorated or failed.
   d. Submit a written report identifying problems and likely future problems.

3.5 DOOR HARDWARE SCHEDULE

A. Door Hardware Schedule, General: Provide door hardware as scheduled below.

1. Hardware is described generally. Select and order door hardware according to manufacturer's full catalog number, providing all features specified and necessary for Project conditions.

2. Provide sub-groups of hardware as necessary.

3. Door Schedule on the Drawings indicates which Hardware Set is used with each door.

B. Manufacturer Indicators:

BES Best Lock

GLY Glynn-Johnson Corp.

HAG Hager Hinge Company

IVE H.B. Ives

LCN LCN Closers

PEM Pemko

TRI Trimco

VON Von Duprin, Inc.

C. Finish Indicators:

600 Primer Coat, Painted (PC): BHMA 600, primer paint on steel base metal, and BHMA 163, primer on brass or bronze base metal. For surface door closers and other unplated metal and plastic components, provide factory primer for field painting to match door color, unless otherwise noted.

626 Chrome, Satin Finish (US26D): BHMA 626, plated finish on brass or bronze base metal.

628 Aluminum, Clear Anodized: Natural aluminum metal color.

630 Stainless Steel, Brushed (US32D): BHMA 630, stainless steel base and finish metal.

652 Chrome, Satin Finish (US26D): BHMA 652, plated finish on steel base metal.

689 Sprayed paint finish, approximating clear anodized aluminum.

AL Aluminum: Natural aluminum color.

D. Finish Indicators:

600 Primer Coat, Painted (PC): BHMA 600, primer paint on steel base metal, and BHMA 163, primer on brass or bronze base metal. For surface door closers and other unplated metal and plastic components, provide factory primer for field painting to match door color, unless otherwise noted.

626 Chrome, Satin Finish (US26D): BHMA 626, plated finish on brass or bronze base metal.

628 Aluminum, Clear Anodized: Natural aluminum metal color.

630 Stainless Steel, Brushed (US32D): BHMA 630, stainless steel base and finish metal.

652 Chrome, Satin Finish (US26D): BHMA 652, plated finish on steel base metal.

689 Sprayed paint finish, approximating clear anodized aluminum.

AL Aluminum: Natural aluminum color.

E. Door Hardware Sets shall be as follows:

Qty.	Item	Catalog No. / Comment	Finish	Mfr.

HDWE SET #1

DOOR # 102A, 102B

6	EA	HINGES	FBB179 4.5 X 5	652	(STA)
1	SET	FLUSHBOLTS	FB41P	626	(IVE)
2	*EA*	*EXIT DEVICE*	*3347WPC-F*	*313AN*	*(VON)*
2	EA	CLOSERS	P8501	689	(NOR)
1	EA	COORDINATOR	COR2 X FB X (2) MB	600	(IVE)
1	EA	DUST PRF STK	DP2	626	(IVE)
2	EA	FLR. STOP	1211ES	626	(TRI)
1	SET	HOT SEAL	HSS2000		(PEM)
1	EA	ASTRAGAL	355CS X HSS2000	628	(PEM)
1	EA	THRESHOLD	272D-MS/ES	DUR	PEM

HDWE SET #2

DOOR # 103A,

3	EA	HINGES	FBB179 4.5 X 4	652	(STA)
1	*EA*	*LOCKSET*	*CL3355 CT6 NZD*	*626*	*(CR)*
1	EA	CLOSER	8501	689	(NOR)
1	EA	FLR. STOP	1211ES	626	(TRI)
1	SET	HOT SEAL	HSS2000	BLK	(PEM)

HDWE SET #3

DOOR # 103B

3	EA	HINGES	FBB179 4.5 X 4	652	(STA)
1	*EA*	*LATCH SET*	*CL3310 NZD*	*626*	*(CR)*
1	EA	CLOSER	8501	689	(NOR)
1	EA	FLR. STOP	1211ES	626	(TRI)
1	SET	HOT SEAL	HSS2000	BLK	(PEM)
1	EA	THRESHOLD	272D-MM/ES	DUR	PEM.

HDWE SET #4

DOOR # 102C, 103C, 107A

6	EA	HINGES	FBB179 4.5 X 4	652	(STA)
1	*EA*	*LOCK SET*	*CL3357 CT6 NZD*	*626*	*(CR)*
1	EA	FLR. STOP	1211ES	626	(TRI)
1	SET	HOT SEAL	HSS2000	BLK	(PEM)

HDWE SET #5

DOOR# 104A

2	SET	PIVOT	7212 –	SP313	(IVE)
2	EA	PIVOT	7215-INT	SP313	(IVE)
2	*EA*	*EXIT DEVICE*	*3347WPC-F*	*313AN*	*(VON)*
2	EA	CLOSER	0700 N	613	(RIX)
1	*EA*	*CYLINDER*	*3080 CT6*	*613*	*(CR)*
1	EA	FLR. STOP	1214CK	613	(TRI)

1	EA	THRESHOLD	272D-MS/ES		DUR	PEM

HDWE SET #6

DOOR# 104B

2	SETS	PIVOTS	7212 – _	SP313	(IVE)	
2	EA	PIVOT	7215-INT		SP313	(IVE)
1	*EA*	*EXIT DEVICE*	*3347EO*		*313AN*	*(VON)*
1	*EA*	*ELECT. EXIT DEVICE*	*..3347L X 06*		*313AN*	*(VON)*
2	EA	CLOSERS	0700N		613	(RIX)
1	*EA*	*CYLINDER*	*3080 CT6*		*613*	*(CR)*
2	EA	FLR. STOPS	1214CK		613	(TRI)
1	EA	PWR SUPPLY	PS871-2			(VON)
1	EA	ARMORED LOOP	K-DLB18		DUR	(KEE)
1	EA	THRESHOLD	272D – MS/ES		DUR	(PEM)

HDWE SET #7

DOOR# 104C

3	EA	HINGES	FBB179 4.5 X 4	652	(STA)
1	EA	PUSH PLATE	1001-4	630	(TRI)
1	EA	PULL PLATE	1013-3B	630	(TRI)
1	EA	CLOSER	8501BF	689	(NOR)
1	EA	SIGN	753	BLU	(TRI)
1	EA	SIGN	527 – BRAIL	BLU	(TRI)
1	EA	FLR. STOP	1211ES	626	(TRI)

HDWE SET #8

DOOR# 105A, 108A

3	EA	HINGES	FBB191 4.5 X 4	630	(STA)
1	*EA*	*LOCK SET*	*CL3357 CT6 NZD*	*626*	*(CR)*
1	EA	FLR. STOP	1211ES	626	(TRI)
1	EA	THRESHOLD	272D – MS/ES	DUR	(PEM)

HDWE SET #9

DOOR 106A, 106C, 1060

2	*EA*	*EXIT DEVICE*	... 3347WDC-F	*313AN*	*(VON)*

SECTION 08800

GLAZING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Glass and glazing for storefronts.

1.2 REFERENCES

A. ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Used in Buildings.

B. ASTM C920 - Elastomeric Joint Sealants.

C. ASTM C1036 - Flat Glass.

D. ASTM C1048 - Heat-Treated Flat Glass.

E. ASTM C1172 - Specification for Laminated Architectural Flat Glass.

F. ASTM E774 - Sealed Insulating Glass Units.

G. CPSC - Consumer Product Safety Council.

H. GANA - Glazing Manual.

I. UL - Underwriters' Laboratories, Inc., Building Materials Directory.

1.3 QUALITY ASSURANCE

A. Conform to The Glass Association of North America (GANA) Glazing Manual and Sealant Manual for glazing installation methods.

1.4 SUBMITTALS

A. Submit product data under provisions of Section 01330.

B. Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.

C. Provide data on glazing sealant. Identify colors available.

D. Submit samples under provisions of Section 01330.

E. Submit two samples, 12 x 12 inches in size, illustrating each glass coloration.

F. Submit 12 inch long bead of glazing sealant in color selected.

G. Submit sealed glass unit manufacturer's certificate under provisions of Section 01330 indicating units meet or exceed specified requirements.

1.5 DELIVERY, STORAGE, AND PROTECTION

A. Deliver, store and protect products under provisions of Section 01600.

1.6 WARRANTY

A. Provide five year manufacturer's warranty under provisions of Section 01770.

B. Warranty: Include coverage of sealed insulating glass units from seal failure, interpane dusting or misting, and replacement of same.

C. Warranty: Include coverage for reflective coating on mirrors and replacement of same.

D. Warranty: Include coverage for delamination of laminated glass and replacement of same.

2. PART 2 PRODUCTS

2.1 ACCEPTABLE GLASS MANUFACTURERS

A. Clear and Tinted Float Glass:

1. AFG Industries, Inc., www.afgglass.com.
2. Guardian Industries Corp., www.gaurdian.com.
3. Pilkington Glass HA, www.pilkington.com.
4. PPG Industries, Inc., www.ppgglazing.com.
5. Oldcastle Glass, www.oldcastleglass.com.
6. Verslux Architectural Glass, www.visteon.com.
7. Viracon, Inc., www.viracon.com.

B. Fire-Resistive Glazing:

1. Interedge Technologies, UL No. R19261, www.firesafe-glass.com.
2. Nippon Electric Glass, Co., UL No. R13849, www.fireglass.com.
3. Pilkington Glass NA, UL No. R16644, www.pilkington.com.
4. Saint-Gobain, UL No. R14515, www.vetrotech.com.
5. Technical Glass Products, UL No. R13377, www.fireglass.com.
6. SAFTI, UL No. R14212, www.safti.com

C. Fire-Resistive Safety Glazing:

1. Interedge Technologies, UL No. R19261, www.firesafe-glass.com.

2. Nippon Electric Glass, Co., UL No. R13849, ww.fireglass.com.

3. Pilkington Glass NA, UL No. R16644, www.pilkington.com.

4. Saint-Gobain, UL No. R14515, www.vetrotech.com.

5. Technical Glass Products, UL No. R13377, www.fireglass.com.

6. SAFTI, UL No. R14212, www.safti.com.

D. Tempered Glass:

1. AFG Industries, Inc., www.afgglass.com.

2. Guardian Industries Corp., www.guardian.com.

3. Oldcastle Glass Co., www.oldcastleglass.com.

4. Interpane, www.interpane.com.

5. Pilkington Glass NA, www.pilkington.com.

6. PPG Industries, Inc., www.ppgglazing.com.

7. Versalux Architectural Glass, www.visteon.com.

8. Viracon, Inc., www.viracon.com.

E. Laminated Glass:

1. AFG Industries, Inc., www.afgglass.com.

2. Guardian Industries Corp., www.gaurdian.com.

3. Interpane, www.interpane.com.

4. Oldcastle Glass Co., www.oldcastleglass.com.

5. Pilkington Glass HA, www.pilkington.com.

6. PPG Industries, Inc., www.ppgglazing.com.

7. Versalux Architectural Glass, www.visteon.com.

8. Viracon, Inc., www.viracon.com.

F. Sealed Insulating Glass:

1. AFG Industries, Inc., www.afgglass.com.

2. Guardian Industries Corp., www.guardian.com.

3. Interpane, www.interpane.com.

4. Oldcastle Glass Co., www.oldcastleglass.com.

5. Pilkington Glass NA, www.pilkington.com.

6. PPG Industries, Inc., www.ppgglazing.com.

7. Versalux Architectural Glass, www.visteon.com.

8. Viracon, Inc., www.viracon.com.

G. Mirror Glass:

1. Laurence Co., Inc., www.crlaurence.com.

2. PPG Industries, Inc., www.ppgglazing.com.

H. One-way Reflective Mirror Glass:

1. Globe Amerada Glass Co., Transparent Mirror Glass, www.globeamerada.com.

2. Pilkington NA, Mirropane E.P. www.pilkington.com.

I. Polycarbonate Mirror:

1. Bunker Plastics, Inc., www.bunkerplastics.com.

J. Substitutions: Under provisions of Section 01630.

2.2 GLASS MATERIALS, GENERAL

A. Primary Glass Standard: Comply with ASTM C1036 requirements, including reference to type, class, quality, and, if applicable, form, finish, mesh and pattern.

B. Tempered Glass Standard: Comply with ASTM C1048 requirements, including those indicated by reference to kind, condition, type, quality, class, and, if applicable, form, finish, and pattern.

C. Laminated Glass Standard: Comply with ASTM C1172 requirements including reference to type, class, quality, and if applicable, form, finish and pattern.

D. Sizes: Fabricate glass to sizes required for glazing openings, with edge clearances and tolerances complying with recommendations of glass manufacturer and GANA.

E. Provide thicknesses indicated or, if not indicated, as recommended by glass manufacturer for application indicated.

2.3 PRIMARY GLASS PRODUCTS

A. Clear Float Glass: ASTM C1036, Type I (transparent glass, flat), Class 1 (clear), Quality q3 (glazing select). With light transmittance of 0.88–0.91 percent, shading coefficient of 0.94, U-value of 1.02 and solar heat gain coefficient of 0.81 for 1/4 inch thick glass.

B. Tinted Float Glass: ASTM C1036, Type I (transparent glass, flat), Class 2 (tinted heat absorbing and light reducing), Quality q3 (glazing select) as follows:

1. Dark Gray: Manufacturer's standard tint, with visible light transmittance of 13-15 percent, shading coefficient of 0.41-0.55, U-value of 1.02, and solar heat gain coefficient of 0.47 for 1/4 inch thick glass.

2.4 TEMPERED GLASS PRODUCTS

A. Manufacturing Process: Horizontal (roller hearth) process with roll wave distortion parallel with bottom edge of glass as installed.

B. Clear Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated surfaces), Type 1 (transparent glass, flat) Class 1 (clear), Quality q3 (glazing select); conforming to ANSI Z97.1 and CPSC 16 CFR 1201, Category II.

C. Clear Tempered Float Glass - Low E: ASTM C1048, Kind FT (fully tempered), Condition C (coated) with low E coating on No. 2 surface, Type 1 (transparent glass, flat) Class 1 (clear), Quality q3 (glazing select); conforming to ANSI Z97.1, and CPSC 16 CFR 1201, Category II.

D. Tinted Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated surfaces), Type 1 (transparent glass, flat), Class 2 (tinted heat absorbing and light reducing), Quality q3 (glazing select), tint color matching non-heat treated float glass; conforming to ANSI Z97.1, and CPSC 16 CFR 1201, Category II.

2.5 LAMINATED GLASS PRODUCTS

A. Laminated Safety Glass: Two plies of float glass of equal thickness, ASTM C1172, kind LHS (heat-strengthened), laminated with 0.030 inch thick plastic interlayer; conforming to ANSI Z97.1, and CPSC 16 CFR 1201, Category II. Unit to have the following characteristics:

1. Glass: Class 1 - clear for inner ply only. Class 2, gray tint outer ply only.

2. Glass Thickness (each pane): 1/8 inch.

3. Color of Plastic Interlayer: Clear

4. Coating: Low E coating on No. 2 surface of inner ply of exterior glass.

B. Plastic Interlayer:

1. Saflex (Solutia); Monsanto Co., www.saflex.com.

2. Butacite; E.S. DuPont DeNemours & Co., Inc., www.dupont.com.

2.6 SEALED INSULATING GLASS UNITS

A. Comply with ASTM E774, Class A.

B. Thickness of Exterior Pane: 1/4 inch.

C. Thickness of Interior Pane: 1/4 inch.

D. Air Space Thickness: 1/2 inch.

E. Exterior Pane: Laminated safety glass.

F. Interior Pane: Clear tempered float glass.

G. Coating: Low E coating on No. 2 surface.

H. Spacer Material: Aluminum, clear anodized finish.

I. Dessicant: Molecular sieve or silica gel or blend of both.

2.7 POLYCARBONATE MIRROR

A. General: Comply with ANSI Z97.1.

B. Material: Clear plastic compound in sheet size required to minimize vertical joints, 1/4 inch thick.

C. Mirror Coating: Vacuum applied metalized premium aluminum mirror grade coating applied to back surface.

D. Protective Coating: Silicone abrasion and chemical resistant coating applied to face of unit. Prime paint protective coating applied to back of mirrored surface.

2.8 GLAZING SEALANTS AND PREFORMED GLAZING TABS

A. General: Comply with ASTM C920, and sealant and glass manufacturers recommendations for suitability and compatibility.

B. One-Part Butyl Glazing Sealant:

1. Chem-Calk 300; Bostik Construction Products Div., www.bostik-findley-us.com.

2. BC 158; Pecora Corp., www.pecora.com.

C. One-Part Acid-Curing Silicone Glazing Sealant: Type S; Grade NS; Class 25:

1. Chem-Calk 1200; Bostik Construction Products Div., www.bostik-findley-us.com.

2. Dow Corning 999; Dow Corning Corp., www.dowcorning.com.

3. SCS 1200; General Electric Corp., www.gesealants.com.

4. 863; Pecora Corp., ww.pecora.com.

5. Omniglaze; Sonneborn Building Products Div.; ChemRex Products, Inc., www.chemrex.com.

6. Proglaze; Tremco, www.tremcosealants.com.

D. Preformed Butyl-Polyisobutylene Glazing Tape With Spacer Rod:

1. Chem-Tape 60; Bostik Construction Products Div., www.bostik-findley-us.com.

2. Shim-Seal; Pecora Corp., www.pecora.com.

3. Pre-shimmed Tremco Polyshim II Tape; Tremco, Inc., www.tremcosealants.com.

2.9 GLAZING ACCESSORIES

A. Setting Blocks: Neoprene; EPDM or silicone blocks, 80-90 Shore A durometer hardness.

B. Spacer Shims: Neoprene; EPDM or silicone blocks, Shore A durometer hardness; self adhesive one face.

C. Glazing Gasket: Resilient polyvinylchloride extruded shape to suit glazing channel retaining slot with prefabricated molded corners. Black color.

D. Glazing Clips: Manufacturer's standard type.

E. Mirror Attachment Accessories: Mirror adhesive, chemically compatible with mirror coating and wall substrate.

3. PART 3 EXECUTION

3.1 INSPECTION

A. Verify surfaces of glazing channels or recesses are clean, free of obstructions, and ready for work of this Section.

B. Beginning of installation means acceptance of substrate.

3.2 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.

B. Seal porous glazing channels or recesses.

C. Prime surfaces scheduled to receive sealant.

3.3 EXTERIOR DRY METHOD (PREFORMED GLAZING)

A. Cut glazing tape to length; install on glass pane. Seal corners by butting tape and dabbing with butyl sealant.

B. Place setting blocks at 1/4 inch points with edge block no more than 6 inches from corners.

C. Rest glass on setting blocks and push against fixed stop with sufficient pressure to attain full contact at perimeter of pane.

D. Install removable stops without displacement of glazing gasket. Exert pressure for full continuous contact.

E. Trim protruding tape edge.

F. Use for all aluminum windows and aluminum framed storefronts.

3.4 EXTERIOR COMBINATION METHOD (TAPE AND SEALANT)

A. Cut glazing tape to length and set against permanent stops, 3/16 inch below sightline. Seal corners by butting tape and dabbing with butyl sealant.

B. Apply heel bed of butyl sealant along intersection of removable stop with frame ensuring full seal between glass and frame.

C. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.

D. Rest glass on setting blocks and push against tape with sufficient pressure to attain full contact at perimeter of pane.

E. Install removable stops with spacer strips inserted between glass, and applied stops at 24 inch intervals, 1/4 inch below sightline.

F. Fill gap between pane and removable stop with silicone sealant to depth equal to bite of frame on pane, but not more than 3/8 inch below sightline.

G. Apply cap bead of silicone sealant along exterior void, to uniform line, flush with sightline. Tool or wipe sealant surface with solvent for smooth appearance.

H. Use for all exterior steel frames.

3.5 INTERIOR - DRY METHOD (TAPE AND TAPE)

A. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch above sight line.

B. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.

C. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.

D. Place glazing tape on free perimeter of glazing in same manner described above.

E. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.

F. Knife trim protruding tape.

G. Use for all interior steel frames.

3.6 INSTALLATION - MIRRORS

A. Set mirrors with adhesive, applied in accordance with adhesive manufacturer's instructions.

B. Place plumb and level.

3.7 CLEANING

A. After installation, mark pane with an "X" by using plastic tape or removable paste.

B. Remove glazing materials from finish surfaces.

C. Remove labels after Work is completed.

END OF SECTION

SECTION 09220

PORTLAND CEMENT PLASTER

1. PART 1 GENERAL

1.1 WORK INCLUDED

A. Metal furring, and lathing.

B. Portland cement plaster system.

C. Machine applied surface finish.

D. Acrylic based finish coat.

1.2 REFERENCES

A. ASTM A641 - Zinc-Coated (Galvanized) Carbon Steel Wire.

B. ASTM C150 - Portland Cement.

C. ASTM C206 - Finishing Hydrated Lime.

D. ASTM C847 - Standard Specifications for Metal Lath.

E. ASTM C897 - Aggregate for Job-Mixed Portland Cement-Based Plasters.

F. ASTM C926 - Application of Portland Cement-Based Plaster.

G. ASTM C932 - Surface-Applied Bonding Agents for Exterior Plaster.

H. ASTM C954 - Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Studs from 0.033 inches to 0.112 inches in thickness.

I. ASTM C1002 - Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases.

J. ASTM C1063 - Installation of Lathing and Furring for Portland Cement Based Plaster.

K. NAAMM Standard ML/SFA 920 - Guide Specifications for Metal Lathing and Furring.

L. Lathing and Plaster Systems Manual - Third Edition.

M. Military Specification MIL-B-19235-Bonding Agents.

N. PCA (Portland Cement Association) - Portland Cement Plaster (Stucco) Manual.

O. 2010 CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2.

P. ICC - International Code Council.

Q. TSIB - Technical Services Information Bureau.

1.3 QUALITY ASSURANCE

A. Applicator: Company specializing in cement plaster work with five years documented experience.

B. At the completion of lathing and prior to the application of scratch coat of plaster, contact the Technical Services Information Bureau, www.tsib.org, and arrange for inspection of lathing and accessories installation. Provide Architect a written report of the results of the inspection.

C. Installation of underlayment and penetration flashing shall be in accordance with manufacturer's installation guidelines and recommendations. Provide site reports from manufacturer's field service representative, indicating observation of underlayment and flashing installation.

1.4 SUBMITTALS

A. Submit product data under provisions of Section 01330.

B. Provide product data on plaster materials, characteristics and limitations of products specified.

C. Submit samples of texture for plaster finish.

D. Provide underlayment manufacturer's written installation instructions.

1.5 FIELD SAMPLES

A. Provide sample panel under provisions of Section 01330.

B. Construct field sample panel, minimum 96 inches long by 96 inches wide, illustrating lath installation, base coat installation, surface texture, of finish coat.

C. Locate where directed.

D. Accepted sample may remain as part of the Work.

1.6 PRE-INSTALLATION CONFERENCE

A. Convene a conference two weeks prior to commencing work of this Section under the provisions of Section 01310.

B. Require the attendance of parties directly affecting the Work of this Section.

C. Review requirements for installation of all materials specified in this Section for sequencing, proper installation, integration and protection.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Do not apply plaster when substrate or ambient air temperature is less than 40 degrees F or more than 90 degrees F.

B. Maintain minimum ambient temperature of 40 degrees F during and after installation of plaster.

C. Protect portland cement plaster from uneven and excessive evaporation during dry weather and from strong blasts of dry air.

1.8 WARRANTY

A. Provide ten year warranty for underlayment and flashings under provisions of Section 01770.

B. Warranty: Include coverage for published water infiltration properties of underlayment and flashings installed for exterior walls and openings.

2. PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Lathing Materials:

1. Western Metal Lath, www.wmlinc.com.

2. Amico-West, www.amico-lath.com.

3. United States Gypsum Co., www.usg.com.

4. National Gypsum Co., www.nationalgypsum.com.

5. CEMCO, www.cemcosteel.com.

B. Accessories:

1. Flannery, Inc., www.flannerytrim.com.

2. Fry Reglet Corp., www.fryreglet.com.

3. United States Gypsum Co., www.usg.com.

4. Keene Building Products, Metalex Corp., www.metlx.com.

5. M.M. Systems Corporation, www.mmsystemscorp.com.

6. CEMCO, www.cemcosteel.com.

7. Amico-West, www.amico-lath.com.

8. Superior Metal Trim, www.superiormetaltrim.com.

9. Stockton Wire Products, www.stocktonproducts.com.

10. Western Metal Lath, www.wmlinc.com.

11. National Gypsum Co., www.nationalgypsum.com.

C. Underlayment:

1. Underlayment: Tyvek as manufactured by E.I. DuPont de Nemours, www.tyvek.com

(a) First layer: Commercial Wrap D.

(b) Second layer: Commercial Wrap.

2. Other acceptable underlayment: Typar Metro Wrap as manufactured by Reemay, Inc., www.Reemay.com

D. Substitutions: Under provisions of Section 01630.

2.2 PLASTER BASE COAT MATERIALS

A. Cement: ASTM C150, Normal - Type I, Portland.

B. Lime: ASTM C206, Type S.

C. Aggregate: In accordance with ASTM C897 and PCA Plaster (Stucco) Manual.

D. Water: Clean, fresh, potable and free of mineral or organic matter which can affect plaster.

E. Bonding Agent: ASTM C932 and MIL-B-19235; type recommended for bonding plaster to concrete and concrete masonry surfaces. Larsen Products Corp. - Weld-Crete, www.larsenproducts.com. Substitutions under provisions of Section 01630.

F. Plaster Mix Reinforcement: Glass fibers, 1/2 inch nominal length, alkali resistant.

2.3 PLASTER FINISH COAT MATERIALS

A. Cement: As specified for plaster base coat, grey color.

B. Lime: As specified for plaster base coat.

C. Water: Clean, fresh, potable and free of mineral or organic matter which can affect plaster.

D. Finish: Site paint under provisions of Section 09900.

2.4 FURRING AND LATHING

A. Metal Lath for Vertical Surfaces: ASTM C847, 3.4 lb/sq.yd. expanded metal, galvanized, self furring type with "V" shaped continuous groove.

B. Metal Lath for Horizontal Surfaces: ASTM C847, 3.4 lb./sq.yd. expanded metal, galvanized, 3/8 inch rib lath with factory applied kraft paper backing.

2.5 ACCESSORIES

A. Corner Mesh: Formed steel, minimum 0.0179 inch thick; expanded flanges shaped to permit complete embedding in plaster; minimum 2 inches wide; galvanized finish. Equivalent to Dietrich, CEMCO, or Cornerite.

B. Corner Reinforcement: Equivalent to Western Metal, 0.0179 inch Stucco-Lok or 18 gage Stockton Corneraid for straight corners. Stockton Bullnose Regular for rounded corners, galvanized finish.

C. Strip Mesh: Metal lath, 3.4 lb/sq. yd. expanded metal, galvanized, 6 inches wide x 18 inches long.

D. Vent Screed: Equivalent to Superior SRS, minimum 0.0179 inch thick; depth governed by plaster thickness, minimum 4 inch width, double "V" profile with perforated expanse between "V's" of longest possible lengths; galvanized finish.

E. Casing Bead: Formed steel; minimum 0.0179 inch thick; thickness governed by plaster thickness; maximum possible lengths; expanded metal flanges, with square edges; galvanized finish.

F. Curved Casing Bead: Square-edged style fabricated from aluminum, preformed into curve or radius indicated.

G. Weep Screed: Equivalent to Superior SWS, minimum 0.0179 inch thick; depth governed by plaster thickness, minimum 3-1/2 inch high flange, "V" shaped, of longest possible lengths; galvanized finish.

H. Drip Screed: Equivalent to Superior No. 5 or No. 10 drip mould as indicated on drawings, minimum 0.0179 inch thick; depth governed by plaster thickness, minimum 3-1/2 inch high flange, of longest possible lengths; galvanized finish.

I. Window/Door Drip Screed: Equivalent to Superior SWD, minimum 0.0179 inch thick; depth governed by plaster thickness, minimum 3-1/2 inch high flange, of longest possible lengths; galvanized finish.

J. Control and Expansion Joints: Equivalent to Western XJ 15-3, depth to conform to plaster thickness, maximum practical lengths, galvanized finish.

K. Single Point Screed: Equivalent to Superior SSP, minimum 0.0179 inch thick; depth governed by plaster thickness, maximum practical lengths; galvanized finish.

L. Interior Corner Joints: Equivalent to Western No. 30, depth to conform to plaster thickness, maximum practical lengths, galvanized finish.

M. Anchorages: Nails, staples, or other approved metal supports, of type and size to suit application, galvanized to rigidly secure lath and associated metal accessories in place.

N. Screws: ASTM C954 or ASTM C1002, self drilling.

O. Penetration Flashing: Tyvek flashing system. Straight flash for jambs and heads, FlexWrap for sills.

P. Polyethylene Sheet: Clear, 6 mil thick.

Q. Wire: ASTM A641, Class 1 coating (galvanized), soft temper.

R. Powder Activated Fastener: 0.145 inch diameter SDM flat head nail with washer as manufactured by Hilti, Inc., www.us.hilti.com, ICC/ES Report No. 2388.

S. Tape: Acrylic adhesive backed oriented polypropylene, 3 inch in width.

2.6 CEMENT PLASTER MIXES

A. Mix and proportion cement plaster in accordance with ASTM C926 and PCA Plaster (Stucco) Manual.

B. Scratch Coat and Brown Coat: One part cement, minimum 3-1/2 and maximum 5 parts aggregate, and 0-3/4 parts hydrated lime. Alkali resistant glass fibers at a rate of 1 lb. per sack of cement in brown coat only.

C. Factory-Prepared Portland Cement Finish Coats: Add water only; comply with finish coat manufacturer's directions.

D. Mix only as much plaster as can be used in 1 hour.

E. Mix materials dry, to uniform color and consistency, before adding water.

F. Protect mixtures from frost, contamination, and evaporation.

G. Do not retemper mixes after initial set has occurred.

3. PART 3 EXECUTION

3.1 INSPECTION

A. Verify that surfaces and site conditions are ready to receive Work. Notify Architect in writing of all unsatisfactory surfaces and conditions.

B. Masonry: Verify joints are cut flush and surface is ready to receive Work of this Section. Verify no bituminous or water repellent coatings exist on masonry surface.

C. Concrete: Verify surfaces are flat, honeycomb is filled flush, and surface is ready to receive work of this Section. Verify no bituminous, water repellent, or form release agents exist on concrete surface that are detrimental to plaster.

D. Grounds and Blocking: Verify items within walls for other Sections of Work have been installed.

E. Mechanical and Electrical: Verify services within walls have been tested and approved.

F. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

A. Remove existing plaster as necessary to install metal lathing and accessories as specified herein and as per manufacturer's instructions.

B. Protect surfaces near the Work of this Section from damage, disfiguration, and overspray. Mask off all ventilation screeds occurring in plastered areas.

C. Clean concrete surfaces of foreign matter. Clean surfaces using acid solutions, solvents, or detergents. Wash surfaces with clean water.

D. Roughen smooth concrete surfaces.

E. Apply bonding agent in accordance with manufacturer's instructions.

3.3 INSTALLATION - LATHING MATERIALS

A. Install metal lathing in accordance with ML/SFA 920, ASTM C1063 and as specified herein.

B. On vertical surfaces apply 2 layers of underlayment over substrate; weatherlap horizontal edges 6 inches, vertical edges 6 inches. Fasten in place at 12 inches on center vertically over stud. Tape seal all joints and penetrations on base layer. Installation to conform to Single "Separate" Layer Method in accordance with TSIB Bulletin 60.220.

C. Install penetration flashing around all openings and penetrations in exterior walls in compliance with underlayment manufacturer's recommendations and in conformance with recommendations contained in Plaster and Lathing Systems Manual and ML/SFA 920. Turn sill flashing up 6 inches at jambs. Extend flashing back onto sill.

D. Apply self-furring reinforcement with self-furring ribs perpendicular to supports for horizontal surfaces.

E. Apply metal lath taut, with long dimension perpendicular to supports for vertical surfaces.

F. Lap ends minimum 1 inch. Secure end laps with tie wire where they occur between supports.

G. Lap sides of expanded metal lath a minimum 1-1/2 inches. Nest outside ribs of rib lath together.

H. Furr out metal lath from vertical supports or backing not less than 1/4 inch. Furring of metal lath on vertical supports having a bearing surface width of 1-5/8 inches or less is not required.

I. Attach metal lath to wood supports using 1-1/2 inch No. 11 galvanized nails with 7/16 inch diameter heads at maximum 6 inches on center. In addition, at horizontal wood supports, secure lath to each support with 1/2 inch wide, 1-1/2 inch long No. 9 W & M gage ring shank, hook staple placed around a 10d common nail laid flat under the surface of the lath at 27 inches o.c. and not more than 3 inches from the edge of each sheet. Such staples may be placed over the ribs of 3/8 rib lath or over the back wire of other approved lath at 27 inches o.c., omitting the 10d nails.

J. Attach metal lath to vertical metal supports with tie wires or No. 8 self drilling screws with 3/8 inch diameter wafer head capable of penetrating metal supports by not less than 1/4 inch or 3 full threads. Maximum spacing 6 inches on center.

K. Attach metal lath to horizontal metal supports with tie wires or No. 8 self drilling screws with 3/8 inch diameter wafer head fitted with 1 inch O.D. x 1/4 inch I.D. x 16 gage galvanized cut washers capable of penetrating metal supports by not less than 1/4 inch or 3 full threads.

L. Attach metal lath to concrete using powder actuated fastener with washers with minimum 1-1/4 inch penetration into substrate. Space at maximum 8 inches on center horizontally and 12 inches on center vertically. Securely wire tie side laps.

M. Continuously reinforce internal angles with corner mesh, except where corner joint No. 30 is shown. Fasten at perimeter edges only.

N. Place beaded external angle with mesh at corners. Fasten at outer edges only.

O. Place strip mesh diagonally at corners of lathed openings. Secure rigidly in place.

P. Place 6 inch wide strips of metal lath centered over junctions of dissimilar backing materials. Secure rigidly in place.

Q. Place window/door drip screed at head of all windows and door openings in exterior walls.

R. Place weep screed at base of all vertical plaster applications at foundation line not less than 4 inches above earth or 2 inches above paved surfaces. Underlayment and lath shall cover and terminate on the attachment flange of the screed.

S. Place drip screed at base of all vertical plaster applications which do not terminate at framed wall openings or at foundation line.

T. Place vent screed in soffit areas indicated.

U. Place casing beads at all terminations of plaster finish not otherwise indicated to have screeds installed and at all intersections with dissimilar materials. Butt and align ends. Secure rigidly in place.

V. Install accessories to lines and levels.

3.4 INSTALLATION - SUSPENDED METAL CEILING FRAMING

A. Install in accordance with ASTM C1063.

B. Coordinate location of hangers with other Work.

C. Install ceiling framing independent of walls and columns.

D. Reinforce openings in ceiling suspension system which interrupt main carrying channels or furring channels with lateral channel bracing. Extend bracing minimum of 24 inches past end of openings.

3.5 CONTROL AND EXPANSION JOINTS

A. Locate interior control and expansion joints as indicated on the drawings, but not to exceed 20'-0" o.c. horizontally or vertically.

B. Locate exterior control and expansion joints as indicated on drawings but not to exceed 12'-0" o.c. horizontally or vertically.

C. Establish control and expansion joints with specified joint device.

D. Attach control and expansion joints to metal lath with wire ties.

E. Install expansion joint over 3 inch wide strip of polypropylene tape to assist with air seal continuity.

F. Cut metal lath behind control and expansion joints.

G. Coordinate joint placement with other related Work.

3.6 PLASTERING

A. Apply plaster in accordance with ASTM C926 and PCA Portland Cement Plaster (Stucco) Manual.

B. Three Coat Application: At metal lathed surfaces, apply scratch coat to a nominal thickness of 3/8 inch, brown coat to a nominal thickness of 3/8 inch, and finish coat to a nominal thickness of 1/8 inch.

C. Two Coat Application: At concrete surfaces, apply 1/2 inch thick leveling coat and then 1/8 inch finish coat.

D. Moisture Curing: Moist cure plaster surfaces using a fine fog spray to assure continuous hydration of cementations materials. Where hot, dry and windy conditions exist, plaster surfaces shall be moistened and covered with a single sheet of polyethylene plastic to prevent water loss thru evaporation.

E. Moist cure scratch and brown coats. Do not apply brown coat sooner than 48 hours following scratch coat.

F. After curing, dampen base coat prior to applying finish coat. Do not apply finish coat sooner than 7 days following brown coat.

G. Machine apply finish plaster in two coats evenly and uniformly. Apply first coat to provide texture pattern; Second coat to obtain uniformity in color and texture.

H. Moist cure finish coat for minimum period of 48 hours only when strong dry wind conditions exist.

3.7 FINISH COAT TEXTURE

A. To match existing as defined by photographs and application procedures in the Plaster Texture Brochure published by the Technical Services and Information Bureau, www.tsib.org.

3.8 TOLERANCES

A. Maximum Variation from True Flatness: 1/8 inch in 10 feet.

3.9 CLEANING

A. Remove protective maskings.

B. Remove any overspray from surrounding materials.

C. Clean adjacent affected surfaces.

3.10 PLASTER APPLICATION SCHEDULE

A. Exterior Vertical Surface of Concrete and Building Walls: Three coat plaster over metal lath.

B. Exterior Vertical Surface of Framed Walls: Three coat plaster over metal lath and underlayment.

C. Exterior Horizontal Framed Surfaces: Three coat plaster over metal lath.

D. Interior Vertical Surface of Framed Walls: Three coat plaster over metal lath and underlayment.

E. Interior Horizontal Framed Surfaces: Three coat plaster over metal lath.

END OF SECTION

SECTION 09260

GYPSUM BOARD SYSTEMS

1. PART 1 GENERAL

1.1 WORK INCLUDED

A. Gypsum board.

B. Glass mat gypsum sheathing.

C. Shaft wall coreboard.

D. Gypsum soffit board.

E. Abuse/Impact resistant gypsum board.

F. Taped and sanded joint treatment.

G. Surface primer.

H. Texture finish.

I. Resilient furring channels.

J. Metal channel ceiling framing.

1.2 REFERENCES

A. ASTM A641 - Zinc-Coated (Galvanized) Carbon Steel Wire.

B. ASTM C11 - Standard Terminology Relating to Gypsum and Related Building Materials and Systems.

C. ASTM C79 - Standard Specification for Treated Core and Nontreated Core Gypsum Sheathing Board.

D. ASTM C475 - Joint Treatment Materials for Gypsum Wallboard Construction.

E. ASTM C514 - Nails for the Application of Gypsum Wallboard.

F. ASTM C557 - Adhesives for Fastening Gypsum Wallboard to Wood Framing.

G. ASTM C645 - Non-Load (Axial) Bearing Steel Studs, Runners (Track), and Rigid Furring Channels for Screw Application of Gypsum Board.

H. ASTM C754 - Installation of Steel Framing Members to Receive Screw Attached Gypsum Wallboard, Backing Board, or Water Resistant Backing Board.

I. ASTM C840 - Application and Finishing of Gypsum Board.

J. ASTM C919 - Use of Sealants in Acoustical Applications.

K. ASTM C1002 - Steel Drill Screws for the Application of Gypsum Board.

L. ASTM C1177 - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.

M. ASTM C1396 - Standard Specification for Gypsum Board.

N. ASTM D226 - Asphalt-Saturated Felt Used in Roofing and Waterproofing.

O. ASTM D1037 - Test Methods for Evaluating Properties of Wood-Based Fiber and Particle Panel Materials.

P. ASTM D4977 - Standard Test Method for Granular Adhesion to Mineral Surfaced Roofing by abrasion (modified).

Q. ASTM D5420 - Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact).

R. ASTM E90 - Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.

S. ASTM E695 - Standard Method of Measuring Relative Resistance of Wall, Floor, and Roof Construction to Impact Loading.

T. GA 201 - Using Gypsum Board for Walls and Ceilings.

U. GA 214 - Levels of Gypsum Board Finish.

V. GA 216 - Application and Finishing of Gypsum Board.

W. GA 253 - Application of Gypsum Sheathing.

X. GA 600 - Fire Resistance Design Manual.

Y. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2.

Z. UL - Underwriters Laboratories.

1.3 QUALITY ASSURANCE

A. Applicator: Company specializing in gypsum board systems work with five years documented experience.

1.4 REGULATORY REQUIREMENTS

A. Conform to CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, Chapter 7, and UL and GA requirements for fire rated assemblies as indicated on the drawings

B. Conform to UL No. 2079 for cyclical design at head of fire rated walls.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Maintain uniform temperature of minimum 60 degrees F and humidity of 30 to 50 percent prior to, during, and after installation of the Work of this Section.

1.6 DEFINITIONS

A. Refer to ASTM C11 for definitions of terms related to gypsum board assemblies.

1.7 FIELD SAMPLES

A. Provide field samples under provisions of Section 01330.

B. On wall and ceiling surface duplicate specified texture finish on at least 100 sq.ft. of surface area.

C. Provide complete finish including surface primer.

D. Simulate finished lighting conditions for review of field sample.

E. After surface texture is accepted, the accepted surface will remain as part of the Work and will be used to evaluate subsequent applications of finish texture.

2. PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - GYPSUM BOARD SYSTEM

A. American Gypsum Corp., www.americangypsum.com.

B. Certainteed, www.certainteed.com.

C. Georgia Pacific Corp., www.gp.com.

D. National Gypsum Co., www.nationalgypsum.com.

E. PABCO Gypsum, www.pabcogypsum.paccoast.com.

F. United States Gypsum Co., www.usg.com.

G. Substitutions: Under provisions of Section 01630.

2.2 FRAMING MATERIALS

A. Metal Furring: ASTM C645, hat-shaped, 7/8 inch deep, 0.0329 inch thick.

B. Resilient Furring Channel: Manufacturer's standard product designed to reduce sound transmission, complying with ASTM C645 for material, finish and widths of face and fastening flange; 1/2 inch deep x 0.0179 inch thick asymmetric-shaped channel with face connected to single flange by slotted leg (web).

C. Furring Channel: ASTM C754, 1-1/2 inch x 0.475 lb./ft. channel.

D. Fasteners: ASTM C514 and C1002.

E. Hanger Wire: ASTM A641, Class 1 coating (galvanized) soft temper, 9 gauge.

F. Tie Wire: ASTM A641, Class 1 coating (galvanized) soft temper, 16 and 18 gauge.

G. Adhesive: ASTM C557.

2.3 GYPSUM BOARD MATERIALS

A. Standard Gypsum Board: ASTM C1396; 5/8 inch thick unless otherwise indicated, maximum permissible length; ends square cut, tapered and beveled edges. Mold and mildew-resistant gypsum core and paper facing at exterior locations.

B. Fire Rated Gypsum Board: ASTM C1396; fire resistive type, UL rated; 5/8 inch thick unless otherwise indicated, maximum permissible length; ends square cut, tapered and beveled edges. Mold and mildew-resistant gypsum core and paper facing at exterior locations.

C. Moisture Resistant Gypsum Board: ASTM C1396; 5/8 inch thick unless otherwise indicated, water resistant core; water resistant paper on front, back, and long edges; maximum permissible length; ends square cut, tapered and beveled edges.

D. Fire Rated Moisture Resistant Gypsum Board: ASTM C1396; fire resistive type, UL rated; 5/8inch thick unless otherwise indicated; water resistant core; water resistant paper on front, back and long edges; maximum permissible length; ends square cut, tapered and beveled edges.

E. Shaftwall Coredboard: ASTM C1396; fire resistive type, UL rated; 1 inch thick; water resistant core; mold, mildew, and water resistant paper on front, back and long edges; maximum permissible length; ends square cut, beveled edges.

F. Exterior Gypsum Soffit Board: ASTM C1396; fire resistive type, UL rated; 5/8 inch thick unless otherwise noted, maximum permissible lengths; enhanced sag resistant core; water resistant paper on front, back and long edges; beveled tongue and groove edges.

G. Glass-Mat Gypsum Sheathing Board: ASTM C1177; 1/2 inch thick, similar to Dens-Glass Gold manufactured by Georgia Pacific Corp.

H. Fire Rated Glass-Mat Gypsum Sheathing Board: ASTM C1177; 5/8 inch thick, similar to Dens-Glass Gold Fireguard, Type X manufactured by Georgia Pacific Corp.

I. Glass Mat Gypsum Parapet Sheathing: ASTM C1177; 1/2 inch thick, with glass mat facing one side, durable low perm coating on the other, similar to DensDeck Duraguard manufactured by Georgia Pacific Corp.

J. Fire Rated Glass Mat Gypsum Parapet Sheathing: ASTM C1177; 5 / 8 inch thick, with glass mat facing one side, durable low perm coating on the other, similar to DensDeck Fireguard Type X manufactured by Georgia Pacific Corp.

K. Abuse/Impact Resistant Gypsum Board: ASTM C1396 ; 5/8 inch thick, maximum permissible lengths; ends square cut, tapered and beveled edges; with additives and fiberglass mat facings to enhance indentation resistance, abrasion, and impact resistance. No failure after 480 ft. lbs. as tested in accordance with ASTM E695. Minimum of 72 ft. lbs. required to produce 0.120 inch indentation when tested by ASTM D5420. Surface abrasion resistance not greater than 0.235 inch depth, 50 cycles with additional 25 lb. weight, when tested by ASTM D4977.

L. Fire Rated Abuse/Impact Resistant Gypsum Board: ASTM C1396; fire resistive type, UL rated; 5/8 inch thick, maximum permissible lengths; ends square cut, tapered and beveled edges; with additives and fiberglass mat facings to enhance indentation resistance, abrasion, and impact resistance. No failure after 480 ft-lbs as tested in accordance with ASTM E695. Minimum of 72 ft-lbs required to produce 0.120 inch indentation when tested by ASTM D5420. Surface abrasion resistance not greater than 0.235 inch dept, 50 cycles with additional 25 lb weight, when tested by ASTM D4977.

M. Flexible Gypsum Board: ASTM C1396; fire resistive core; 1/4 inch thick, maximum permissible lengths; fire resistive core; ends square cut, slightly tapered edges. Mold and mildew-resistant gypsum core and paper facing at exterior locations.

2.4 ACCESSORIES

A. Acoustical Sealant: Non-hardening, non-skinning, for use in conjunction with gypsum board: As specified in Section 07900.

B. Fire Rated Sealant and Fiber Stuffing: As specified in Section 07840.

C. Corner Beads: Metal, hot dip galvanized.

D. Edge Trim: GA 201 and GA 216; Type LC bead, unless otherwise indicated.

E. Control Joints: Roll-formed zinc, Type USG No. 093.

F. Spot Grout: ASTM C475, setting-type joint compound.

G. Joint Materials Interior: ASTM C475; reinforcing tape, joint compound, adhesive, water, and fasteners. Use tapes and compound recommended by gypsum board manufacturer for the use intended. Use ready mixed, drying type compounds. Use taping compound for embedding tape and first coat over fasteners and flanges of corner beads and trim. Use topping compound for fill and finish coats.

H. Joint Materials, Exterior:

1. Gypsum Soffit Board: Setting-type taping and setting-type, sandable topping compound.

2. Glass-Mat Gypsum Sheathing: 2 inch wide 10 x 10 self-adhering fiberglass joint tape recommended by manufacturer.

I. Primer: Flat latex basecoat paint equivalent to First Coat manufactured by United States Gypsum Company.

J. Primer-Surfacer: Vinyl acrylic latex-based primer and surfacer equivalent to Tuff-Hide manufactured by United States Gypsum Company.

K. Spray Texture Finish: Equivalent to USG Spray Texture Finish, orange peel texture, manufactured by United States Gypsum Company.

L. Membrane: ASTM D226; No. 15 asphalt saturated roofing felt.

3. PART 3 EXECUTION

3.1 INSPECTION

A. Verify that site conditions are ready to receive Work.

B. Beginning of installation means acceptance of substrate.

3.2 WALL FURRING INSTALLATION

A. Erect wall furring for direct attachment to concrete walls.

B. Erect metal furring vertically at 16 inches o.c. Secure in place on alternate channel flanges at maximum 24 inches o.c.

3.3 ACOUSTICAL ACCESSORIES INSTALLATION

A. Space resilient furring channels horizontally at maximum 24 inches o.c., not more than 2 inches from floor and ceiling lines.

B. Locate nested joints over framing members.

C. Install acoustical sealant within partitions in accordance with manufacturer's instructions and ASTM C919.

D. Seal perimeter, joints, openings and penetrations on each face of partition.

3.4 CEILING FRAMING INSTALLATION

A. Install in accordance with ASTM C754 and CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, Chapter 25.

B. Coordinate locations of hangers with other Work.

C. Install ceiling framing independent of walls and columns.

D. Space 9 gauge hanger wires 3'-0" o.c. along 1-1/2 inch furring channels and within 6 inches of end of furring channel.

E. Install 1-1/2 inch furring channels at 4'-0" o.c. and within 6 inches of parallel walls. Provide 1 inch clearance between end of channels and abutting walls.

F. Position furring channels for proper ceiling height, level, and secure with hanger wire saddle-tied along channel.

G. At channel splices, interlock flanges, overlap ends 12 inches and secure each end with double-strand of 16 gauge tie wire.

H. Erect metal furring at right angles to 1-1/2 inch furring channels. Space metal furring 16 inches o.c.

I. Install metal furring within 6 inches of parallel walls. Provide 1 inch clearance between end of furring and abutting wall.

J. Secure metal furring to furring channel with clips or saddle tie with double strand of 18 gauge tie wire.

K. At splices of metal furring nest furring at least 8 inches and securely wire-tie each end with double strand of 16 gauge tie-wire.

L. Reinforce openings in ceiling suspension system which interrupt main furring channels or metal furring with lateral channel bracing. Extend bracing minimum 24 inches past each end of openings.

3.5 MEMBRANE INSTALLATION

A. Install membrane over wall studding where moisture resistant gypsum board is to be installed.

B. Install membrane over substrate; weatherlap horizontal edges 4 inches and vertical edges 6 inches.

3.6 GYPSUM BOARD INSTALLATION

A. Install gypsum board in accordance with ASTM C840 and manufacturer's instructions.

B. Erect single layer standard gypsum board in most economical direction, with ends and edges occurring over firm bearing except those ends and edges which are perpendicular to framing.

C. Erect single layer fire rated gypsum board vertically, with edges and ends occurring over firm bearing except those ends and edges which are perpendicular to framing members. Comply with required UL, CBC, or GA fire rated assembly.

D. Erect double layer gypsum board with standard gypsum board for first layer placed in most economical direction with second layer placed parallel to face layer with adhesive and supplementary fasteners. Off-set joints of second layer from joints of first layer by at least 12 inches.

E. Erect double layer fire rated gypsum board in accordance with required UL, CBC, or GA fire rated assembly.

F. Use screws when fastening gypsum board to metal furring.

G. Use screws when fastening gypsum board to wood furring or framing except where nails are required for UL or UBC fire rated assembly.

H. Install fire stop sealant and fiber stuffing at wall penetrations and terminations in accordance with required UL, CBC, or GA fire rated assembly in accordance with Section 07840.

I. Install acoustical sealant at wall penetrations and terminations as specified in this Section and in accordance with Section 07900.

J. Treat cut edges and holes in moisture resistant gypsum board with sealant.

K. Install gypsum board with mold and mildew-resistant core and paper facing at exterior locations on the interior face of all exterior walls.

L. Place control joints as indicated on the drawings and not to exceed 30 feet maximum in either direction for partitions and ceilings. Provide adequate seal or safing insulation behind control joints to maintain sound or fire ratings.

M. Place corner beads at external corners. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials.

N. Spot grout metal door frames. Apply spot grout at each jamb anchor clip just before inserting board into frame.

3.7 CURVED PARTITIONS

A. Install panels horizontally and unbroken across curved surface.

B. Wet gypsum panels on surface that will become compressed.

C. On convex side of partition, begin installation at one end of curved surface and fasten panels to studs as they are wrapped around curve.

D. On concave side of partition, start fastening panels at center of curve and work outward to panel ends.

E. Allow wetted panels to dry before applying joint treatment.

3.8 EXTERIOR SOFFIT AND CEILING INSTALLATION

A. Apply gypsum soffit board panels perpendicular to supports with end joints staggered and located over supports.

B. Install panels with 1/4 inch open space where panels abut other construction or penetrations.

C. Fasten with corrosion-resistant screws.

3.9 GLASS MAT GYPSUM SHEATHING INSTALLATION

A. Install glass mat gypsum sheathing in accordance with manufacturer's instructions and in accordance with GA-253.

B. Install glass mat gypsum sheathing with gold side out.

C. Install glass mat gypsum parapet sheathing with blue low-perm side out.

D. Install glass mat gypsum sheathing with long dimension parallel to framing members.

E. Fasten with corrosion-resistant screws.

F. Install fire rated glass mat gypsum sheathing in accordance with listed assembly indicated from UL, CBC or GA.

3.10 SHAFT WALL ASSEMBLY INSTALLATION

A. Shaft wall assemblies shall be installed to comply with requirements of fire-resistance-rated assemblies indicated from UL, CBC or GA.

B. Do not bridge building expansion joints with shaft-wall assemblies. Frame both sides of joint with furring and other supports.

C. At penetrations in shaft wall, maintain fire-resistive rating by installing supplemental fire protection behind boxes, elevator call buttons, elevator floor indicators and similar items.

D. Isolate gypsum finish panels from building structure to prevent cracking while maintaining continuity of fire-rated construction.

E. Seal gypsum board shaft walls with fire rated sealant at perimeter of assembly where it abuts other work and at joints and penetrations.

F. Where shaft wall assemblies cannot be positioned within 2 inches of the shaft wall face of structural beams, floor edges and similar projections into shaft, install 5/8 inch thick gypsum board cants covering tops of projections.

G. Install multiple layers of gypsum board materials as specified for double layer installation.

3.11 JOINT TREATMENT

A. Tape, fill, and sand joints, edges, and corners in accordance with GA-214.

B. Feather successive coats a minimum of 2 inches onto adjoining surfaces for each coat.

C. Where fire resistance rating is required, detail of joint treatment shall meet fire rating requirement.

D. Level 1 Treatment:

1. All joints and angles shall have tape embedded in joint compound.

2. Surface shall be free of excess joint compound.

3. Tool marks and ridges are acceptable.

4. Use for plenum areas above ceiling, in areas that are generally concealed and other areas not normally open to view.

E. Level 2 Treatment:

1. All joints and angles shall have tape embedded in joint compound and one separate coat of joint compound shall be applied over all fastener heads and accessories.

2. Surface shall be free of excess joint compound.

3. Tool marks and ridges are acceptable.

4. Use where surface is substrate to ceramic tile, acoustic tile, or tackable wallboard system.

F. Level 3 Treatment:

1. Not used.

G. Level 4 Treatment:

1. All joints and angles shall have tape embedded in joint compound with three separate coats of topping compound applied over all joints, angles, fasteners, and accessories.

2. All compound shall be smooth and free of tool marks and ridges.

3. Sand lightly between coats, taking care not to roughen face paper.

4. Use for all surfaces that are scheduled to receive a textured and painted finish, except areas of food service and preparation, or a surface applied wallcovering.

H. Level 5 Treatment:

1. All joints and angles shall have tape embedded in joint compound with three separate coats of topping compound applied over all joints, fasteners, and accessories.

2. Apply two thin skim coats of topping compound over entire surface.

3. All compound shall be smooth and free of tool marks and ridges.

4. Sand lightly between coats.

I. Glass-Mat Gypsum Sheathing Board: Apply self-adhering fiberglass joint tape over joints and embed in bead of acrylic latex sealant applied into board joint.

J. Gypsum Board Soffit Board: Apply joint tape over joints and embed in setting type joint compound. Skim joint surface with setting type joint compound for smooth finish.

3.12 FINISHING

A. Roller apply surface primer to all gypsum board surfaces scheduled to receive a painted and textured finish prior to application of paint or texture finish.

B. Spray apply textured finish to all surfaces scheduled to receive a paint finish except surfaces of food service and preparation areas.

C. Remove any overspray of texture finish from door frames, windows, and other adjoining construction.

3.13 TOLERANCES

A. Maximum Variation from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09511

SUSPENDED ACOUSTICAL CEILINGS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Suspended metal grid ceiling system.

B. Acoustical panels.

C. Non-fire rated assembly.

D. Perimeter trim.

1.2 REFERENCES

A. ASTM A513 - Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing.

B. ASTM A641 - Zinc-Coated (Galvanized) Carbon Steel Wire.

C. ASTM C635 - Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

D. ASTM C636 - Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.

E. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.

F. ASTM E84 - Test Methods for Surface Burning Characteristics of Building Materials.

G. ASTM E580 - Application of Ceiling Suspension Systems for Acoustic Tile and Lay-in Panels in Areas Requiring Seismic Restraint.

H. ASTM E1264 - Classification of Acoustical Ceiling Products.

I. DSA - Division of the State Architect.

J. 2010 CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2.

K. ICC - ES - International Code Council Evaluation Service, Inc.

L. UL - Underwriters' Laboratories Building Material Directory.

1.3 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacture of ceiling suspension system and ceiling panels with five years minimum experience.

B. Installer: Company with five years minimum documented experience, approved by manufacturer.

1.4 REGULATORY REQUIREMENTS

A. Conform to CBC, California Building Code (CCR) California Code of Regulations, Title 24, Part 2, Chapter 25 for suspension system requirements.

B. Conform to applicable UL and CBC combustibility requirements for materials.

1.5 SUBMITTALS

A. Submit product data under provisions of Section 01330.

B. Provide product data on metal grid system components and acoustic units.

C. Submit samples under provisions of Section 01330.

D. Submit two samples 6 x 6 inch in size, illustrating material and finish of acoustic units.

E. Submit two samples each, 12 inches long, of suspension system main runner, cross runner, and edge trim.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Maintain uniform temperature of minimum 60 degrees F, and humidity of 50 percent prior to, during, and after installation.

1.7 SEQUENCING/SCHEDULING

A. Do not install acoustical ceilings until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Schedule installation of acoustic units after interior wet work is dry.

2. PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - SUSPENSION SYSTEM

A. Armstrong Ceiling Systems, www.ceilings.com. ICC-ES No. ESR-1308.

B. Certainteed, www.certainteed.com ICC-ES NG NA.

C. Chicago Metallic Corporation, www.chicago-metallic.com. ICC-ES No. ESR-2631.

D. USG Interior Systems, (DONN), www.usg.com. ICC-ES No. ESR-1222.

E. Substitutions: Under provisions of Section 01630.

2.2 SUSPENSION SYSTEM MATERIALS

A. Grid: ASTM C635, heavy duty, non-fire rated, exposed T; components die cut and interlocking. Catalog numbers of acceptable manufacturer are indicated on drawings.

B. Accessories: Stabilizer bars, clips, splices, and edge moldings required for suspended grid system.

C. Grid Materials: Commercial quality cold rolled steel with galvanized coating.

D. Grid Finish: Black color, baked enamel.

E. Support Channels and Hangers: Galvanized steel; size and type to suit application, to rigidly secure acoustic ceiling system including integral mechanical and electrical components, as detailed on drawings.

F. Compression Strut: As detailed on drawings.

G. Hanger Wire: ASTM A641, Class 1 coating (galvanized), soft temper, No. 12 gage.

2.3 ACCEPTABLE MANUFACTURERS - ACOUSTIC UNITS

A. Armstrong Ceiling Systems, www.ceilings.com.

B. Certainteed, www.certainteed.com.

C. USG Interiors, Inc., www.usg.com.

D. Substitutions: Under provisions of Section 01630.

2.4 ACOUSTIC UNIT MATERIALS

A. Acoustic Panels: ASTM E1264, conforming to the following:

1. Type 1 Equivalent to Fine Fissured, manufactured by Armstrong.

(a)	Type	:	Square Lay-in
(b)	Form	:	Rectangular
(c)	Pattern Designation	:	1824
(d)	Size	:	24 x 48 inches
(e)	Thickness	:	3/4 inches
(f)	Composition	:	Mineral
(g)	Light Reflectance	:	.85 percent
(h)	NRC Range	:	.70
(i)	CAC Range	:	35
(j)	Edge	:	Square
(k)	Surface Color		Black
(l)	Flame Spread		ASTM E-84 (0-25) Class A, UL 25 or under
(m)	Smoke Density		Not to exceed 450 when tested in accordance with CBC Standard No. 8-1
(n)	Mold/Mildew Inhibitor	:	Biocide treatment that inhibits mold and mildew when tested according to ASTM D3273.

3. PART 3 EXECUTION

3.1 INSPECTION

A. Verify that existing conditions are ready to receive work.

B. Verify that layout of hangers will not interfere with other work.

C. Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION - GRID SYSTEM

A. Install system in accordance with ASTM C636 and ASTM E580 as supplemented in this Section and with notes on the drawing entitled Metal Suspension Systems for Lay In Panel Ceilings.

B. Install after major above ceiling work is complete. Coordinate the location of hangers with other work.

C. Hang system independent of columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

D. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

E. Compression struts to be installed at each main runner not exceeding 12'- 0" o.c. in both directions and not more than 8 inches from end of main runner. Insert main 3/4 inch tube over 1/2 inch tube with a minimum 6 inch lap. Secure crimped end of main 3/4 inch tube to structural framing with wood screws and 1/2 inch tube to main runner with metal screws. Secure tube sections together with 2 set screws. Install prefabricated compression post according to manufacturer's recommendations.

F. Locate system on room axis according to reflected plan.

G. Do not eccentrically load system, or produce rotation of runners.

H. Install edge molding at intersection of ceiling and vertical surfaces, using longest practical lengths. Miter corners. Provide edge moldings at junctions with other interruptions.

3.3 INSTALLATION - ACOUSTIC UNITS

A. Field rabbet cut edge of perimeter tiles to match factory rabbeted edge. Paint cut surface if necessary to match surface of tile.

B. Fit acoustic units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Lay directional patterned units one way in room. Fit border neatly against abutting surfaces.

D. Install acoustic units level, in uniform plane, and free from twist, warp and dents.

3.4 TOLERANCES

A. Maintain tolerances in accordance with Section 01450.

B. Variation from flat and level surface: 1/8 inch in 10 feet.

C. Variation from plumb of grid members caused by eccentric loads: Two degrees maximum.

END OF SECTION

SECTION 09688

CARPET GLUE-DOWN

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Carpeting installed by glue down method.

B. Base and stair finish.

C. Accessories.

1.2 REFERENCES

A. AATCC - American Association of Textile Chemists and Colorists.

B. ASTM D1335 - Tuft Bind of Pile Floor Coverings

C. ASTM E648 - Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.

D. ASTM E662 - Specific Optical Density of Smoke Generated by Solid Materials.

E. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

F. ASTM F2170 - Determining Relative Humidity in Concrete Floor Slabs Using In Situ Probe.

G. CRI 104 - Carpet and Rug Institute Standard for Installation of Commercial Textile Floorcovering Materials.

H. FCIB - Floor Covering Installation Board

I. FTC - Federal Trade Commission Guides, Part 260, Guides for Use of Environmental Marketing Claims

J. NFPA - National Fire Protection Association.

K. NSF / ANSI 140-2007e Sustainable Carpet Assessment.

1.3 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01330.

B. Shop drawings shall comply with CRI 104, Section 6.1.

C. Provide product data on specified products, describing physical characteristics; sizes, patterns, colors available, and method of installation.

D. Submit samples under provisions of Section 01330.

E. Submit two samples 12 x 12 inch in size illustrating color and pattern for each carpet material specified.

1.4 RECYCLED PROGRAM

A. Manufacturer shall have an existing established collection and recovery system for carpet in operation.

B. Collection and recovery system shall be capable of reclaiming and recycling 100 percent of a vinyl backed carpet.

C. Current recycling program to be in accordance with FTC Guides, Section 260.7(d).

1.5 PRODUCT CERTIFICATION

A. Carpet must be certified to NSF 140-207(e) Sustainable Carpet Assessment Standards. Platinum level of certification.

1.6 OPERATION AND MAINTENANCE DATA

A. Submit maintenance data under provisions of Section 01770.

B. Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning and shampooing.

1.7 QUALITY ASSURANCE

A. Perform work in accordance with CRI 104.

B. Maintain one copy of document on site.

C. Manufacturer: Company specializing in carpet manufacturing with ten years minimum experience.

D. Installer: FCIB certified or demonstrate ability to comply with FCIB certification procedures.

E. Carpet shall have an average tuft bind of 20 pounds when tested in accordance with ASTM D1335.

F. Carpet shall bear CRI Indoor Air Quality Carpet Testing Program Green Label Plus.

G. Carpet shall have a minimum Reference Scale Rating of 3 in accordance with CRI Test Method 101.

H. Carpet shall have a minimum of 400 ppm fluorine by weight after 2 AATCC No.171 hot water extraction cleanings when tested according to AATCC No. 189.

I. Carpet shall have a minimum AATCC Red Dye 40 Stain Scale rating of 8 when tested in accordance with AATCC No. 175.

J. Carpet shall have a Gray Scale Color Change rating of 4 or better when tested in accordance with AATCC No. 16E.

1.8 REGULATORY REQUIREMENTS

A. Floor covering to have a NFPA Class I rating with a minimum radiant flux of 0.45 watt per square centimeter when tested in accordance with ASTM E648.

B. Floor covering to have a smoke developed rating of less than 450 when tested in accordance with ASTM E662.

1.9 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, and protect products to site under provisions of Section 01600.

B. Comply with requirements of CRI 104 Section 5.

1.10 PROJECT/SITE CONDITIONS

A. Comply with requirements of CRI 104, Section 7.

B. Concrete subfloor to be allowed to cure for a minimum of 90 days to achieve acceptable dryness.

C. Store materials for three days prior to installation in area of installation to achieve temperature stability.

D. Moisture Testing: Perform tests as recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.

1. Subfloor Moisture Conditions: Moisture emission rate of no more than 3 lb/1000 sq. ft./24 hours when tested by the Quantitive Anhydrous Calcium Chloride Test, ASTM F1869, with subfloor temperature not less than 65 degrees F.

2. Subfloor Humidity Conditions: Relative humidity level of no more than 75 percent when tested by in situ drilled probes according to ASTM F2170.

3. Subfloor Alkalinity Conditions: pH range of between 5 to 9 when subfloor is wetted with potable water and pHdrion paper is applied.

1.11 WARRANTY

A. Provide manufacturer's standard lifetime or 20-year non-prorated warranty under provisions of Section 01770.

B. Performance Warranty: Manufacturer's warranty covering delamination of secondary backing, edge ravel and tuft bind of carpet under both wet and dry conditions.

C. Wear Warranty: Manufacturer's warranty that carpet will lose no more than 10 percent by weight of face yarn.

1.12 EXTRA MATERIALS

A. Provide full width rolls equal to 5 percent of amount installed for each type and color but not less than 10 square yards under the provisions of Section 01770.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS

A. The Mohawk Group, Lees, Style: Work Place Collection, Groundwork Pattern with Unibond Flex-bloc backing, www.themohawkgroup.com.

B. InterfaceFLOR, LLC, Style: Boucle Grid Classic, www.interfaceflor.com.

C. Mannington Mills, Inc., Style: Lateral Thinking with UltraBac RE Backing, www.mannington.com.

D. Tandus, Powerbond., Style: Runaway with Powerbond Ethos Cushion, www.tandus.com.

E. Shaw Industries, Inc., Style: Reflections IV with Ecoworx Performance Broadloom Backing, www.shawcontractgroup.com.

F. Substitutions: Under provisions of Section 01630.

2.2 MATERIALS

A. Carpet shall conform to published specification characteristics of named manufacturer as modified by requirements specified in this section.

B. Fiber Type: Invista Antron Legacy, Antron Lumena, or Universal Nylon Type 6,6.

C. Backing: Synthetic, non-woven, 100 percent recycled content. No latex backing to be used.

D. Antimicrobial Treatment: Shall contain treatment to inhibit growth of bacteria, mold, mildew, and other odor causing microorganisms

E. Soil-Resistant Treatment: Manufacturer's standard integral stain resistant treatment.

F. Pile height to be 1/2 inch maximum.

2.3 ACCESSORIES

A. Sub-Floor Filler: White premix portland cement and latex; type as recommended by carpet manufacturer.

B. Primers and Adhesives: Waterproof; of types recommended by carpet manufacturer. Shall meet South Coast Air Quality Management District (SCAQMD) Rule 1168.

C. Edge Strips: Vinyl type, color as selected. Strip shall be beveled with a slope no greater than 1 unit vertical to 2 units horizontal (50 percent slope).

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Examine subfloors and conditions for compliance with requirements for moisture content, humidity levels, alkalinity range and other conditions affecting performance of carpet.

B. Verify that subfloor surfaces are smooth and flat and are ready to receive work.

C. Beginning of installation means acceptance of subfloor and site conditions.

3.2 PREPARATION

A. Remove subfloor coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone.

B. Remove subfloor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with sub-floor filler.

C. Apply, trowel, and float filler to leave smooth, flat, hard surface.

D. Prohibit traffic until filler is cured.

E. Apply subfloor primer compatible with adhesive where recommended by carpet manufacturer.

F. Vacuum floor surface.

3.3 INSTALLATION

A. Apply carpet and adhesive in accordance with manufacturer's instructions and CRI 104, Section 9.

B. Verify carpet match before cutting to ensure minimal variation between dye lots.

C. Row cut carpet, to allow intended seam and pattern match. Make cuts straight, true, and unfrayed.

D. Locate seams in area of least traffic.

E. At doorways, center seams under door in closed position.

F. Fit seams straight, not crowded or peaked, free of gaps.

G. Prior to seaming, both trimmed edges to be joined must be sealed with appropriate seam sealer.

H. Apply seam sealer to edge of carpet at transition areas where carpet abuts adjacent dissimilar materials.

I. Lay carpet on floors with run of pile in same direction as anticipated traffic.

J. Do not change run of pile in any room where carpet is continuous through a wall opening into another room.

K. Locate change of color or pattern between rooms under door centerline.

L. Extend carpet into toe spaces, door reveals, open-bottomed obstructions, alcoves and similar openings.

M. Cut and fit carpet around interruptions.

N. Fit carpet tight to intersection with vertical surfaces without gaps.

O. Extend carpet as base finish up vertical surfaces to form base. Terminate top of carpet with special lipped base gripper strip.

P. Install carpet continuously to stair treads, full width in accordance with CRI, Section 13. Install in one piece. Adhere over entire surface. Fit accurately and securely, tight to treads and risers.

Q. Install 2 inch wide stripe of contrasting colored carpet parallel to and not more than 1 inch from nose of top and bottom stair tread or landing.

3.4 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Vacuum carpet surfaces.

3.5 PROTECTION

A. Comply with requirements of CRI 104, Section 16.

B. Prohibit traffic from carpet areas for 24 hours after installation.

END OF SECTION

SECTION 09840

ACOUSTICAL TREATMENT

2.XX ACOUSTICAL FINISHES

A. Description: Work includes labor, material and equipment necessary to provide acoustical wall & ceiling treatment where shown on Drawings, as specified herein and as needed for a complete and proper installation and includes:

1. Exposed, semi-rigid insulation.

2. Assemblies comprised of semi-rigid and rigid insulation covered by metallic or wooden facings.

3. Pre-manufactured wall panels.

4. Unit absorbers.

5. Spray-on acoustical finishes.

6. Acoustical CMUs

7. Draperies for Reverberation Control

8. Sound reflector panels.

9. Supplementary parts and components such as fasteners, clips and anchors required for a complete installation.

B. Acoustical Performance: Manufacturer's sound absorption data based on sound absorption tests and calculations in accordance with the latest editions of ASTM C 423, *Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method* and ASTM E 795, *Standard Practices for Mounting Specimens during Sound Absorption Tests* conducted by a laboratory accredited for specific acoustical testing under the National Voluntary Laboratory Accreditation Program (NVLAP).

C. Submittals: Submit sound absorbing finish materials and equipment in accordance with the general requirements and procedures pertaining to this project. Accordingly, or in addition, submit the following:

1. A complete description of products to be supplied including product data, dimensions, and specifications.

2. Manufacturer's recommended installation instructions and procedures.

3. Laboratory test data showing proposed product has been tested in accordance with latest editions of ASTM C 423 and ASTM E 795 and has met or exceeded specified Noise Reduction Coefficient (NRC) rating required herein, if any.

D. Products

1. AF # 1.1: Black Glass Fiber Building Insulation

a. Application: Ceilings or walls as indicated or scheduled on the drawings.

b. Configuration: Semi-rigid glass fiber insulation, black-dyed throughout its thickness. Exposed face shall have black fiber control coating or mat face without visible labels or logos. No field painting is permitted.

c. Thickness: 1" or 2" as indicated or scheduled on drawings. Multiple layers may be required to achieve requisite thickness.

d. Density: 3 pounds per cubic foot.

e. Minimum NRC (in type A mounting): 1" - 0.70; 1.5" – 0.85; 2" - 0.95.

f. Acceptable Products: Manville Permacote Linacoustic R-300, Manville Theatershield System or Owens Corning SelectSound Black Acoustic Board. Coated surface exposed.

g. Method of Attachment: Impalling Pins: Metal or plastic spindle with base plate approximately 2" square or round for adhesive application. Provide spindles with retainer friction washers or washers with spindle caps. Spindle length as appropriate for thickness of insulation.

2. AF # 1.2: Hardware Cloth Over AF # 1.1

a. Application: As indicated or scheduled on the drawings.

b. Configuration: AF # 1.1 as noted on the drawings spanning gaps between 2x vertical furring strips behind 2 mesh, .063" wire, square mesh wire "hardware" cloth having a minimum open area of 75%.

c. Paint:

1. Wood: Three coats flat black.

2. Hardware Cloth: Prime coat and two coats acrylic latex, shop applied only. Color to be selected by architect.

3. AF #2.1: Standard, Fabric-Covered Glass Fiber Panels

a. Application: As indicated or scheduled on the drawings.

b. Configuration: Rigid glass fiber panels with fabric covering. Fabric shall be acoustically transparent and highly "breathable." Fabric shall not be glued or adhered in any way to exposed faces of glass fiber panels.

c. Thickness: As noted on the drawings.

d. Density: 6 to 10 pounds per cubic foot.

e. Minimum NRC:

1. 1.5": 0.85
2. 2": 0.90
3. 4": 1.00

f. Acceptable Products:

1. Capaul WP
2. Decoustics AP
3. Wall Technology A100 WP or A200 WP

g. Fabrication: Fabricate panels to sizes and configurations indicated on the drawings. Attach facing materials securely to produce installed panels with visible surfaces fully covered and free from wrinkles, sags, blisters, seams, adhesive or other foreign matter. Facing material shall be an open weave fabric approved by the project acoustical consultant. Fabric shall be stretched over panels and attached only at the back of the panels. No glue, backing or other stabilizers shall be permited between the fabric and the faces of glass fiber panels.

h. Methods for Permanent or Semi-Permanent Attachment:

1. Metal clips: Provide metal clips or angles attached to panels and loose, mating clips or angles for screw attachment to walls or ceilings.

2. Velcro: Provide velcro tabs attached to panels and loose, mating tabs for adhesive attachment to walls or ceilings.

3. Adhesives: Provide adhesives as recommended and approved by material manufacturer for direct attachment of panels to walls or ceilings.

4. Magnets: Provide magnetic tabs attached to panels and loose, mating ferrous metal tabs for adhesive attachment to walls or ceilings.

i. Methods for Temporary or Adjustable Attachment (Walls Only):

1. Wood or Metal Rails: Provide wood or metal rails at the top and bottom elevation of panels. Rails shall be configured so that panels can be removed and replaced or slid to different locations.

2. Metal Tracks: Provide steel tracks for support of panels and associated roller or support hardware integral to panels. Panels may be suspended from above or supported from the back.

4. AF # 2.2: Tackable, Impact-Resistant, Fabric-Covered Glass Fiber Panels

a. Application: As indicated or scheduled on the drawings.

b. Configuration: Rigid glass fiber panels with 1/8" thick high density glass fiber facing and fabric covering. Fabric shall be acoustically transparent and highly "breathable." Fabric shall not be glued or adhered in any way to exposed faces of glass fiber panels.

c. Thickness: 1.5"-2.0" thick as noted on the drawings.

d. Density:

1. Basic Panel - 6 to 10 pounds per cubic foot.
2. 1/8" Facing: 12 to 22 pounds per cubic foot.

e. Minimum NRC: 1.125" - .85

f. Acceptable Products:

1. Capaul HFP
2. Decoustics HIR 1AP
3. Wall Technology IR 108 WP

g. Fabrication: Fabricate panels to sizes and configurations indicated on the drawings. Attach facing materials securely to produce installed panels with visible surfaces fully covered and free from wrinkles, sags, blisters, seams, adhesive or other foreign matter. Facing material shall be an open weave fabric approved by the Owner's acoustical consultant. Fabric shall be stretched over panels and attached only at the back of the panels. No glue, backing or other stabilizers shall be permited between the fabric and the faces of glass fiber panels.

h. Methods for Permanent or Semi-Permanent Attachment:

1. Metal clips: Provide metal clips or angles attached to panels and loose, mating clips or angles for screw attachment to walls or ceilings.

2. Velcro: Provide velcro tabs attached to panels and loose, mating tabs for adhesive attachment to walls or ceilings.

3. Adhesives: Provide adhesives as recommended and approved by material manufacturer for direct attachment of panels to walls or ceilings.

4. Magnets: Provide magnetic tabs attached to panels and loose, mating ferrous metal tabs for adhesive attachment to walls or ceilings.

i. Methods for Temporary or Adjustable Attachment (Walls Only):

1. Wood or Metal Rails: Provide wood or metal rails at the top and bottom elevation of panels. Rails shall be configured so that panels can be removed and replaced or slid to different locations.

2. Metal Tracks: Provide steel tracks for support of panels and associated roller or support hardware integral to panels. Panels may be suspended from above or supported from the back.

5. AF # 2.3: Abuse-Resistant, Fabric-Covered Glass Fiber Panels

a. Application: As indicated or scheduled on the drawings.

b. Configuration: Rigid glass fiber panels with 1/8" perforated, co-polymer face sheet flexible enough to return to original shape after heavy impact and fabric covering. Fabric shall be acoustically transparent and highly "breathable." Fabric shall not be glued or adhered in any way to exposed faces of glass fiber panels.

c. Thickness: 1.0" or 2.0" thick as noted on the drawings.

d. Density: 6 to 10 pounds per cubic foot.

e. Minimum NRC: 1.0" – 0.80 and 2.0" - 0.95

f. Acceptable Products:
1. Wall Technology A200RE Rebound or

2. Conwed Respond Ultimate II.

g. Fabrication: Same as for AF # 2.1

h. Methods for Permanent or Semi-Permanent Attachment: Same as AF #2.1

i. Methods for Temporary or Adjustable Attachment (Walls only): Same as AF #2.1

6. AF #2.4: AF # 2 Series Panels Furred Out Over Airspace

a. Application: As indicated or scheduled on the drawings.

b. Configuration: 2" thick AF # 2 Series panels applied over vertical or horizontal wood or metal furring. The furring shall be of dimensions indicated or scheduled on the drawings.

7. AF # 2.5: Scrim-Faced Glass Fiber Panels

a. Application: As indicated or scheduled on the drawings.

b. Configuration: Rigid glass fiber panels covered with integral scrim-facing.

c. Thickness: As noted on the drawings.

d. Density: 6 to 10 pounds per cubic foot.

e. Minimum NRC: 1" - 0.85; 2" - 0.90

f. Acceptable Products:
1. Decoustics Metallo
2. Decoustics Claro
1. Wall Technology New Dimensions
2. Conwed Respond Subtle Texture

g. Fabrication: Fabricate panels to sizes and configurations indicated on the drawings.

8. AF # 2.6: Field-applied, Fabric covered Glass Fiber Wall Panels

a. Application: Walls of rooms as indicated or scheduled on the drawings.

b. Configuration: Acoustically-breathable fabric field-stretched and adhered via special plastic serrated extrusions over glass fiber core. Extrusion attachments shall be made at perimeter, midwall, base and corner. Cover perimeter exposed edges. Bevel edges, 90 degree corners.

c. Thickness: As noted on the drawings.

d. Density of Glass Fiber core material: 6 to 10 pounds per cubic foot.

e. Minimum NRC in Type A mount:
a. 1.5" thickness NRC 0.90
b. 2.0" thickness NRC 0.95

f. Acceptable Vendors: Wall Technology "Eurospan"
Novawall Systems, Inc.
StretchWall Products, Inc.

g. Fabric: To be selected by the architect and approved by project acoustical consultant.

9. AF #3.0: Wood Fiber Panels

a. Application: As indicated or scheduled on the drawings.

b. Configuration: Panels shall be constructed of wood fiber in a cementitious binder. Panels shall be used alone or furred out over 1" AF # 1.1

c. Thickness: 1", 1.5", or 2" (More if furred).

d. Minimum NRC:

1. 1": 0.40
2. 1.5": 0.55
3. 2": 0.60
4. 1" over 1" AF # 1.1: 0.80
5. 1.5" over 1" AF # 1.1: 0.90
6. 2" over 1" AF # 1.1: 0.95

e. Acceptable Products: Tectum Inc. "Tectum" Acoustical Panels

10. AF # 4.1: Hanging Fabric or Poly Wrapped Ceiling Baffles

a. Application: As indicated or scheduled on the drawings.

b. Configuration: Baffles shall be 24" x 48", constructed of semi-rigid glass fiber and wrapped with fabric or polyethelene. Baffles shall be provided with grommets for wire suspension from the ceiling.

c. Thickness: 1" or 2".

d. Minimum Sound Absorption Characteristics:

1. 1":

	Octave Band Center Frequency in Hertz					
Absorption per Baffle, Sabins:	125	250	500	1000	2000	4000
	1.9	4.7	10.3	12.7	11.9	8.2

2. 2":

	Octave Band Center Frequency in Hertz					
Absorption per Baffle, Sabins:	125	250	500	1000	2000	4000
	2.8	6.5	12.3	15.2	15.2	11.7

e. Acceptable Products:
1. Proudfoot Baffles
2. Decoustics Baffles

f. Fabrication: Glass fiber baffle shall be encased in a fabric or polyethelene bag to produce units with visible surfaces fully covered and free from wrinkles, sags, blisters, seams, adhesive or other foreign matter. Facing material shall be a polyethelene or open weave fabric approved by the owner's acoustical consultant. No glue, backing or other stabilizers shall be permited between the covering and the glass fiber baffles.

11. AF # 5.1: Spray-Applied Cellulose Fiber Insulation

a. Application: As indicated or scheduled on the drawings.

b. Configuration: Cellulose fiber insulation shall not contain asbestos, fiberglass or other man-made mineral fibers. The insulation may be integrally colored but should not be painted after installation. The insulation may be sprayed directly over a solid substrate such as gypsum board.

c. Thickness: .5", 1" as indicated or scheduled on the drawings.

d. Minimum Sound Absorption Characteristics:

1. 0.5": NRC: 0.65

	Octave Band Center Frequency in Hertz					
Sound Absorption 125	250	500	1000	2000	4000	
Coefficient:	.08	.16	.46	.87	1.07	1.12

2. 1.0": NRC: 1.00

	Octave Band Center Frequency in Hertz					
Sound Absorption 125	250	500	1000	2000	4000	
Coefficient:	.12	.38	.88	1.16	1.15	1.00

5. Acceptable Products:

1. International Cellulose Corp. "K-13 (FC) Dura-k" Acoustical Treatment.

12. AF # 6.1: Load-Bearing, Sound-Absorbing Structural Masonry Units (Interior Use)

a. Application: As indicated or scheduled on the drawings.

b. Configuration: Masonry blocks include slotted openings to cavities. Cavities include a metal septum and glass fiber sound absorbing material.

c. Size: 8" x 8" x 16".

d. Minimum Sound Absorption Characteristics: NRC: 0.65

	Octave Band Center Frequency in Hertz					
Sound Absorption 125	250	500	1000	2000	4000	
Coefficient:	.33	.94	.62	.60	.57	.49

e. Acceptable Products: The Proudfoot Company, Inc. "SoundBlox" Type R

f. Fabrication: Blocks are fabricated at regional block plants on standard block machines using molds furnished by the manufacturer. Block cavities are slotted and provided with incombustible fibrous filler material with metal septum laminated to inside face of fibrous material. Filler material and metal septum installed in block plant according to mold

manufacturer's instructions. Blocks are approved for use in reinforced masonry construction and are allowed 90% of the shear value of standard CMU. (City of LA, Dept. of Building & AFety Research Report No. RR23609.)

13. AF # 6.2: Load-Bearing, Sound-Absorbing Structural Masonry Units (Interior or Exterior Use)

a. Application: As indicated or scheduled on the drawings.

b. Configuration: Masonry blocks include slotted openings to cavities. Cavities include a bare metal septum.

c. Size: 8" x 8" x 16".

d. Minimum Sound Absorption Characteristics: NRC: 0.50

	Octave Band Center Frequency in Hertz					
Sound Absorption 125	250	500	1000	2000	4000	
Coefficient:	.95	.57	.61	.37	.56	.55

e. Acceptable Products: The Proudfoot Company, Inc. "SoundBlox" Type Q

f. Fabrication: Blocks are regionally fabricated at block plant on standard block machines using molds furnished by the manufacturer. Block cavities are slotted and provided with bare metal septum. Metal septum installed in block plant according to mold manufacturer's instructions. Blocks are approved for use in reinforced masonry construction and are allowed 90% of the shear value of standard CMU. (City of LA, Dept. of Building & AFety Research Report No. RR23609.)

14. AF #8.0: Pre-Fabricated Ceiling Sound Reflectors

a. Application: As indicated or scheduled on the drawings.

b. Configuration: Nominal 48" x 48" Pyramidal, Trapezoidal or Convex glass fiber reinforced molded resin diffuser panels with a standard white gel-coat finish for installation into standard ceiling grid.

c. Thickness: 3/32" molded fiberglass.

d. Acceptable Products:

1. Acoustical Resources, Inc.
2. CONWED.
3. Golterman & Sabo, Inc.
4. Kinetics Noise Control, Inc.
5. Wenger Acoustical Panel System.

e. Fabrication: Provide panels in sizes and configurations as indicated on the drawings. Lay panels in ceiling grid in accordance with panel and ceiling grid manufacturer's instructions.

15. AF #8.1: Pre-Fabricated Wall Sound Reflectors

a. Application: As indicated or scheduled on the drawings.

b. Configuration: Nominal 24"x48", 36"x48", 48"x48", 36"x60" and/or 36"x72" as shown on the drawings. Convex glass fiber reinforced molded resin diffuser panels with fabric covering.

c. Thickness: 3/32" molded fiberglass.

d. Acceptable Products:

1. Acoustical Resources, Inc.
2. CONWED.
3. Golterman & Sabo, Inc.
4. Kinetics Noise Control, Inc.
5. Wenger Acoustical Panel System.

e. Fabrication: Provide panels in sizes and configurations as indicated on the drawings. Panels supplied fully assembled with mounting brackets included for installation.

E. Execution

1. Examination: Examine substrates, adjoining construction and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions have been corrected.

2. Preparation: Clean substrate to remove deleterious substance which would impaire work.

3. Installation:

a. AF #1.1: Black Glass Fiber Building Insulation: Adhere impalling pins to substrate with recommended and approved adhesive. Locate fasteners not more than 3" from each edge or corner of acoustical unit and not more than 12" on center. Locate additional fasteners in the field of each acoustical unit not more than 24" on center. Impale acoustical unit onto spindle with edges tightly butted. Install retainer friction washers or washers with spindle caps snugly to acoustical unit without over compressing the unit. Touch up locally with flat black paint to conceal spindle caps and other irregularities.

b. AF #1.2: Hardware Cloth over Black Glass Fiber Building Insulation: Apply pre-painted flat-black 2 x 2 vertical wood furring to wall surface on convenient centers. Glue 2" thick black glass fiber to wall surface between furring in accordance with manufacturer's instructions. Spray paint or touch up wood furring with flat black paint as required. Apply pre-painted hardware cloth over wood furring and glass fiber, centering hardware cloth seams along wood furring centerlines. Provide pre-painted, flat black wood trim over hardware cloth seams as detailed.

d. AF #2.1: Standard, Fabric-Covered Glass Fiber Panels: Comply with the panel manufacturer's printed instructions and the approved shop drawings. Install panels plumb and level and in alignment with adjacent panels. Joints shall be hairline and flush. Scribe to fit adjoining work accurately at borders and at penetrations.

e. AF #2.2: Tackable, Impact-Resistant, Fabric-Covered Glass Fiber Panels: Comply with the panel manufacturer's printed instructions and the approved shop drawings. Install panels plumb and level and in alignment with adjacent panels. Joints shall be hairline and flush. Scribe to fit adjoining work accurately at borders and at penetrations.

f. AF #2.3: Abuse-Resistant, Fabric-Covered Glass Fiber Panels: Comply with the panel manufacturer's printed instructions and the approved shop drawings. Install panels plumb and level and in alignment with adjacent panels. Joints shall be hairline and flush. Scribe to fit adjoining work accurately at borders and at penetrations.

g. AF #2.4: AF #2 Series Panels Furred Out over Airspace: Apply AF panels over furring using the attachment methods outlined in the AF # 2 series descriptions above.

h. AF #2.5: Scrim-Faced Glass Fiber Panels: Comply with the panel manufacturer's printed instructions and the approved shop drawings. Install panels plumb and level and in alignment with adjacent panels. Joints shall be hairline and flush. Scribe to fit adjoining work accurately at borders and at penetrations.

j. AF #2.6: Field-applied, Fabric covered Glass Fiber Wall Panels: Apply rigid plastic mounting system to surfaces receiving the acoustical treatment. Cut fabric from each roll maintaining sequence of drops and matching direction of weave for a sequential and uniform installation. Stretch fabric to a smooth finish, free of wrinkles. Weave straight and parallel to perimeter, plumb and aligned horizontally and vertically. Damages, soiled, or discolored fabric panels shall be cleaned or removed and replaced to match.

k. AF #3.0: Wood Fiber Panels: Apply metal or 1x wood furring to wall surfaces on 24" centers. Glue black glass fiber to wall surface between furring in accordance with manufacturer's instructions. Attach wood fiber panels over furring and glass fiber according to manufacturer's instructions.

l. AF #4.1: Hanging Fabric or Poly Wrapped Ceiling Baffles: Comply with the panel manufacturer's printed instructions and the approved shop drawings. Suspend baffles as configured on the architectural drawings with no more than 24" between parallel rows of baffles and 12" between baffle edges.

m. AF #5.1: Spray-Applied Cellulose Fiber Insulation: Spray-applied by factory trained applicators in thickness as scheduled or noted on drawings.

n. AF #6.1: Load-Bearing, Sound-Absorbing Structural Masonry Units, Interior: Installed by mechanics skilled in laying masonry blocks. Locate slots toward space where sound absorption is required. Keep slots free of mortar and debris above the mortar joints. Where vertical reinforcing is required utilize special right-hand and left-hand units together with standard blocks to provide space for reinforcing bars and grout.

o. AF #6.2: Load-Bearing, Sound-Absorbing Structural Masonry Units, Interior or Exterior: Same as AF #6.1 above.

p. AF #8.0: Pre-Fabricated Ceiling Sound Reflectors: Install as shown on the drawings and in accordance with panel and ceiling grid manufacturer's instructions.

q. AF #8.1: Pre-fabricated Wall Sound Reflectors: Install as shown on the drawings. Mount to wall using supplied mounting brackets in accordance with manufacturer's instructions.

- END OF SECTION -

SECTION 09900

PAINTING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Surface preparation.

B. Products and application.

C. Surface finish schedule.

1.2 SUMMARY OF PAINTED SUBSTRATES

A. Section includes the application of paint systems on the following interior substrates:

1. Primed or unprimed steel.
2. Galvanized metal.
3. Steel handrails, guardrails and fittings.
4. Steel lintels and shelf angles.
5. Intumescent fireproofing.
6. Aluminum (not anodized or otherwise coated).
7. Steel doors, frames and lights.
8. Glass frames in steel and wood doors.
9. Wood doors.
10. Access doors and frames.
11. Overhead coiling doors and frames.
12. Rolled steel windows.
13. Wood.
14. Horizontal and vertical gypsum board.
15. Plaster.
16. Spray-textured ceilings.
17. Suspended acoustic ceilings.
18. Applied acoustic ceilings.
19. Wall louvers.
20. Cotton or canvas insulation covering.
21. Mechanical equipment.
22. Electrical panel board covers.

B. Section includes the application of paint systems on the following exterior substrates:

1. Concrete.
2. Primed or unprimed steel.
3. Galvanized metal.
4. Steel handrails, guardrails, and fittings.
5. Steel roof deck.
6. Steel lintels and shelf angles.
7. Sheet metal flashing and trim.
8. Sheet metal gutters and downspouts.
9. Steel pipe downspouts.
10. Steel doors, frames and lights.
11. Glass frames in steel and wood doors.
12. Access doors and frames.
13. Overhead coiling doors and frames.
14. Wood.
15. Portland cement plaster (stucco).
16. Horizontal or vertical gypsum board or sheathing.
17. Wall louvers.
18. Mechanical roof mounted equipment.
19. Electrical panel board covers.

C. Substrate listings are for principal surfaces only. Refer to drawings, details and individual specification sections for items, surfaces, and substrates not specifically listed.

1.3 REFERENCES

A. ASTM D16 - Definitions of Terms Relating to Paint, Varnish, Lacquer, and Related Products.

B. SSPC - The Society for Protective Coatings.

1.4 SYSTEM DESCRIPTION

A. Preparation of all surfaces to receive final finish.

B. Painting and finishing work of this section using coating systems of materials including primers, sealers, fillers, and other applied materials whether used as prime, intermediate, or finish coats.

C. Surface preparation, priming, and finish coats specified in this Section are in addition to shop-priming and surface treatment specified under other Sections.

D. Painting and finishing all exterior and interior surfaces of materials including structural, mechanical, and electrical work on site, in building spaces, and above or on the roof.

E. Paint exposed surfaces except where a surface or material is specifically indicated not to be painted or is to remain natural. Where an item or surface is not specifically mentioned, paint the same as similar adjacent materials or surfaces.

1.5 DEFINITIONS

A. Conform to ASTM D16 for interpretation of terms used in this Section.

1.6 QUALITY ASSURANCE

A. Product Manufacturer: Company specializing in manufacturing quality paint and finish products with five years experience.

B. Applicator: Company specializing in commercial painting and finishing with five years documented experience.

C. Coats: The number of coats specified is the minimum number acceptable. If full coverage is not obtained with the specified number of coats, apply such additional coats as are necessary to produce the required finish.

D. Employ coats and undercoats for all types of finishes in strict accordance with the recommendations of the paint manufacturer.

E. Provide primers and undercoat paint produced by the same manufacturer as the finish coat.

F. The minimum dry film thickness of each coat of paint shall comply with the manufacturer's recommendations for each type of paint used.

1.7 REGULATORY REQUIREMENTS

A. Comply with applicable codes and regulations of governmental agencies having jurisdiction including those having jurisdiction over airborne emissions and industrial waste disposal. Where those requirements conflict with this specification, comply with the more stringent provisions.

B. Comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA).

C. Comply with South Coast Air Quality Management District (SCAQMD) Rule 1113. A copy of this regulation can be obtained from http://www.aqmd.gov/rules/reg/reg11/r1113.pdf.

D. In the South Coast Air Quality Management District (SCAQMD), where lower VOC contents are specified for a number of categories, certain products maybe covered under the manufacturer's SCAQMD - approved Averaging Program. As a result, certain products may be fully compliant with SCAQMD Rule 1113, despite having VOC contents higher than specified limits.

1.8 SUBMITTALS

A. Submit product data under provisions of Section 01330.

B. Provide manufacturer's technical information and instructions for application of each material proposed for use by catalog number.

C. List each material by catalog number and cross-reference specific coating with specified finish system.

D. Provide manufacturer's certificate that products proposed meet or exceed specified materials.

E. Submit samples under provisions of Section 01330.

F. Submit two samples 8-1/2 x 11 inch in size of each paint color and texture applied to cardboard. Resubmit samples until acceptable color, sheen and texture is obtained.

G. On same species and quality of wood to be installed, submit two 4 x 8 inch samples showing system to be used.

1.9 FIELD SAMPLES

A. Provide field samples under provisions of Section 01330.

B. On wall surfaces and other exterior and interior components, duplicate specified finishes on at least 100 sq.ft. of surface area.

C. Provide full-coat finishes until required coverage, sheen, color and texture are obtained.

D. Simulate finished lighting conditions for review of field samples.

E. After finishes are accepted, the accepted surface may remain as part of the work and will be used to evaluate subsequent coating systems applications of a similar nature.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site and store and protect under provisions of Section 01600.

B. Deliver products to site in sealed and labeled containers; inspect to verify acceptance.

C. Container labeling to include manufacturer's name, type of paint, brand name, brand code, coverage, surface preparation, drying time, cleanup, color designation, and instructions for mixing and reducing. Paint containers not displaying product identification will not be acceptable.

D. Store paint materials at minimum ambient temperature of 50 degrees F and a maximum of 90 degrees F, in well ventilated area, unless required otherwise by manufacturer's instructions.

E. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.11 ENVIRONMENTAL REQUIREMENTS

A. Provide continuous ventilation and heating facilities to maintain interior surface and ambient temperatures above 50 degrees F with a maximum humidity level of 50 percent for 24 hours before, during, and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.

B. Do not apply exterior coatings during rain or snow, or when relative humidity is above 50 percent, unless required otherwise by manufacturer's instructions.

C. Minimum Application Temperatures for Latex Paints: 50 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

D. Minimum Application Temperature for Varnish and Urethane Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions.

E. Provide lighting level of 80 foot candles measured mid-height at substrate surface.

1.12 EXTRA MATERIAL

A. Provide a five gallon unopened container of each color and surface texture to Owner.

B. Label each container with color, texture, and room locations in addition to the manufacturer's label.

2. PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - PAINT

A. Unless specifically identified otherwise, product designations included at end of section are those of the Dunn-Edwards Corporation, www.dunnedwards.com and shall serve as the standard for kind, quality, and function.

B. Subject to compliance with requirements, other manufacturers and their affiliate companies offering equivalent products are:

1. Benjamin Moore Paints, www.benjaminmoore.com.
2. Frazee Paint, www.frazeepaint.com.
3. Glidden Professional, www.gliddenprofessional.com.
4. Kelly-Moore Paint Company, www.kellymoore.com.
5. Pittsburgh Paints, www.ppg.com.
6. Sherwin Williams, www.sherwin-williams.com.
7. Tnemec Company, Inc., www.tnemec.com.
8. Vista Paint Corporation, www.vistapaint.com.

C. Substitutions: Under provisions of Section 01630.

2.2 ACCEPTABLE MANUFACTURERS - MULTICOLORED PAINT COATING

A. Bollen International, Inc., (Crafton), www.bolleninternational.com.

B. Dunn-Edwards Corporation (Multispec), www.dunnedwards.com.

C. Textured Coatings of America (Tex-Cote), www.texcote.com.

D. Trikes (Polomyx and Zolatone), www.zolatone.com.

E. Substitutions: Under provisions of Section 01630.

2.3 ACCEPTABLE MANUFACTURERS - CERAMIC EPOXY COATING

A. Tnemec Company, Inc. www.tnemec.com.

B. Vitrocem, www.vitrocem.com.

2.4 ACCEPTABLE MANUFACTURER - HEAT REFLECTIVE COATING

A. Textured Coatings of America (Tex-Cote), www.texcote.com.

2.5 MATERIALS

A. Ready mixed, except field catalyzed coatings. Process pigments to a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating.

B. Good flow and brushing properties; capable of drying or curing free of streaks or sags.

C. "Deep Tone" colors to be composed of 100 percent acrylic pigments with a colored base.

D. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.

2.6 FINISHES

A. Refer to schedule at end of Section for surface finish schedule.

3. PART 3 EXECUTION

3.1 INSPECTION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

C. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:

1.	Plaster and Gypsum Wallboard	:	12 percent.
2.	Masonry, Concrete, and Concrete Unit Masonry	:	12 percent.
3.	Interior Located Wood	:	15 percent.
4.	Exterior Located Wood	:	15 percent.

D. Beginning of installation means acceptance of existing surfaces.

3.2 SURFACE PREPARATION - GENERAL

A. Remove electrical plates, hardware, light fixture trim, and fittings prior to preparing surfaces or finishing.

B. Remove all finish hardware from doors and frames prior to preparing surfaces or finishing.

C. Correct minor defects and clean surfaces which affect work of this Section.

D. Shellac and seal marks which may bleed through surface finishes.

E. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

F. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.

G. Concrete Floors: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.

H. Gypsum Board: Repair all voids, nicks, cracks and dents with patching materials and finish flush with adjacent surface. Latex fill minor defects. Spot prime defects after repair.

I. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Pretreat with phosphoric acid etch or vinyl wash. Apply coat of etching primer the same day as pretreatment is applied.

J. Plaster: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.

K. Uncoated Steel and Iron: Remove grease, scale, dirt, and rust. Where heavy coatings of scale are evident, remove by wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint after repairs.

L. Shop Primed Steel: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime paint steel surfaces.

M. Interior Wood: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats.

N. Exterior Wood: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior caulking compound after prime coat has been applied.

O. Glue-Laminated Beams: Prior to finishing, wash surfaces with solvent, remove grease and dirt.

P. Wood Doors: Seal top and bottom edges with 2 coats of spar varnish sealer.

Q. Existing surfaces to be recoated shall be thoroughly cleaned and deglossed by sanding or other means prior to painting. Patched and bare areas shall be spot primed with same primer as specified for new work.

3.3 SURFACE PREPARATION - MODERNIZATION

A. Properly prepare all existing surfaces to receive new paint.

B. Prior to application of any new paint, existing surfaces to be cleaned free of damaged paint, dust, corrosion, and other foreign matter which will destroy bond or mar appearance of new paint.

C. Sand, scrape, fill and repair surfaces flush with suitable fillers. Patch and repair; feather edges to provide smooth transitions; match existing surfaces.

D. Remove hardware and accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not-to-be-finish painted, or provide surface-applied protection. Reinstall removed items upon completion of work in each area.

E. Existing surfaces to be painted shall be thoroughly cleaned and deglossed by sanding or other means prior to painting. Patched and bare areas shall be shall be spot primed with same primer as for new work.

F. Existing paint removal:

1. Remove loose, blistered, scaled, oxidized, cracked, alligatored, or defaced paint down to a sound surface.

2. Brush and clean free all loose material.

3. Feather edges of removal areas to provide a smooth transition between surfaces.

G. Perform preparation and cleaning procedures in strict accordance with coating manufacturer's instructions for each substrate condition.

H. Washing and Cleaning:

1. Remove all loose and foreign materials.

2. At building interiors, wash all surfaces clean with approved cleaner and rinse with clean water.

3. At building interiors, vacuum existing ceiling panels to remove all dirt and dust from the material surface. Utilize caution so as not to mar or damage the finish surface in any way.

4. Completely remove wax from surfaces which receive new paint.

I. Remove dust, grit, and foreign matter from existing wood surfaces. Sand surfaces and dust clean. Spot coat knots, pitch streaks, and sappy section with pigmented stain sealer when surfaces are to be painted. Fill nail holes, cracks, and other defects after priming and spot prime repairs when fully cured.

J. Repair and crack filling:

1. Wood: Putty cracks and holes flush at stained and or varnished work, color putty to match. Sand smooth any rough spots. Seal knots and pitch pockets.

2. Gypsum Wallboard: Fill all nail heads, screw heads, holes, cracks, or defects with drywall joint compound or spackle. Sand any rough spots smooth; do not raise nap on paper covering. Remove dust. Skim coat drywall must be sealed with a suitable sealer recommended by the coating manufacturer.

3. Plaster:

(a) Cracks exceeding 1/16 inch wide shall be V-grooved out, and then filled flush.

(b) Interior Plaster: Fill with spackle or patching plaster.

(c) Exterior Plaster: Small defects may be filled with exterior spackle. Cracks more than 1/16 inch wide shall be filled with cement grout, textured to match adjacent surfaces.

4. Concrete / Masonry: Fill as specified for exterior plaster.

K. Natural / Stain Finished Wood Doors:

1. Typically, fully strip existing natural finish clear coat, fill all dents, gouges, scrapes, etc., and finish sand to prepare surface to receive a complete new finish coat system.

2. All patching materials shall be natural wood dough tinted to match existing natural wood color.

3. Doors shall appear as new when work is finished.

L. Concrete and masonry surfaces shall be dry, clean, and free of dirt, efflorescence, encrustation, mortar spots, and other foreign matter. Glazed surfaces on concrete shall be roughened or etched to uniform texture.

M. Ferrous metal shall be cleaned of oil, grease, and foreign matter. Cleaning method: SSPC-SP No. 1 "Solvent Cleaning".

N. Ferrous Steel: Where raw metal surface is exposed, proceed s follows:

1. Cleaning method: SSPC-SP No. 2 "Hand Cleaning" or No. 3 "Power Brush Cleaning" as required to remove corrosion, loose paint, and rust.

2. Priming: Prime immediately after cleaning.

O. Galvanized Metal: Where galvanizing is exposed, proceed as follows:

1. Cleaning: Solvent clean per SSPC-SP No. 1 " Solvent Cleaning".

2. Pre-Treatment; Apply Supreme Chemical Metal Clean and Etch SC-ME01, follow manufacturer's recommendations and the following:

(a) Application: Brush apply in a thin even coat. Remove excessive solution from surface with rags, squeegee, or sponge. When using full strength, rinse surface with water.

(b) Thinning: Use water, do not reduce solution beyond 3 parts water to 1 part Supreme Chemical Metal Clean and Etch SC-ME01.

(c) Drying: Allow to dry for 10 minutes, rinse thoroughly with water and wipe dry with rags.

3. Cleaned and treated galvanized metal should be primed within 48 hours.

P. Thoroughly back paint all surfaces of exterior and interior finish lumber and millwork, including doors and window frames, trim, cabinetwork, etc., which will be concealed after installation. Back paint items to be painted with a priming coat. Use a clear sealer for back priming where transparent finish is required.

Q. Pipes, ducts, hangers, exposed steel and ironwork, and primed metal surfaces of equipment installed under mechanical and electrical work shall be cleaned prior to priming.

3.4 PROTECTION OF ADJACENT WORK

A. Protect elements surrounding the work of this Section from damage or disfiguration.

B. Repair damage to other surfaces caused by work of this Section.

C. Furnish drop cloths, shields, and protective methods to prevent spray or droppings from disfiguring other surfaces.

D. Remove empty paint containers from site.

3.5 WORK NOT TO BE PAINTED

A. Painting is not required on surfaces in concealed and inaccessible areas such as furred spaces, foundation spaces, utility tunnels, pipe spaces and duct shafts.

B. Do not paint metal surfaces such as stainless steel, chromium plate, brass, bronze, and similar finished metal surfaces.

C. Do not paint anodized aluminum or other surfaces which are specified to be factory pre-finished.

D. Do not paint sandblasted or architecturally finished concrete surfaces.

E. Do not paint prefinished acoustic materials or acoustic suspension systems.

F. Do not paint over Underwriters Laboratories, Factory Mutual or other code-required labels or identifications.

3.6 APPLICATION

A. Apply products in accordance with manufacturer's instructions.

B. Do not apply finishes to surfaces that are not dry.

C. Apply prime coat to surfaces which are to be painted or finished.

D. Apply each coat to uniform finish.

E. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.

F. Sand lightly between coats to achieve required finish.

G. Allow applied coat to dry before next coat is applied.

H. The number of coats specified is the minimum that shall be applied. Apply additional coats when undercoats, stains or other conditions show through final paint coat, until paint film is of uniform finish, color and appearance.

I. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

J. Prime back surfaces of interior and exterior woodwork with primer paint.

K. Prime back surfaces of interior woodwork scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with mineral spirits.

L. Paint mill finished door seals to match door or frame.

M. Paint primed steel glazing stops in doors to match door or frame.

N. Cloudiness, spotting, lap marks, brush marks, runs, sags, spikes and other surface imperfections will not be acceptable.

O. Where spray application is used, apply each coat of the required thickness. Do not double back to build up film thickness of two coats in one pass.

P. Where roller application is used, roll and redistribute paint to an even and fine texture. Leave no evidence of roller laps, irregularity of texture, skid marks, or other surface imperfections.

3.7 CLEANING

A. As Work proceeds, promptly remove paint where spilled, splashed, or spattered.

B. During progress of Work maintain premises free of unnecessary accumulation of tools, equipment, surplus materials, and debris.

C. Collect cotton waste, cloths, and material which may constitute a fire hazard, place in closed metal containers and remove daily from site.

3.8 PROTECTION OF COMPLETED WORK

A. Protect finished installation under provisions of Section 01600.

B. Erect barriers and post warning signs. Maintain in place until coatings are fully dry.

C. Confirm that no dust generating activities will occur following application of coatings.

3.9 PATCHING

A. After completion of painting in any one room or area, repair surfaces damaged by other trades.

B. Touch-up or re-finish as required to produce intended appearance.

3.10 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01458.

B. The Owner reserves the right to invoke the following test procedure at any time and as often as the Owner deems necessary.

C. The Owner will engage the services of an independent testing agency to sample paint material being used.

D. Samples of material delivered to the Project will be taken, identified, sealed, and certified in the presence of the Contractor.

E. The testing agency will perform appropriate quantitive materials analysis and other characteristic testing of materials as required by the Owner.

F. If test results show materials being used and their installation do not comply with specified requirements or manufacturer's recommendations, the Contractor may be directed to stop painting, remove noncomplying paint, pay for testing and repaint surfaces to acceptable condition.

3.11 COLOR SCHEDULE

A. Paint and finish colors shall be selected by the Architect from manufacturer's entire range of standard and custom color selections and special colors selected to match or compliment the colors of other materials, equipment, or components which comprise the work.

B. Access doors, registers, exposed piping, electrical conduit and mechanical/electrical panels: Generally the same color as adjacent walls.

C. Exterior and interior steel doors, frames and trim: Generally a contrasting color to adjacent walls.

D. Doors generally are all the same color, but of a contrasting color from frame and trim.

E. Exterior and interior steel fabrications: Generally a contrasting color to adjacent walls.

F. Exposed interior mechanical/ductwork: Generally a contrasting color to adjacent walls or ceiling.

G. Ceilings are generally to be painted a different color than walls.

H. Two different color schemes for painting of walls.

I. Approximately 20 percent of overall painting work will be required to be "Deep Tone" colors. This work will require one additional coat of paint beyond that as specified.

3.12 SCHEDULE - EXTERIOR SURFACES

A. Wood-Painted (Flat Acrylic)

1st coat:	EZPROO EZ Prime Premium
2nd coat:	EVSH10 Evershield
3rd coat:	EVSH10 Evershield

B. Concrete (Eggshell Acrylic)

1st coat:	EZPROO Eff-Stop Premium
2nd coat:	EVSH30 Evershield
3rd coat:	EVSH30 Evershield

C. Cement Plaster (Eggshell Acrylic)

1st coat:	ESPROO Eff-Stop Premium
2nd coat:	EVSH30 Evershield
3rd coat:	EVSH30 Evershield

D. Steel - Primed or Unprimed (Eggshell Acrylic)

1st coat:	GAPROO Galv-Alum Premium
2nd coat:	EVSH30 Evershield
3rd coat:	EVSH30 Evershield

E. Steel - Galvanized (Eggshell Acrylic)

1st coat:	Supreme Chemical Metal Clean and Etch SC-ME01
2nd coat:	GAPROO Galv-Alum Premium
3rd coat:	EVSH30 Evershield
4th coat:	EVSH30 Evershield

3.13 SCHEDULE - INTERIOR SURFACES

A. Wood - Painted (Eggshell, Acrylic)

1st coat:	UGPROO Ultra-Grip Premium
2nd coat:	SPMA30 Suprema
3rd coat:	SPMA30 Suprema

B. Wood - Painted (Semi-Gloss Acrylic)

1st coat:	UGPROO Ultra-Grip Premium
2nd coat:	SPMA50 Suprema
3rd coat:	SPMA50 Suprema

C. Wood - Transparent (Stain - Semi-Gloss Varnish)

1st coat:	V109 Stainseal - Minwax Stain
Filler coat (Open grain wood only):	Valspar Wood Filler VSP 0109
2nd coat:	Cabot W.B. Polyurethane CAB 8087-1
3rd coat:	Cabot W.B. Polyurethane CAB 8087-1
4th coat:	Cabot W.B. Polyurethane CAB 8087-1

D. Concrete Floors - Sealed (Low Sheen Epoxy Acrylic)

1st coat:	Seal Krete - Epoxy Seal
2nd coat:	Seal Krete - Epoxy Seal with Decorative Flakes
3rd coat:	Seal Krete - Clear Sealer

E. Steel - Primed or Unprimed (Eggshell, Acrylic)

1st coat:	GAPROO Galv-Alum Premium
2nd coat:	SPMA30 Suprema
3rd coat:	SPMA30 Suprema

F. Steel - Galvanized (Eggshell, Acrylic)

1st coat:	GAPROO Galv-Alum Premium
2nd coat:	SPMA30 Suprema
3rd coat:	SPMA30 Suprema

G. Gypsum Board (Eggshell Acrylic)

1st coat:	VNPROO Vinylastic Premium
2nd coat:	SPMA30 Suprema
3rd coat:	SPMA30 Suprema

H. Gypsum Board (Semi-Gloss Acrylic)

1st coat:	VNPROO Vinylastic Premium
2nd coat:	SPMA50 Suprema
3rd coat:	SPMA50 Suprema

I. Plaster (Eggshell Acrylic)

1st coat:	UGPROO Eff-Stop Premium
2nd coat:	SPMA30 Suprema
3rd coat:	SPMA30 Suprema

END OF SECTION

SECTION 10172

SOLID COLOR REINFORCED COMPOSITE TOILET COMPARTMENTS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Solid color reinforced composite toilet partitions and sight screens, floor mounted, headrail braced.

B. Hardware.

C. Attachments screws and bolts.

1.2 REFERENCES

A. ADAAG - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities.

B. 2010 CBC - California Building Code, (CCR) - California Code of Regulations, Title 24, Part 2, California State Accessibility Standards.

C. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

D. ASTM E84 - Test Method of Surface Burning Characteristics of Building Materials.

E. D2197 - Standard Test Method for Adhesion of Organic Coatings by Scrape Adhesion.

F. D2794 - Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).

G. D6578 - Standard Practice for Determination of Graffiti Resistance.

1.3 PERFORMANCE REQUIREMENTS

A. Graffiti Resistance: Five staining agents cleaned off in accordance with ASTM D6578.

B. Scratch Resistance: Maximum load value shall exceed 10 kilograms in accordance with ASTM D2197.

C. Impact Resistance: Maximum impact force value shall exceed 30 inch-lbs in accordance with ASTM D2794.

1.4 SUBMITTALS

A. Submit product data under provisions of Section 01300.

B. Submit product data for components, hardware, and accessories.

C. Submit samples under provisions of Section 01300.

D. Submit three samples 4 x 4 inch in size cut from actual panel construction, illustrating panel pattern.

E. Provide a sample of each type of hardware.

F. Submit manufacturer's installation instructions under provisions of Section 01300.

1.5 REGULATORY REQUIREMENTS

A. Conform to CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, and the ADAAG for accessibility requirements.

B. Conform to Class B flame spread rating of 26-75 and smoke developed ratings of 0/450 for panel materials when tested in accordance with ASTM E84.

1.6 COORDINATION

A. Coordinate work under provisions of Section 01039.

B. Coordinate work with support framing, anchors, and blocking.

C. Coordinate work with placement of plumbing fixtures and floor drains.

D. Coordinate work with placement of electrical fixtures and equipment.

E. Coordinate work with toilet accessories.

1.7 WARRANTY

A. Provide 10-year warranty under provisions of Section 01700.

B. Warranty to provide for replacement of solid color reinforced composite panels, doors and stiles for breakage, corrosion and delamination.

C. Furnish one-year warranty for defects in material and workmanship for stainless steel door hardware and mounting brackets.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Bobrick Washroom Equipment, Inc., Sierra Series with Institutional hardware, www.bobrick.com.

B. Substitutions: No known substitute.

2.2 MATERIALS

A. Material composed of dyes, organic fibrous material, and polycarbonate/phenolic resins with a non-ghosting, graffiti resistant surface integrally bonded to core.

B. Stainless Steel: ASTM A167, Type 304.

2.3 ACCESSORIES

A. Pilaster Shoe: ASTM A167, Type 304 stainless steel, with adjustable screw jack.

B. Headrail and Bracing: 1 x 1-5/8 inch anodized extruded aluminum; with anti-grip configuration; with stainless steel wall brackets.

C. Attachments, Screws, Bolts, and Nuts: Pin-in-head Torx stainless steel fasteners set in threaded brass inserts, factory installed for door hinge and latch connections, capable of withstanding a direct pull force exceeding 1,500 pounds per fastener.

D. Through Bolts and Nuts: Pin-in-head Torx stainless steel sex bolt fasteners factory installed for latch keeper to stile connections capable of withstanding direct pull force exceeding 1,500 pounds per fastener.

2.4 HARDWARE

A. Hinges: Full height continuous hinges of 0.0625 inch thick stainless steel. Spring-loaded and self-closing.

B. Latch and Keeper, Standard Doors: 0.0781 inch thick stainless steel combination slide latch and bumper.

C. Latch and Keeper, Accessible Stall Door: 14-gage stainless steel combination slide and bumper door latch requiring less than five pound force to operate. Twisting latch operation not acceptable.

D. Door Stop: Vinyl coated 0.125 inch thick stainless steel door stop with rubber bumpers.

E. Coat Hook: 0.1094 inch thick stainless steel coat hook.

F. Door Pull: Stainless steel "U" shaped door pull.

G. Panel Brackets: Full length "U" shaped brackets of 0.050 inch thick stainless steel.

H. Leveling Device: 3/16 inch thick hot rolled steel bar; chromate-treated and zinc-plated.

2.5 FABRICATION

A. Doors and Panels:

1. Door Thickness: 3/4 inch.

2. Panel Thickness: 1/2 inch.

3. Door Width: 24 inch.

4. Door Width for Accessible Use: 36 inch.

5. Panel Height: 58 inch.

6. Panel Height from Floor: 12 inch.

B. Pilasters: 3/4 inch thick, constructed same as doors, of sizes required to suit cubicle width and spacing.

C. Furnish units with cutouts and drilled holes to receive partition mounted hardware, accessories, and grab bars as indicated.

2.6 FINISHES

A. Solid Color Reinforced Composite: Color to be selected by Architect from standard colors. Edges to match color of panel.

B. Stainless Steel Surfaces: No. 4 finish.

C. Aluminum: Clear anodized.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that openings are ready to receive work.

B. Verify field measurements are as shown on shop drawings.

C. Verify correct location of built-in framing, anchorage, bracing, blocking, electrical, and plumbing fixtures.

D. Beginning of installation means installer accepts existing conditions.

3.2 ERECTION

A. Erect in accordance with manufacturer's instructions.

B. Install partition components secure, plumb and level.

C. Attach panel brackets securely to walls and floors using appropriate anchor devices.

D. Attach panels and pilasters to brackets with through bolts and nuts. Locate headrail joints at pilaster center line.

E. Set all floor anchors and pilaster shoes firmly in mastic.

F. Provide additional headrail cross bracing at end compartments and accessible stalls to form rigid assembly.

G. Provide 1/2 inch space between wall surface and panels or pilasters.

H. Provide for adjustment of floor variations with screw jack through steel saddles integral with pilaster. Conceal floor fastenings with pilaster shoes.

I. Equip each toilet stall door with hinge, door latch and pull.

J. Factory install threaded brass inserts for hinge attachments.

K. Equip each accessible toilet stall door with two pulls, one each side of door. Mount at 3'-4" from floor line to center of pull.

L. Thru bolt door strike keeper on each pilaster in alignment with door latch.

M. Equip each accessible toilet stall door with coat hook and bumper. Mount at 4'-0" from floor line to top of hook. Center coat hook and bumper on interior face of door.

N. Equip each standard toilet stall door with one coat hook and bumper. Mount on interior of door at 6 inches from top of the door to top of hook and 6 inches to hook centerline from strike side of door.

3.3 ERECTION TOLERANCES

A. Maximum Variation from Plumb or Level: 1/8 inch.

B. Maximum Misplacement from Intended Position: 1/8 inch.

3.4 ADJUSTING

A. Adjust work under provisions of Section 01700.

B. Adjust and align door hardware to uniform clearance at vertical edges of doors. Clearance space not to exceed 3/16 inch.

C. Adjust door hinges so that free movement is attained and will locate in-swinging doors in partial open position when unlatched and will return out-swinging doors to closed position.

3.5 CLEANING

A. Clean work under provisions of Section 01700.

B. Remove protective coverings.

C. Clean surfaces and hardware.

3.6 PROTECTION OF FINISHED WORK

A. Protect finished installation under provisions of Section 01600.

B. Field touch-up of finished surfaces will not be permitted.

C. Replace damaged or scratched materials with new materials.

END OF SECTION

SECTION 10400

IDENTIFYING DEVICES

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Plastic/acrylic signs.

B. Metal signs.

C. Letters and numbers.

D. Cast metal plaques.

E. Fire wall barrier identification signs.

F. Precast Concrete Monument Sign.

1.2 REFERENCES

A. 2010 CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2.

B. 2010 Americans with Disability Act (ADA) Standards for Accessible Design.

1.3 SUBMITTALS

A. Submit shop drawings under provisions of Section 01330.

B. Submit shop drawings listing sign styles, lettering and locations, spacing and installation method.

C. Submit samples under provisions of Section 01330.

D. Submit two samples illustrating full size sample sign, of type, style and color specified including method of attachment.

E. Submit manufacturer's installation instructions under provisions of Section 01330.

F. Include installation templates.

1.4 REGULATORY REQUIREMENTS

A. Conform to CBC - California Building Code, (CCR), Title 24, Part 2 and the 2010 Americans with Disability Act (ADA) Standards for Accessible Design for accessibility requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and protect products to site under provisions of Section 01600.

B. Package signs, labeled in name groups.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acrylic Signs:

1. Architectural Sign Identity, www.architecturalsignidentity.com.
2. ASI - Modulex, www.asisignage.com.
3. Best Manufacturing, www.bestsigns.com.
4. Bravo Sign and Design, www.bravosign.com.
5. CA Signs, www.casigns.com.
6. Mohawk Sign Systems, www.mohawksign.com.
7. Neiman and Company, www.neimanandco.com.
8. Signs and Lucite Products, Inc., www.signscalifornia.com.
9. Southwell Company, www.southwellco.com.
10. Vomar Products, Inc., www.vomarproducts.com.
11. Substitutions: Under provisions of Section 01630.

B. Letters and Numbers:

1. ARK Ramos, www.arkramos.com.
2. ASI - Modulex, www.asimodulex.com.
3. Bravo Sign and Design, www.bravosign.com.
4. Matthews, www.matthewssigns.com.
5. Metal Arts, Inc., www.metalartslettersandplaques.com.
6. Nelson-Harkins Ind., www.nelson-harkins.com.
7. Neiman and Company, www.neimanandco.com.
8. Signs and Lucite Products, Inc., www.signscalifornia.com.
9. Southwell Company, www.southwellco.com.
10. Vomar Products, Inc., www.vomarproducts.com.
11. Substitutions: Under provisions of Section 01630.

C. Cast Metal Plaques:

1. ARK Ramos, www.arkramos.com.
2. Bravo Sign and Design, www.bravosign.com.
3. Matthews, www.matthewsbronze.net.
4. Metal Arts, Inc., www.metalartslettersandplaques.com.

5. Metallic Arts, Inc., www.metallicarts.com.

6. Signs and Lucite Products, Inc., www.signscalifornia.com.

7. Southwell Company, www.southwellco.com.

8. Substitutions: Under provisions of Section 01630.

D. Metal and Traffic Signs:

1. Four S Company, (877) 597-1288. No URL available.

2. Signs and Lucite Products, Inc., www.signscalifornia.com.

3. Traffic Control Service Inc., www.trafficmanagement.com.

4. Substitutions: Under provisions of Section 01630.

E. Fire Wall Barrier Identification Sign:

1. Fire Wall Signs, Inc. www.firewallsigns.com.

2. Substitutions: Under provisions of Section 01630.

2.2 MANUFACTURED UNITS

A. Exterior Wall Graphics: [_____

_____

_____]

B. Interior Signs: [_____

_____

_____]

C. Interior Wall Graphics: [_____

_____

_____]

D. Room Control Signage: ASI In-Touch or equal with 1/32 inch raised letters with integral California round top contracted Grade 2 braille dots 1/10 inch on center with 2/10 inch between cells and raised a minimum of 1/40 inch. Material shall be 1/8 inch thick photopolymer and acrylic plates of length required with 1 inch high optima lettering; mechanical mounting with copy centered on plate. Provide one sign for each door shown on the drawings. Allow for twelve letters and three numerals for each sign. Signage to be in compliance with the requirements of Article 703 of the 2010 ADA Standards for Accessible Design and CBC, California Building Code (CCR), Title 24, Part 2, Section 1117B.5.

E. Tactile Exit Signage: ASI In-Touch or equal with 1/32 inch raised border and letters with integral California round top contracted Grade 2 braille dots 1/10 inch on center with 2/10 inch between cells and raised a minimum of 1/40 inch. Material shall be 1/8 inch thick photopolymer and acrylic plates of length required with 1 inch high optima lettering; mechanical mounting with copy centered on plate. Provide signs at locations shown on the drawings. Signage to be in compliance with the requirements of Article 703 of the 2010 ADA Standards for Accessible Design and CBC, California Building Code (CCR), Title 24, Part 2, Section 2.8.6.1 and 1117B.5.

F. Pictorial Symbol Signage: Mohawk Sign Systems, Series 200A, with 1/32 inch raised border and letters with integral California round top contracted Grade 2 braille dots 1/10 inch on center with 2/10 inch between cells and raised a minimum of 1/ 40 inch. Material shall be 1/8 inch thick photopolymer and acrylic plates of size indicated with lettering and symbols as indicated; mechanical mounting with copy centered on plate. Provide sign in locations shown on the drawings. Signage to be in compliance with the requirements of Article 703 of the 2010 ADA Standards for Accessible Design and CBC, California Building Code (CCR), Title 24, Part 2, Section 1117B.5.

G. Entrance and Restroom Signage:

1. Restroom Doors: Acrylic plastic signs equivalent to that as detailed on the drawings; 12 inch circle and triangle with international symbol of accessibility in accordance with CBC, California Building Code, (CCR), Title 24, Part 2, Section 1115B.6 and 1117B.5.7.

2. Building Entrance: Equivalent to 5 inch square, reflective plastic accessible sign in accordance with CBC, California Building Code (CCR), Title 24, Part 2, Section 1127B.3.

H. Exterior Directional Signage: 0.080 inch thick aluminum sheet sign of size indicated. Paint with reflectorized paint. Graphics and text to be as indicated. Mount sign to wall with four countersunk vandal resistant screws or on free standing 2-inch diameter standard weight galvanized steel pipe post as indicated. Signs shall be in conformance with CBC, California Building Code (CCR), Title 24, Part 2, Section 1117B.5.1.2 Directional and Informational Signs.

I. Accessible Gate Signage: 0.080 inch thick aluminum sheet sign of size indicated. Paint with reflectorized paint. Graphics and text to be as indicated. Attach sign to adjacent fence with 12 gage wire ties at each corner. Mount sign at 5'-0" from grade to center of sign. Sign shall be in conformance with CBC, California Building Code (CCR), Title 24, Part 2, Section 1133B.2.3.4.

J. Fire Wall Barrier Identification Sign: 11 x 15 inch adhesive backed vinyl sign with minimum 1/2 inch high letters identifying wall as a fire and or smoke barrier; listing hourly rating of fire wall; with specific language stating that all openings in wall are to be protected. Sign shall be in conformance with CBC, California Building Code (CCR), Title 24, Part 2, Section 703.7.

K. Traffic Signage:

1. Van Parking Stall: 12 inch x 18 inch 0.080 inch thick aluminum accessible sign in accordance with CBC, California Building Code, (CCR), Title 24, Part 2, Section 1129B.4 with separate 12 inch wide x 4 inch high sign with "Van-Accessible" wording and additional language below symbol of accessiblity shall state "Minimum Fine $250.00." Mount on 2 inch diameter standard weight galvanized steel pipe post.

2. Auto Parking Stall: 12 inch x 18 inch 0.080 inch thick aluminum accessible sign in accordance with CBC, California Building Code, (CCR), Title 24, Part 2, Section 1129B.4. Mount on 2 inch diameter standard weight galvanized steel pipe post with additional language below symbol of accessiblity that states "Minimum Fine $250.00."

3. Drive Approach: 18 inch x 24 inch 0.080 inch thick aluminum tow-away sign with local address and police phone number in accordance with CBC, California Building Code, (CCR), Title 24, Part 2, Section 1129B.5. Mount on 2 inch diameter standard weight galvanized steel pipe post.

4. Passenger Loading Zone: 12 inch x 18 inch 0.080 inch thick aluminum accessible sign in accordance with CBC, California Building Code, (CCR), Title 24 Part 2, Section 1131B.2. Mount on 2 inch diameter standard weight galvanized steel pipe post.

L. Occupant Load Signage:

1. Provide maximum occupant load signs where indicated on drawings. Locate near main exit of space.

2. Material: 1/8 inch thick photopolymer and acrylic plates of size indicated with 3/4 and 1/2 inch high optima lettering: mechanical mounting with copy centered on plate.

3. Signage to conform to the requirements of the CBC, California Building Code, (CCR), California Code of Regulations, Title 24, Part 2, Section 1004.3.

M. Accessories: Provide all anchors, adhesives, and accessories for a complete installation.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are ready to receive work.

B. Beginning of installation means installer accepts existing surfaces.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install true, plumb, level and adequately secured to substrate.

C. Install fire wall barrier identification signs on fire walls in accessible concealed floor, floor-ceiling or attic space above accessible ceilings at intervals not exceeding a 30'-0" horizontal spacing.

D. Clean and polish.

END OF SECTION

SECTION 10520

FIRE PROTECTION SPECIALTIES

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fire extinguishers.

B. Non-rated cabinets.

C. Accessories.

1.2 REFERENCES

A. ASTM E814 - Fire Tests of Through-Penetration Fire Stops.

B. NFPA 10 - Portable Fire Extinguishers.

C. CFC - California Fire Code, (CCR) California Code of Regulations, Title 24, Part 9.

D. Title 19, State Fire Marshal Regulations.

1.3 QUALITY ASSURANCE

A. Conform to NFPA 10 requirements.

1.4 REGULATORY REQUIREMENTS

A. Conform to requirements of the CFC, Section 906, and Title 19 - State Fire Marshal Regulations, Chapter 3.

1.5 SUBMITTALS

A. Submit product data under provisions of Section 01330.

B. Include physical dimensions, operational features, color and finish, mounting and anchorage details, rough-in measurements, location, and details.

C. Submit manufacturer's installation instructions under provisions of Section 01330.

1.6 OPERATION AND MAINTENANCE DATA

A. Submit manufacturer's operation and maintenance data under provisions of Section 01770.

B. Include test, refill or recharge schedules, procedures, and re-certification requirements.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Do not install extinguishers when ambient temperatures may cause freezing.

2. PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Amerex Corporation, www.amerex-fire.com.

B. J. L. Industries, www.jlindustries.com.

C. Larsen's Mfg. Co., www.larsensmfg.com.

D. Potter-Roemer, Inc., www.potterroemer.com.

E. Substitutions: Under provisions of Section 01630.

2.2 EXTINGUISHERS

A. Dry Chemical Type: Equivalent to J.L. Industries Cosmic Model 10E, UL 4A:80B:C nominal capacity with multi-purpose chemical agent and inert material in enameled-steel container, with pressure-indicating gage.

2.3 CABINETS

A. Non-rated cabinets equivalent to J.L. Industries Model No. 2035s21 with stainless doors.

2.4 FABRICATION

A. Form body of cabinet with tight inside corners and seams.

B. Fabricate body of fire rated cabinet of double wall construction filled with a 5/8 inch thick layer of protective fire barrier insulation.

C. Predrill holes for anchorage.

D. Form perimeter trim by welding, filling, and grinding smooth.

E. Hinge doors for 180 degree opening with continuous piano hinge. Provide nylon catch with pull handle.

2.5 ACCESSORIES

A. Steel Cable Theft Device: Model STI 6200 as manufactured by STI Inc., www.sti-usa.com.

2.6 FINISHES

A. Extinguisher: Red enamel.

B. Cabinet Trim and Door: Type 304 stainless steel with No. 4 finish.

3. PART 3 EXECUTION

3.1 INSPECTION

A. Verify rough openings for cabinet are correctly sized and located.

B. Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION

A. Install cabinets plumb and level in wall openings.

B. Secure rigidly in place in accordance with manufacturer's instructions.

C. Install fire rated cabinets in strict conformance with manufacturer's instructions and listing requirements of Warnock-Hersey.

D. Attach steel cable theft device to each extinguisher. Locate inside cabinet.

3.3 SCHEDULE

Room	Name	Size	Quantity
101	Platform	10 lb	1
102	Seating	10 lb	2
103	Control Room	10 lb	1
107	Storage	10 lb	1
108	Mechanical	10 lb	1

END OF SECTION

SECTION 10810

TOILET ACCESSORIES

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Toilet and washroom accessories.

B. Framed mirror units.

C. Concealed anchor devices and backing plate reinforcements furnished to other Sections.

D. Attachment hardware.

1.2 REFERENCES

A. 2010 Americans with Disability Act (ADA) Standards for Accessible Design..

B. 2010 CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, California State Accessibility Standards.

C. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars and Strips.

D. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.

E. ASTM A366 - Steel, Carbon, Cold-Rolled Sheet, Commercial Quality.

F. ASTM A386 - Zinc Coating (Hot-Dip) on Assembled Steel Products.

G. ASTM B456 - Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.

H. ASTM A269 - Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

1.3 SUBMITTALS

A. Submit product data under provisions of Section 01330.

B. Provide product data on accessories describing size, finish, details of function, attachment methods.

C. Submit manufacturer's installation instructions under provisions of Section 01330.

1.4 KEYING

A. Supply two keys for each accessory to Owner.

B. Master key all accessories.

1.5 REGULATORY REQUIREMENTS

A. Conform to CBC, California Building Code, (CCR) Title 24, Part 2, and the 2010 Americans with Disability Act (ADA) Standards for Accessible Design for accessibility requirements.

B. Structural strength of grab bars, shower seats, fasteners and mounting devices shall conform to requirements of the CBC, California Building Code, (CCR) Title 24, Part 2, Section 11B-609, 11B-610 and shall withstand the application of a 250 lb. point load.

1.6 COORDINATION

A. Coordinate the work of this Section under provisions of Section 01310.

B. Coordinate the work of this Section with the placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Bobrick Washroom Equipment, Inc., www.bobrick.com.

B. American Specialties, Inc. (ASI), www.americanspecialties.com.

C. Bradley Corporation, www.bradleycorp.com.

D. Substitutions: Under provisions of Section 01630.

2.2 MATERIALS

A. Sheet Steel: ASTM A366.

B. Stainless Steel Sheet: ASTM A167, Type 304.

C. Tubing: ASTM A269, stainless steel, Type 304.

2.3 ACCESSORIES

A. Adhesive: Two component epoxy type waterproof.

B. Fasteners, Screws, and Bolts: Hot dip galvanized, tamperproof.

C. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

D. Existing Grab Bar Wall Anchor: Wingit Model GBW40, www.wingits.com. Fastener capable of withstanding an applied load of 250 lbs.

2.4 FABRICATION

A. Weld and grind smooth joints of fabricated components.

B. Form exposed surfaces from single sheet of stock, free of joints.

C. Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.

D. Back paint components where contact is made with building finishes to prevent electrolysis.

E. Shop assemble components and package complete with anchors and fittings.

F. Provide steel anchor plates, adapters, and anchor components for installation.

G. Hot dip galvanize exposed and painted ferrous metal and fastening devices.

H. Toilet tissue dispensers located in accessible toilet rooms or stalls shall not have their flow restricted and shall be capable of continuous flow.

2.5 FACTORY FINISHING

A. Galvanizing: ASTM A123 to 1.25 oz/sq yd.

B. Shop Primed Ferrous Metals: Pretreat and clean, spray apply one coat primer and bake.

C. Enamel: Pretreat to clean condition, apply one coat primer and minimum two coats electrostatic baked enamel.

D. Chrome/Nickel Plating: ASTM B456, Type SC 2 satin finish.

E. Stainless Steel: No. 4 satin luster finish.

F. Mirror Glass: FS DD-G-451 Type I, Class 1, Quality of 2, 1/4 inch thick with silver coating, copper protective coating and non metallic paint coating complying with FS DD-M-411.

G. Stainless Steel Mirror: Type 430, 20 gage, bright annealed stainless steel.

3. PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that site conditions are ready to receive work and dimensions are as instructed by the manufacturer.

B. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

A. Deliver inserts and rough-in frames to site at appropriate time for building-in.

B. Provide templates and rough-in measurements as required.

C. Verify exact location of accessories for installation.

3.3 INSTALLATION

A. Install fixtures, accessories and items in accordance with manufacturers' instructions.

B. Install plumb and level, securely and rigidly anchored to substrate.

C. Accessories required to be accessible shall be mounted at heights according to CBC Section 11B-603.5 and as indicated on the drawings.

D. Toilet paper dispensers and feminine napkin dispensers located on the grab bar side of an accessible toilet room or stall shall not project more than 3 inches from the finished surface of the wall nor be located closer than 1-1/2 inches clear of the tangent point of the grab bar.

3.4 SCHEDULE

A. Model numbers refer to Bobrick items.

END OF SECTION

SECTION 11005

MISCELLANEOUS EQUIPMENT

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Projection screen.

B. Clock.

C. Owner furnished Contractor install theater seats.

1.2 REFERENCES

A. ADAAG - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities.

B. 2010 CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2.

1.3 SUBMITTALS

A. Submit product data and manufacturer's installation instructions for each item under provisions of Section 01330.

1.4 REGULATORY REQUIREMENTS

A. Conform to CBC, California Building Code, (CCR), Title 24, Part 2 and ADAAG for accessibility.

1.5 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data under provisions of Section 01770.

2. PART 2 PRODUCTS

2.1 PRODUCTS

A. Electric Projection Screen: Draper Inc., Model No. 101181, NSTC Format, 150" diagonal, matte white surface material, ceiling suspended, with 110v motor.

B. Clock: _____

C. Substitutions: Under provisions of Section 01630.

3. PART 3 EXECUTION

3.1 INSTALLATION

A. Install equipment in accordance with manufacturer's printed instructions and as indicated on the drawings.

B. Furnish all necessary hardware, anchors, inserts, connections, and embedded items necessary for proper installation. Coordinate with work of other sections.

END OF SECTION

SECTION 11064

STAGE CURTAINS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Main stage curtain.

B. Cyclorama.

C. Tracks.

D. Necessary mounting brackets, rigging, accessories, fittings, and fastenings.

1.2 SUBMITTALS

A. Submit product data under provisions of Section 01330.

B. Submit manufacturer's standard color samples of selection under provisions of Section 01330.

C. Submit manufacturer's installation instructions under provisions of Section 01330.

1.3 QUALIFICATIONS

A. Manufacturer: Company specializing in the manufacture of products specified in this Section with minimum of ten years documented experience.

B. Installer: Company specializing in applying the work of this Section with minimum five years documented experience, approved by manufacturer.

1.4 REGULATORY REQUIREMENTS

A. Flame Resistance: Certify stage curtains to be flame resistant per NFPA 701.

B. Permanently attach label to each curtain indicating that unit is inherently and permanently flame resistant (immersion method), or whether it will require retreatment after dry cleaning.

2. PART 2 PRODUCTS

2.1 CURTAIN TRACKS

A. Drapery tracks and required related components: Tru-Roll No. 2300 Medium Duty Curtain Track System, www.truroll.com, or equivalent track manufactured by Automatic Devices Company, www.automaticdevices.com.

2.2 CURTAIN FABRICS

A. Main Curtain: No. 202 Bolero Boucle or Nevada Doral Opaque, 13.5 oz/ln yd, with black vinyl backing, manufactured by Frankel and Associates, (800) 221-4670, www.fabricsbyfrankel.com. Color as selected from manufacturer's entire range of selections.

B. Valance: Same material as main curtain. Color to match main curtain.

C. Cyclorama: Lightweight woven cotton velour, Style No. 13253 Roussillon , 15 oz/lin yd, manufactured by J. B. Martin, (800) 223-0525, www.jbmartin.com. Color as selected.

D. Main Curtain and Cyclorama Bags. Heavy duty black cordura plus fabric with dual side zipper.

E. Substitutions: Under provisions of Section 01630.

2.3 CURTAIN FABRICATION

A. Curtains: Provide not less than 50 percent additional fullness for main curtain and valance only. Horizontal seams and fabric less than half-width not acceptable.

1. Seams: Make seams vertical, material being fed straight to machine, equally lapped and stretched, and finished free of wrinkles or sag. Clip selvage edges and finish curtains square and true. Horizontal seams not acceptable. Minimum seams shall be 6 inches end hem, and 6 inches bottom hem on all curtains.

2. Hems: Hang all curtains on scenery frames for at least 24 hours before hemming. Minimum hems: top, 3-1/2 inch wide; 6 inch wide for end and bottom. All bottom hems shall contain No. 8 jack chain weight in permanently flameproofed canvas tube secured within hem.

3. Webbing: 3-1/2 inch, 9 lb. jute sewn at top of each drapery, triple stitched at both sides of webbing for length of drapery piece. Finish with 1-1/4 inch binding tape folded in half and lockstitched.

4. Turnbacks: Provide turnbacks formed by folding 18 inches of material back at end of panel, and securing by sewing across top hem only, and grommeting through both layers of material. Do not sew turnbacks vertically.

5. Grommets: Brass, No. 3, centered on each box pleat and 1 inch from corner of curtain, for snaps or S-hooks. Black finish for black curtains.

6. Lining: For each curtain in same fullness as face fabric, finished 2 inches shorter than face fabric. Attach lining to face fabric along bottom and side seams with 4 inch long strips of heavy cotton tape.

7. Overlap: Maintain two foot overlap of main curtain behind proscenium wall at each end and at center.

3. PART 3 EXECUTION

3.1 INSTALLATION - GENERAL

A. Install stage-curtain system according to track manufacturer's and curtain fabricator's written instructions.

B. Curtain Installation:

1. Hang all curtains over 10 ft. in height on scenic frames for 24 hours prior to insertion of hems, to avoid improper stretching.

2. Secure curtains to track carriers with manufacturer's heavy-duty S-hooks.

C. Track Installation:

1. Install curtain tracks at locations shown on drawings, in accordance with manufacturer's recommendations.

2. Install level, plumb, secure, and at the specified height. Coordinate with other trades as required.

3. Drill track at maximum 4'-0" spacing and fasten directly to structure.

4. Install track for main curtain with not less than 24 inch overlap of track sections at center.

5. Provide protection for installed units so as to be in perfect operating condition without damage or blemishes or indication of use upon completion of construction.

6. Repair or replace damaged units as directed by the Architect.

3.2 INSTALLATION TOLERANCES

A. Provide all trim chains to allow two additional wraps at suspension, to allow for future trim changes.

B. For curtains intended to reach stage floor, curtain heights shall trim a maximum of 1 inch off above stage finish floor.

END OF SECTION

SECTION 15400

PLUMBING

1. PART 1 - GENERAL

1.1 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing work as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.2 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:

1. C.C.R., Title 24, Part 5 (2010 CPC).
2. 2010 California Plumbing Code.
3. SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
4. National Fire Protection Association.
5. California Division of the State Architect.
6. California State Division of Industrial Safety.
7. County Health Department.
8. Any other legally constituted body-having jurisdiction thereof.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the Owner's representative.

1.3 DRAWINGS

A. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings and the work of other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his approval. Only when Architect's approval is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications or between the specifications and the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.4 PERMITS, INSPECTIONS AND LICENSES

A. All permits, inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.5 UTILITIES

A. See Drawings for Points of Connection.

B. Certain site utilities are to be connected to and extended. Before laying of any pipe or digging of any trenches, Contractor shall determine by actual excavation and measurement exact location and depth of lines to which he is to connect. In event depth of lines is not sufficient to permit connection in manner indicated, Contractor shall obtain direction from the Owner's representative before proceeding with this work.

C. Verify that utility companies size their services and meters to suit ultimate demand indicated on the drawings.

D. Storm Drain: The Contractor shall be responsible for the storm drain service outside of the building within five feet (5') of the foundation, and within the building itself. See Civil Engineer's plans for onsite storm drain system.

1.6 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.7 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.8 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

C. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.

1.9 SUBMITTAL DATA (Also see General Conditions)

A. Submittal Requirements:

1. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules.

2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.

3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.

4. To be valid, all submittals must:

   a. Be delivered to the Architect's office within thirty-five (35) days of award of the contract. Contractor shall make time allowance for Engineer's review, return of comments, if any, and resubmittal if required. Corrections or changes in submittals returned as inadequate or incomplete shall be accomplished within this time limit.

   b. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.

   c. Include all pertinent construction, installation, performance and technical data.

   d. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.

      i. Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.

      ii. Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.

   e. Include, for every item which differs in size, configuration, connections, service, accessibility or any other significant way, a drawing to the same (or larger) scale as to the pertinent portions of the contract drawings. In this drawing show a complete layout of the system except that which is identical to the contract drawings, unless the unchanged portions must be shown to indicate such things as clearances. This drawing, together with the contract design drawings must show the complete system as revised to accommodate the proposed alternate.

B. Substitution Requirements:

1. Any items included in submittals and proposed by the Contractor as substitution for that specified or shown on plans shall be submitted within thirty five (35) days of award of the contract. After such time, proposed substitutions shall not be accepted for review, and the Contractor shall submit all items as specified or shown on plans.

   a. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for the specified item shall be placed side by side with product data sheets for the proposed substitution item within the submittal.

      i. In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".

   b. Provide calculations and other detailed data justifying how any items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.

3. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.

4. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.

5. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

6. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials. Decisions of the Architect or that of his representative shall be final and conclusive.

1.10 UNINSPECTED WORK

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.11 RECORD DRAWINGS (Also see General Conditions)

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.12 GUARANTEES (Also see General Conditions)

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship for not less than one (1) year. See specific equipment specifications for extended warranty requirements.

2. PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT (See Schedules on Drawings)

A. General: All materials, as specified or required in the work, shall be new, free from defects and imperfections. All manufactured shall comply with California Assembly Bill 1953.

B. Pipe and Fittings:

1. Soil and Waste Piping:

   a. Soil and waste piping within the building itself and outside within five feet (5') of the foundation, shall be no-hub cast iron pipe and fittings, asphaltum coated, free from defects, and shall comply with CISPI. Standard 301, ASTM A-888 or ASTM A-74. Pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute. Fittings shall be made up with "Husky" SD 4000 series or "Clamp All" HI-TORQ 125 series stainless steel type 304 couplings and shall conform to ASTM C1540 & ASTM C564 except all above ground vent pipe fittings may be made with "Anaco" or "Tyler" stainless steel two band couplings conforming to CISPI Standard 310.

2. Vent Piping:

   a. Concealed or underground vent piping shall be cast iron pipe and fittings as specified for soil and waste piping.

   b. Exposed vent piping shall be Schedule 40 galvanized steel pipe, ASTM A53, with black cast iron recessed drainage fittings.

      i. All vents through roof shall terminate with vandal proof caps (Refer to "Roof Flashing" herein).

3. Domestic Water Piping:

   a. Piping within the building and above grade shall be Type "L" ASTM B88, hard drawn copper tubing with wrought copper sweat fittings ANSI B16.18 and B16.22, or mechanically formed tee connections as described herein.

   b. Outdoor underground piping in sizes 2-1/2" and 3" shall be Type "L" ASTM B88, hard drawn copper as specified for water piping within the building. Piping 2" and smaller shall be Type "K" ASTM B88, hard drawn copper with wrought copper sweat fittings ANSI B16.18 and B16.22.

   c. Piping below the building floor shall be Type "K" soft annealed copper tubing with no fittings below the slab.

4. Storm Drain Piping:

   a. Concealed storm drain piping within the building itself and outside within five feet (5') of the foundation, shall be no-hub cast iron pipe and fittings, asphaltum coated, free from defects, and shall comply with CISPI. Standard 301, ASTM A-888 or ASTM A-74. Pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute. Fittings shall be made up with "Husky" SD 4000 series or "Clamp All" HI-TORQ 125 series stainless steel type 304 couplings and shall conform to ASTM C 1540 & ASTM C564.

5. Air Conditioning Condensate Drain Piping.

   a. Shall be Type "M" copper as specified for water piping.

6. Unions or flanges shall be furnished and installed at each threaded connection to all equipment or valves. The unions or flanges shall be located so that the piping can be easily disconnected for removal of the equipment, tank, or valve, and shall be of the type specified in the following schedule.

   a. Unions:

      i. Black Steel Pipe: 250 pound screwed black malleable iron, ground joint, brass to iron seat.

      ii. Galvanized Steel Pipe: 250 pound screwed galvanized malleable iron, ground joint, brass to iron seat.

      iii. Copper or Brass Tubing: 150 pound cast bronze or copper, ground joint, nonferrous seat with ends, by Walseal, Nibco or Mueller.

   b. Flanges: Tube Turn or approved equal, raised face 150 pound class forged steel, weld, neck or slip-on type conforming to ASA B16.5 and ASTM A181. For copper piping systems, provide flanges conforming to ANSI B16.24. The faces of the flanges being connected to be alike in all cases. Locate flanges so that the piping can be easily disconnected for removal of the

equipment or valve. Gasket material shall be of material suiting the service of the opening system in which installed and which conforms to its respective ANSI Standard (A21.11. B16.21). Provide materials that will not be detrimentally affected by the chemical and thermal conditions of the fluid being carried.

C. Valves:

1. General:

a. Piping systems shall be supplied with valves arranged so as to give complete and regulating control of each building and piping systems throughout the building, and located so all parts are easily accessible and maintained.

i. Valve Design: Rising stem or outside screw and yoke stems. Non-rising stem valves may be used where space conditions prevent full extension of rising stems.

ii. Sizes: Same size as upstream pipe, unless otherwise indicated.

iii. Operators:

1. Hand wheels fastened to valve stem for all valves other than quarter turn.

2. Lever handles on quarter-turn valves, 6 inch and 8 inch and larger gear operated, except for plug valves. Provide plug valves with square heads and operating wrench.

3. Provide gear operator for valves 8 inch or larger.

iv. Extended stems: Where piping insulation is indicated or specified, valves shall be equipped with 2" extended handles of non-thermal conductive material. Also provide a protective sleeve that allows operation of the valve without breaking the vapor seal or disturbing the insulation. Supply with memory stops, which are fully adjustable after insulation is applied.

v. End Connection: 2 inch and under shall be threaded, 2-1/2 inches and larger shall be flanged or full lug style.

b. Valves for Potable Water must comply with California Lead Free Law, effective January 1, 2010.

i. "Lead Free" refers to the wetted surface of pipe, fittings and fixtures in potable water systems that have a weighted average lead content ≤ 0.25%. Source: California Health & Safety Code (116875).

ii. All valves must be 3rd party certified.

iii. Bronze valves shall be made with dezincification-resistant material.

c. Where possible, valves of one manufacturer shall be used.

d. Provide Class 150 valves meeting the valve specifications where Class 125 valves are specified but are not available.

2. Approved Manufacturers. The following manufacturers (or equal) shall be accepted for submittal review provided that all features and options are equivalent to the corresponding items as specified.

a. General valves.

i. NIBCO

ii. Hammond

iii. Milwaukee

b. Below grade domestic water shut-off valves (gate valves) 2" and larger.

i. NIBCO.

ii. Clow.

iii. Mueller.

c. Butterfly Valves.

i. NIBCO.

ii. Demco.

iii. Dezuric.

3. Valves shall be installed in locations as indicated on plans per the following usage criteria:

a. Below grade domestic water shut-off valves 1-1/2" and smaller.

i. Gate valve.

b. Below grade domestic water shut-off valves 2" and larger.

i. Resilient seated gate valve.

c. Above grade domestic water shut-off valves 2" and smaller.

i. Ball valve.

4. Gate Valves.

a. Gate Valves, 1-1/2-Inch and Smaller.

i. Rising Stem: Valves shall be Class 125 and 200 PSI CWP, rising stem, union bonnet, solid wedge and manufactured in accordance with MSS-SP 80. Body, bonnet and wedge shall be of bronze ASTM B-62. Stems shall be of dezincification-resistant silicon bronze ASTM B-371 or low-zinc alloy B-99, non-asbestos packing and malleable or ductile iron hand wheel. Valve ends shall be threaded.

1. Acceptable Valves: NIBCO T124 (threaded), or approved equal.

ii. Non-Rising Stem: Valves shall be Class 125 and 200 PSI CWP, non-rising stem, screw-in bonnet, solid wedge and manufactured in accordance with MSS-SP-80 and NSF-61-G. Body, bonnet, external stuffing box and wedge shall be of bronze ASTM B-584 C87850. Stems shall be of dezincification-resistant silicon bronze ASTM B-371 C69400 or ASTM B-99 C65100, Aramid Fibers with graphite packing and malleable iron hand wheel. Valve ends shall be threaded.

1. Acceptable Valves: NIBCO T113-LF (threaded), or approved equal.

b. Resilient Seated Gate Valves, 2-Inch and Larger.

i. Valves shall conform to AWWA C-509 and C515, fusion-bonded epoxy coating inside and out, meets or exceeds AWWA C-550, ductile iron body, rubber encapsulated D.I. wedge, rubber bonnet gasket, low torque operation, full diameter waterway, flanged, mechanical joint or ring-tite, UL/FM listed and approved. Provide complete with traffic weight cast iron valve box with cast iron cover and operating wrench.

1. Acceptable Valves: NIBCO F-607-RW OS&Y or F-609-RW NRS or M-609-RW, or approved equal by Clow or Mueller.

5. Ball Valves, 2 Inches and Smaller.

a. Valves shall be rated 250°F: 330 psig600 PSI CWP, shall have 2-piece full port lead free dezincification resistant bronze bodies with TFE seats and seals, stainless steel stem, separate packing nut with blow-out proof adjustable stem packing, and vented stainless steel ball. Valves shall conform to ASTMB371 C69300, or ASTM B-584 C87850and conform to MSS-SP-110 and NSF-61-G.

1. Acceptable Valves: NIBCO T-68580-LF (threaded), or approved equal.

D. Traps, Strainers and Tailpieces: Every sanitary fixture, unless otherwise specified, shall be provided with a seventeen (17) gauge chromium tailpiece, a Los Angeles pattern chrome plated cast-brass trap and galvanized nipple trap arm and wall flanges. Trap arm shall be provided with chromium plated brass casing between the trap and wall flanges at each fixture. All sanitary waste system floor drains and floor

sinks shall have cast iron "P" traps.

E. Cleanouts: Shall be Jay R. Smith and Zurn.

1. General: Provide cast-iron ferrule and countersunk brass clean-out plug with round cast iron access frame and heavy duty secured top cover.

2. Wall Cleanouts: Jay R. Smith No. 4472 for steel pipe and Jay R. Smith No. 4532 for cast iron pipe.

3. Floor Cleanouts: Jay R. Smith No. 4023 or 4028, bronze plug and non-skid nickel bronze top.

4. Cleanouts to Grade: Jay R. Smith No. 4258 or Jay R. Smith No. 4253 with X-H bronze plug and X-X-H non-skid cover with lifting device set flush with surface for concrete areas. Asphalt or nonsurfaced areas shall be installed with ring of concrete poured around the bottom flange six inches (6") below surface. Use cast iron soil pipe on cleanout risers. For cleanouts in non-traffic areas, terminate cleanout plug in concrete yard box.

F. Access Panels: Wall access panels shall be minimum 12" x 12" for concealed valves and other equipment unless otherwise specified or indicated. Ceiling access panels shall be 18" x 18" minimum. Access panels shall be located and positioned for ready access and service of equipment housed within. Where access panels are specified with keyed cylinder locks, all such locks shall be identically keyed.

1. Wall, Non-Fire Rated: Elmdor/Stoneman DW-SS-CL, drywall, stainless steel finish, cylinder lock.

2. Ceiling, Non-fire Rated: Elmdor/Stoneman DW, drywall, prime coated finish, screwdriver latch.

3. Wall, Fire Rated: Elmdor/Stoneman FR-SS-CL, fire rated, stainless steel finish, cylinder lock.

4. Ceiling, Fire rated: Elmdor/Stoneman FRC, Fire rated, prime coated finish, return latch.

G. Yard Boxes & Vaults: For service shut-off valves on gas and domestic water; for pressure regulator assemblies and for cleanouts, shall be Brooks Products or Fraser Cement Products Co., rectangular concrete type with vandal-proof cast iron cover and name of service clearly marked on cover. Box shall be of size to permit full range of valve operation and to permit easy removal of valve assembly. Vaults shall be sectional type.

H. Roof Flashing:

1. Sanitary vents thru roof and grease vents thru roof: Stoneman No. 1100-5, one (1) piece, seamless, four (4) pound, series with reinforcing steel boot counterflashed with cast iron flashing sleeve and equipped with vandal-proof hood for all vent piping. Seal joint between flashing and pipe with waterproofing compound per flashing manufacturer's recommendations.

2. Water, gas, condensate drainage and other metallic piping thru roof: Stoneman No. 1100-4, one (1) piece, seamless, four (4) pound, series with reinforcing steel boot counterflashed with cast iron flashing sleeve. Seal joint between flashing and pipe with waterproofing compound per flashing manufacturer's recommendations

I. Escutcheons: Shall be chrome plated cast brass with setscrew locking device.

J. Water Hammer Arresters: Shall be sized per the manufacturer's recommendations. Install at all quick closing valves, clothes washers and dishwashers behind access panel.

K. Dielectric Union Isolators: Connection between incompatible materials above grade and inside building shall be made with two (2) dielectric unions separated by a twelve inch (12") section of red brass pipe. Dielectric union isolator for connection piping or non-compatible materials shall be of standard commercial design with threaded connections.

L. Pipe Supports: Unless otherwise indicated on the drawings, shall be as follows:

1. The Contractor shall furnish and install all miscellaneous iron work including angles, channels, etc., required to appropriately support the various piping systems. Hanger spacing and location shall conform to 2010 California Plumbing Code Table 3-2.

2. All horizontal runs of piping within the building to be supported from the structural framing with steel rods and split ring hangers, B-Line, Grinnell Company, Tolco, or approved equal. Steel rods shall be secured to overhead framing with side beam connectors. Where necessary, install angle iron between framing to accommodate hanger rods. Where several pipes are running together, Unistrut,

B-Line or Powerstrut channels with clamps may be used in lieu of individual pipe hangers, and supported from structure as herein specified. Submit test data for type of hanger supports to be provided. For support conditions other than specified herein, the Contractor shall submit method of support for approval prior to any installation.

3. Horizontal Piping Hangers and Supports:

   a. General: Provide factory fabricated horizontal hangers and supports complying with one of the following MSS types listed to suit horizontal-piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping. Provide copper-plated hangers and supports for copper-piping systems.

      i. Adjustable Steel Clevis Hangers: (MSS Type 1.) B-Line B 3100

      ii. Adjustable Swivel Pipe Rings: (MSS Type 5) B-Line B3690

4. Vertical-Piping Clamps:

   a. General: Provide factory fabricated vertical-piping clamps complying with the following types listed, to suit vertical piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Select size of vertical piping clamps to exactly fit pipe size of bare pipe. Provide copper-plated clamps for copper-piping systems.

   b. Two-Bolt Riser Clamps: (MSS Type 8) B-Line B3373

5. Hanger-Rod Attachments:

   a. General: Provide factory fabricated hanger-rod attachments B-Line, Tolco or approved equal, selected by Installer to suit horizontal-piping hangers and building attachments, in accordance with MSS SP-58 and manufacturer's published product information. Select size of hanger-rod attachment to suit hanger rods. Provide copper-plated hanger-rod attachments for copper-piping systems.

   b. Side beam eye socket, Tolco Fig. #57 for rod sizes 3/8" dia. and Tolco Fig. #25-30-251 for rod sizes 1/2" dia.

6. Building Attachments:

   a. General: Provide factory fabricated building attachments, selected by Installer to suit building structural framing conditions, in accordance with MSS SP-69 and manufacturer's published product information. Select size of building attachments to suit hanger rods. Provide copper-plated building attachments for copper-piping systems.

7. Hanger Rods and Spacing shall conform to the following table:

Pipe Sizes	Spacing	Rods
2 Inch and Smaller	6 Feet	3/8 Inch
2-1/2 Inch to 3 Inch	8 Feet	1/2 Inch
4 Inch and larger	8 Feet	5/8 Inch

8. Hangers and Supports shall be adequate to maintain alignment and prevent sagging and shall be placed within 18 inches of joint. Support shall be provided at each horizontal branch connection.

9. Provide lateral bracing as manufactured by B-Line or approved equal for all piping to prevent swaying or movement in accordance with SMACNA "Guidelines for Seismic Restraints of Piping Systems". Piping smaller than indicated in the guidelines shall be provided with bracing as specified for the smallest size indicated. The entire water distribution system shall be properly braced and will not move due to the action of quick closing of valves.

10. Miscellaneous Supports, Wall Brackets, Etc.: Provide where required in accordance with the best standard practices of the trade. Submit shop drawings for all fabricated supports.

11. Isolators. All piping which is not isolated from contact with the building by its insulation shall be installed with a manufactured type isolator. Isolators shall be B-Line vibra clamp and cushion, Super Strut, Stoneman "Trisolator", or approved equal. Piping shall be installed and supported in a manner to provide for expansion without strains. Guides shall be properly installed to ensure this requirement.

12. Shields:

    a. General: Provide shields at piping hangers and supports, factory-fabricated, for all insulated piping as manufactured by Pipeshields Incorporated or approved equal. Size shields for exact fit to mate with pipe insulation.

    b. Protection Shields: MSS Type 40; provide high density insert of same thickness of insulation or equal 100-psi average compressive strength, waterproofed calcium silicate, encased with a sheet metal shield. Insert and shield shall cover entire circumference of the pipe and shall be of length indicated by manufacturer for pipe size and thickness of insulation.

M. Insulation:

1. Condensate Pipe Insulation: All condensate piping within the building shall be insulated with "Imcoa" "Imcolock" ¾" nominal wall thickness closed-cell insulation. Insulation shall have a flame spread of not more than 25 and a smoke density not exceeding 50 per 2010 CMC. All joints shall be mitered and secured with black duct tape.

2. All insulation shall be continuous through supports and hangers.

3. All fixtures complying with the provisions of the Americans with Disabilities Act shall be provided with Prowrap insulation for exposed hot water pipe, tailpiece, and trap as manufactured by McGuire, and secured per manufacturers recommendations. No tape wrapping shall be permitted.

N. Equipment and Fixtures:

1. Fixtures:

    a. See schedule on drawings.

    b. Accessible plumbing fixtures shall comply with all of the requirements of CBC Section 1115B. Heights and location of all fixtures shall be in according to CBC Section 1115B.4 and Table 1115B-1. Fixture controls shall comply with CBC Section 1115B.4.4.4 for showers, 1115B.4.3.1 for lavatories, 1115B.4.1.5 for toilets and 1115B.4.2.3 for urinals. Sinks shall not exceed 6-1/2" in depth, CBC Section 1115B.4.7.1.

2. Acceptable Manufacturers.

    a. The following manufacturers (or equal) shall be accepted for submittal review provided that all features and options are equivalent to the corresponding items as specified on plans and in specifications:

        i. Vitreous China Plumbing Fixtures.

            1. American Standard.

            2. Kohler.

        ii. Flushometer Valves.

            1. Sloan.

        iii. Faucets.

            1. Chicago.

        iv. Lavatory and Sink Drains.

            1. McGuire.

            2. Elkay.

        v. Angle Stops / Supplies.

            1. Chicago.

vi. Trap Primers.

1. Mifab.
2. Precision Plumbing Products.

vii. Roof Drains and Overflow Drains.

1. Zurn
2. Jay R. Smith.

viii. Floor Sinks.

1. Zurn.

ix. Drinking Fountains.

1. Haws.
2. Elkay.

x. Hose Bibbs.

1. Acorn.
2. Woodford.

3. Furnish complete with necessary trim, including stops. All trim and fittings shall be chrome-plated brass including handles, supply tailpieces, traps and escutcheons.
4. Connections to fixtures shall be in accordance with code requirements except as exceeded herein or on the drawings and in no case less than the supply stop size.
5. All plumbing fixture faucets submitted for review shall have identification label or certification showing compliance with California TITLE 24, PART 5, ARTICLE I, "Energy Conservation Standards". ARTICLE I, T20-1406; ARTICLE 2, T20-1525 and ARTICLE 4, 1604 and 1606.
6. Minimum waste sizes shall be four-inch (4") for water closets and two inch (2") for lavatories.

3. PART 3 - EXECUTION

3.1 INSTALLATION - GENERAL

A. Locations and Accessibility: Install equipment for ease of maintenance and repair. If changes in the indicated locations or arrangements are made by the Contractor, they shall be made without additional charges.

B. Openings: Furnish information to the other trades on size and location of openings which are required in walls, slabs, roof, for piping and equipment at the proper times.

C. Closing-In of Uninspected Work: Do not allow or cause any of the work to be covered up or enclosed until it has been inspected, tested, and approved by the Architect. Any work enclosed or covered prior to such inspection and test shall be uncovered and, after it has been inspected, tested, and approved, make all repairs with such materials as may be necessary to restore all work, including that of other trades, to its original and proper condition.

D. Before laying of any pipe or digging of any trenches, Contractor shall determine by actual excavation and measurement exact locations and depth of existing utility and service lines to which he is going to connect. In event depth of existing sewer main or storm drain is not sufficient to permit installation of piping as detailed on drawings or to make connection in manner indicated, Contractor shall confer with the Architect, Owner's representative and Engineer for Direction.

E. Excavation, Trenching and Backfill: Perform all necessary trench excavation, shoring, backfilling and compaction required for the proper laying of the pipe lines.

1. The Contractor shall coordinate the layout of all below grade piping and components with the General Contractor prior to bid to determine the extent of required sawcutting, excavation, alterations, and subsequent repair/restoration of all affected hardscape and softscape surfaces. All such items shall be included in bid.

2. Backfill shall be clean soil free from rocks and debris. Compact to ninety percent (90%) of surrounding soil. All piping shall be installed in a minimum 6" sand bed and covered with 6" of sand prior to backfill. Continue backfill with materials free of rocks and debris, properly moistened and mechanically tapered and compacted to 90% of surrounding soil.

3. Bottoms of Trenches: Cut to grade and excavate bell holes to ensure the pipes bearing for their entire length upon the outside periphery of the lower third of the pipe.

4. Water piping shall not be run in the same trench with sewer or drainage piping unless separated as required by the CPC.

5. All horizontal soil and waste piping 3" and smaller shall be installed to a uniform grade of not less than one-fourth inch (1/4") per foot. All horizontal soil and waste piping 4" and larger shall be installed to a uniform grade of not less than one-eighth inch (1/8") per foot, unless otherwise indicated or directed.

F. Piping Installation:

1. All piping shall be concealed in finished portion of the building except where otherwise indicated or directed at the time the work is done. All piping shall be installed to clear all framing members and beams, even if drawings do not indicate same. Contractor shall constantly check the work of other trades so as to prevent any interference with the installation of this work.

2. All piping into stem walls and footings shall be double half lap wrapped with 1/8" thick "Armaflex" insulation. The Contractor shall also provide blocked out areas in stem wall and footing as required for the installation of the piping. All piping shall avoid the lower 9" of the footing and the Contractor shall coordinate and provide dropped footings as required for the installation of the underground piping.

3. Unions shall be installed on one side of all screwed shut-off valves, at both sides of screwed automatic valves and on all by-passes, at all equipment connections and elsewhere as indicated or required for ease of installation and dismantling.

4. Connections between copper tubing and equipment shall be with Mueller Brass Company, or approved equal, brass stream line copper to P.P.S. ground joint unions.

5. Hot and cold water supplies to lavatories and sinks shall be provided with ninety degree (90°) drop-ear copper to pipe thread elbows. Cold water supplies to water closets and urinals shall be provided with ninety degree (90°) drop-ear copper to pipe thread elbows. Bolt securely to backing plates located between wall studs to provide a rigid anchor for exposed supply pipes and stops.

6. Corrosion Protection:

   a. General.

      i. Corrosion protection shall be provided for all below grade cast iron and copper piping and associated valves and fittings. Such piping shall be protected from corrosion by encasement in a polyethylene protective wrapping, referred to hereafter as polywrap. Although not intended to be a completely air and water tight enclosure, the polywrap shall provide a continuous barrier between the pipe and surrounding bedding and backfill.

   b. Materials.

      i. Cast iron piping encasement.

         1. The polywrap shall be minimum 8 mil. in thickness, group 2, linear low density, flat tube, natural (clear) virgin polyethylene film formed into tubes or sheets as required. Material shall meet or exceed the requirements of AWWA C105, ANSI A21.5 and ASTM A674.

         2. The polywrap shall be as manufactured by Northtown Company or approved equal.

      ii. Copper piping encasement.

         1. The polywrap shall be minimum 6 mil. in thickness, group 2, linear low density, flat tube, natural (clear) virgin polyethylene film formed into tubes or sheets as required. Material shall conform to the requirements of ASTM D1248.

2. The polywrap shall be as manufactured by Northtown Company or approved equal.

iii. The minimum Polywrap flat tube width for each pipe diameter shall be as follows:

Pipe Size / Type	Polywrap Flat Tube Width
½" to ¾" copper	2"
1" to 1-½ copper	3"
2" copper	4"
2-1/2" copper	5"
3" copper	6"
2" to 3" cast iron	14"
4" cast iron	16"

iv. The polywrap shall be secured as specified with 2 inch wide pressure sensitive plastic tape not less than 10 mils thick.

1. Tape shall be Scotchwrap No. 50, Polyken No. 900, Tapecoat CT, Johns-Manville No. V-10 Trantex or approved equal.

c. Installation.

i. The polyethylene tubing shall be cut into lengths approximately 2 feet longer than the pipe sections. Slip the tube around the pipe, centering it to provide a 1-ft overlap on each adjacent pipe section, and bunching it accordion fashion lengthwise until it clears the pipe ends. Lower the pipe into the trench and make up the pipe joint with the preceding section of pipe. . A shallow bell hole must be made at each joint to facilitate installation of the polywrap. The bunched-up polywrap shall be pulled from the preceding length of pipe, slipped over the end of the new length of pipe, and secured in place with one circumferential turn of tape plus enough overlap to assure firm adhesion. The end of the polywrap shall be slipped from the new pipe section over the end of the first wrap until it overlaps the joint at the end of the preceding length of pipe and tape it in place. The loose wrapping on the barrel of the pipe shall be pulled snugly around the barrel of the pipe and excess material folded over the top of the pipe and the folds held in place by means of short strips of adhesive tape, at about 3 foot intervals along the pipe.

ii. Rips, punctures or other damage to the tube shall be repaired with the adhesive tape or pieces of tube material secured with tape. Bends and reducers in the line shall be covered with polyethylene in the same manner as pipe.

iii. Valves, tees, crosses and outlets shall be wrapped with flat sheets of the same material. The sheets shall be passed under valves and brought up around the body to the stem. Edges shall be brought together, folded twice and secured with the adhesive tape.

G. Sleeves: Shall be plastic or galvanized steel where pipes pass through concrete walls or floor slabs.

1. Isolate pipes through ground floor slabs with Kraft paper, plastic tape or similar materials unless conduit is specified or indicated.

2. Sleeves for pipes through exterior walls shall be non-metallic with minimum 2" weep ring as manufactured by Link Seal. Pipe shall be sealed with Link Seal modular seal with EPDM seal elements.

3. Sleeves in or through fire rated walls shall be per U.L. Fire Resistance System No. WL1146 for drywall construction, and U.L. Fire Resistance System No. CAJ1044 for concrete construction. See architectural plans for all locations of rated walls.

H. Contraction and Expansion: Install all work in such a manner that its contraction and expansion will not do any damage to the pipes, the connected equipment, or the building. Install offsets, swing joints, expansion joints, seismic joints, anchors, etc., as required to prevent excessive strains in the pipe work. All supports shall be installed to permit the materials to contract and expand freely without putting any strain or stress on any part of the system. Provide anchors as necessary.

I. Pipe Joints and Connections:

1. Copper Tubing and Brass Pipe with Threadless Fittings:

a. Solder joints for copper shall be made with lead free solder in accordance with manufacturer's recommendations for the service intended.

b. Use threaded adapters on copper tubing where threaded connections are required.

J. All closet bends shall be adequately blocked and secured. Trap arms and similar connections installed below the floor level or under concrete slabs shall be adequately supported and anchored to prevent motion in any direction. All piping installed above grade within buildings shall be secured to structural framing with Unistrut or pipe clamps to provide a rigid installation. Piping utilizing gaskets as a seal shall be given prime consideration to providing adequate stability through proper supports and anchors because of its flexible nature.

K. Each pipe penetration of the roof shall be separated from other piping and any roof equipment by a minimum of 18" to insure a proper pipe flashing installation.

L. Floor, Wall and Ceiling Plates: Where pipes pierce finished surfaces, C.P. brass split flanges with setscrew lock shall be provided.

M. Roof Flashings: Extend pipe a minimum of seven inches (7") above finished roof line, except where a vandal proof hood is required in which case pipe shall extend to a height required to receive the hood and also where specifically required to exceed this dimension by the local authority due to snow conditions.

N. Installation of Plumbing Fixtures:

1. Install each fixture at the exact height and location shown on the Architectural Drawings.

2. Set fixtures, supplies, trap and trap outlet square with the wall, in line with fixture outlets without any offsets, angles, or bends.

3. Grout joint between the fixtures and the walls or floors with polysulfide or silicone sealant to be smooth, even and watertight.

O. Completion of Installation:

1. Cleaning and Flushing: Clean all equipment and materials thoroughly. Leave surface to be painted smooth and clean, ready for painting.

2. Flush each unit of water supply and distribution system thoroughly with clean water at the highest velocities attainable.

3. Clean all piping, valves, traps, water heaters, fixtures and other devices thoroughly and flush or blow out until free of scale, oil silt, sand, sediment, pipe dope and foreign matter of any kind.

3.2 STERILIZATION OF DOMESTIC WATER LINES

A. Sterilize water lines by filling with a solution containing fifty (50) parts of chlorine per million parts water and holding the solution therein for at least eight (8) hours with a water head of at least five feet (5') above the highest point in the system. Unless otherwise directed, thoroughly flush each line prior to sterilization. Introduction of sterilizing solution or materials into the lines shall be such as to provide thorough and uniform distribution throughout the system.

1. Operate all valves during the retention period. Following retention period, the heavy chlorinated water shall be flushed from the system with clean water.

2. Continue flushing until the residual chlorine at the end of 24 hours is as required by AWWA C651.

3. All work and certification of performance must be done by an approved laboratory utilizing qualified applications and personnel.

i. Upon completion of the domestic water line sterilization, Contractor shall submit sterilization report directly to the Architect stating that all testing was performed as specified and that testing was performed by an approved laboratory utilizing qualified applications and personnel.

3.3 TESTING

A. No piping work shall be concealed or covered until piping has been tested, inspected and approved by the Inspector. All piping for plumbing systems shall be completely installed and tested as required by the Uniform Plumbing Code. Test pressures and times indicated are a minimum only. All tests shall be as required by the governing authority as well.

Schedule of Test Pressures:

System Tested	Gauge	Test	Duration
Water	100 PSI	Water	4 Hours

Waste, Vent and Storm Drain: Per California Plumbing Code (Minimum 10 Feet of Head)

3.4 OPERATION INSTRUCTION

A. Prior to occupancy or prior to the date of final inspection, whichever may occur first, the Contractor shall prepare two (2) sets of typewritten instructions for the operation of all equipment, valves, etc., specified and furnished as a part of the work under this section, and shall assign a competent person, thoroughly familiar with the job, to demonstrate and instruct a representative of the Owner in the operation of the equipment. The time of said demonstration and instructions shall be arranged with the Owner's representative approximately one (1) week in advance. Verbal instructions shall include shut-off location of gas and water. The Contractor shall assemble all operation and maintenance data supplied by the manufacturers of the various pieces of equipment, all keys and special wrenches required to operate and service the equipment (including keys for yard boxes, gas stops and fixture stops), and all equipment warranties and deliver same to the representative of the Owner on date of said instructions.

3.5 PIPE AND EQUIPMENT IDENTIFICATION

A. Each operating and service line shut-off valve shall be identified by a 19 ga. brass tag with stamped, engraved type of service identified and area served, complete with hole and brass chain mounted on valve stem or handle. Tag shall be a minimum of one and one-half inch (1-1/2") in diameter.

B. All piping systems shall be readily identifiable by appropriate labeling with the name of the piping contained. Such labeling shall be by means of metal tags, stenciling, stamping, or with adhesive markers, in a manner that is not readily removable. Labeling shall appear on the piping at intervals of not more than 20 ft and at least once in each room and each story traversed by the piping system.

C. All equipment shall be provided with name plate indicating all pertinent information on it.

END OF SECTION

SECTION 15800

HEATING, VENTILATION AND AIR CONDITIONING

1. PART 1 - GENERAL

1.1 DESCRIPTION

A. Work under this section includes all labor, equipment, material, services, transportation, etc. required for and reasonably incidental to the complete and satisfactory installation of all of the HVAC Systems as indicated on the Drawings or specified herein.

1.2 Work included in This Section:

A. Split Heat Pump/Air Handling Units.

B. Heat Pump Unit.

C. Exhaust Fans.

D. Smoke/Fire Dampers.

E. Diffusers, Registers, and Grilles.

F. Duct Insulation.

G. Vibration Isolation.

H. Test and Balance.

I. Submittals and Shop Drawings.

J. Record Drawings.

K. Operation and Maintenance Manuals.

L. Guarantee.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. Electrical supply to units. See Electrical Drawings.

1.4 GENERAL REQUIREMENTS

A. This section of the specification shall be considered as a part of the entire specification and all applicable portions of General Conditions, Special Conditions, and Division 1 shall apply.

B. Before commencement of work this contractor shall determine the exact location, size, elevation, and availability of all utilities relevant to the mechanical work and immediately notify the owner with written notification of any discrepancies. In addition, this Contractor shall contact all involved utility companies, make all necessary arrangements for service, and pay all fees incurred due to connection of services.

C. Erection: The Contractor shall furnish the services of an experienced superintendent, who shall be constantly in charge of the erection of the work, together with all necessary journeymen, helpers, and laborers required to properly unload, erect, connect, adjust, start of operate and test the work involved.

1.5 REFERENCES

A. AABC - National Standards for Field Measurement and Instrumentation, Total System Balance.

B. AMCA 210 - Laboratory Methods of Testing Fans for Rating Purposes.

C. AMCA 300 - Test code for sound rating air-moving devices.

D. ANSI/NFPA 90A - Installation of Air Conditioning and Ventilation System.

E. ARI 270 - Sound rating of Outdoor Unitary Equipment.

F. ASHRAE 52-76 - Method of Testing Air Cleaning Devices Used in General Ventilation for Removing Particulate Matter.

G. ASTM A90 - Weight of Coating on Zinc - Coated (Galvanized) Iron or Steel Articles.

H. ASTM A120 - Black and Galvanized Steel Pipe.

I. ASTM B88 - Seamless Copper Water Tube.

J. ASTM C518 - Steady State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

K. ASTM C553 - Mineral Fiber Blanket and Felt Insulation.

L. ASTM C612 - Mineral Fiber Block and Board Thermal Insulation.

M. ASTM E84 - Surface Burning Characteristics of Building Materials.

N. ASTM E96 - Water vapor Transmission of Materials.

O. NFPA 90B - Installation of Warm Air Heating and Air Conditioning Systems.

P. NFPA 255 - Surface Burning Characteristics of Building Materials.

Q. SMACNA - Low Pressure Duct Construction Standards.

R. UL 181 - Factory Made Air Ducts and Connectors.

S. UL 723 - Surface Burning Characteristics of Building Materials.

T. California Mechanical Code - 2010 Edition.

1.6 SUBMITTALS AND SHOP DRAWINGS

A. Contractor agrees that shop drawings submittals processed by the owner do not become Contract Documents and are not Change Orders; that the purpose of the shop drawing review is to establish a reporting procedure and is intended for the Contractor's convenience in organizing his work and to permit the owner to monitor the Contractor's progress and understanding of the design. The process of review of the Contractor's submittals is not of testing the owner's perception. If deviations, discrepancies or conflicts between shop drawings submittals and the Contract Documents are discovered either prior to or after the shop drawing submittals are processed by the owner, the Contractor agrees that the Contract Documents shall control and shall be followed.

B. Prepare and furnish fully coordinated shop drawings showing ductwork and piping on separate drawings. The drawings shall be minimum 1/4" = 1'-0" scale and shall show dimensioning of piping and ductwork from gridlines, bottom of elevation marks for ductwork and piping and fittings, valves, dampers, devices, etc. with labels. In addition, coordinate with related work and reference on the same drawings major plumbing piping, structural steel, fire protection piping, conduit runs and cable trays. Review and sign these drawings to verify coordination of related equipment. Conflicts, which occur shall be brought to the attention of the owner prior to issuance of the drawings. Refer to Section 01330 of the Specifications for additional requirements.

C. Contractor shall provide detailed shop drawings min. 45 days prior to installation for a complete functional system indicating all equipment, ductwork routing, and etc. including changes in elevation, direction, sway bracing, and etc. Contractor shall indicate all roof curb locations and sizes.

D. Materials and Equipment: As soon as possible and within 21 days after award of the contract, and before their purchase, the Contractor shall submit to the owner seven bound booklets for approval containing a complete list of materials, specialties and equipment he is to furnish for the installation. Literature shall be standard manufacturer's catalog cuts and items to be installed shall be clearly indicated. All submittals shall be made at one time.

E. Each item shall be identified by manufacturer, brand and trade name, number, size, rating and whatever other data is necessary to properly identify and check the materials and equipment. The words: "as specified" will not be considered sufficient identification.

F. Accessories, controls, finish, etc., not submitted or identified with the submitted equipment shall be furnished and installed as specified.

G. Shop drawings shall be approved only to extent of information indicated. Approval of an item of equipment shall not be construed to mean approval for components for that item for which Contractor has provided no information.

H. Approval of shop drawings shall not relieve Contractor of responsibility for providing all controls, wiring, components, etc. which are shown or specified, or all additional controls, wiring, components, etc. required to provide complete and correctly operating mechanical systems.

I. Submit product data for the following manufactured products, assemblies, personnel and testing agencies required for this project.

1. Split Heat Pump/Air Handling Units.
2. Heat Pump Unit.
3. Exhaust Fans.

4. Smoke/Fire Dampers.
5. Controls including thermostat.
6. Diffusers, Registers, and Grilles.
7. Ductwork and Accessories.
8. Insulation Materials.
9. Vibration Isolation.
10. Detailed procedures, agenda, sample report forms, and copy of AABC National Project Performance Guarantee.
11. Fire and Smoke/Fire Dampers.

1.7 SUBSTITUTIONS

A. Should the Contractor desire to substitute any material, equipment or other items for those specified, he shall submit a complete list, including detailed equipment layouts and performance characteristics within 35 calendar days after the scheduled Start of Construction. Said data shall be submitted in 7 copies, assembled in individual brochures.

B. The entire cost of all changes of any type due to substitution for materials specified shall be born by the Contractor at no extra cost to the owner.

C. Unsolicited and voluntary deducts, on the part of the Contractor for substituting unapproved systems and/or equipment, shall not be considered for the purpose of awarding the Contract.

D. The contractor shall submit the amount of cost credit to the Contract in the event the proposed substitution is accepted.

E. In all cases where substitutions are proposed after bids are received, the Contractor shall bear the cost of evaluation on the basis of 2-1/2 times technical salaries of engineering personnel involved.

1.8 AVAILABILITY OF SPECIFIED EQUIPMENT

A. Verify prior to bidding that all specified equipment is available and can be obtained in time for installation during orderly and timely progress of the work.

B. In the event that specified items will not be so available, notify the owner prior to receipt of bids.

C. Costs of delays because of non-availability of specified items, when such delays could have been avoided by proper investigation on the part of the Contractor, will be back-charged as necessary and shall not be born by the owner.

1.9 RECORD DRAWINGS

A. The contractor shall arrange and pay for one set of white prints of the HVAC drawings, which he shall alter in red to show all changes made to the original layout. These drawings shall be kept current.

B. The contractor shall deliver these completed to the owner when the job is finished and accepted prior to final payment.

1.10 OPERATION AND MAINTENANCE DATA

A. Submit two sets prior to final inspection, bound in 8-1/2 x 11 inch text pages, binders with durable plastic covers. Prepare binder covers with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", and title of project. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.

B. Contents: Prepare a Table of Contents with each Product or system description identified.

1. Part 1: Directory listing names, addresses, and telephone numbers of owner, Contractor, Subcontractors, and major equipment suppliers.
2. Part 2: Operation and maintenance instructions, arranged by system. Identify the following:
    a. Significant design criteria.
    b. List of equipment.
    c. Parts list for each component.
    d. Operating instructions.

e. Maintenance instructions for equipment and systems.

f. Maintenance instructions for special finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents.

C. Submit one copy of completed volumes in final form 15 days prior to final inspection. This copy will be returned after final inspection, with owner comments. Revise content of documents as required prior to final submittal.

D. Submit final volumes (revised) within ten days after final inspection.

1.11 GUARANTEES

A. The Contractor, in accepting this contract, binds himself to replace or repair at his own expense any defect in workmanship or material which may appear within a period of one year from the date of the final acceptance of the building, and to pay for all resulting damage which shall appear within the said period; provided always that the Contractor shall not be liable for anything attributable to acts of the agents of the owner, or for ordinary wear. Also, given date of work performed by the Contractor be accepted as complete, he shall agree to correct any deficiencies or omissions in respect to the plans or specifications which may appear in the afore-mentioned twenty-four month period.

B. The Contractor guarantees that all piping as provided in this specification will be free from all obstructions, and that all piping will be tight and drip free.

C. All refrigerant compressors shall carry a five-year manufacturer's warranty.

1.12 LOCAL CONDITIONS

A. The Contractor and trade submitting tenders on this work shall visit and will be deemed to have visited the site to ensure that they are familiar with all conditions relating to the work. Failure to visit the site will in no way relieve the successful Contractor of the necessity of furnishing any material or performing any work that may be required to complete the work in accordance with the drawings and specifications without additional cost to the owner.

1.13 RULES, REGULATIONS AND CODES

A. All work and materials shall be in full accordance with the latest California Mechanical Code, California Plumbing Code, California Building Code and local rules and regulations, State Fire Marshal regulations, the safety orders of the Division of Industrial Safety; the National Electric Code; the standards of the National Fire Protection Association; American Gas Association; Occupation and Safety Act; American National Standards Institute; American Society of Mechanical Engineers; American Society for Testing and Materials; Installation Standards published by the International Association of Plumbing And Mechanical officials (IAPMO) and other applicable laws, codes, or regulations. Nothing in these specifications shall be construed to permit work not conforming to these codes.

B. Electrical Work: Motors, electrical apparatus and wiring specified in this section shall conform to the National Electrical Manufacturer's Standards and the National Electric Code and bear the Underwriter's label of approval.

C. The Contractor shall furnish, without extra charge, any additional material and labor when and where required to comply with these rules and regulations, though the work be not mentioned in these Specifications or shown on the Drawings. When these Specifications or Drawings call for or describe materials or construction of a better quality or larger sizes than required by the above mentioned rules and regulations, the provisions of these specifications and accompanying drawings shall take precedence.

1.14 FEES AND PERMITS

A. The Contractor must obtain and pay all fees for permits, licenses, inspections, etc., which are required by any legally constituted authority. Coordinate exact requirements with the owner prior to bid.

1.15 COORDINATION

A. Following the general arrangement indicated on the Drawings as closely as possible, the Contractor shall coordinate with the architectural, structural, plumbing, electrical and all other trades prior to installation of the materials and equipment to verify adequate space available for installation of the work shown. The owner shall be immediately notified if an area of conflict occurs between trades.

B. The Contractor shall bear all costs incurred for work that must be relocated due to conflicts between trades.

C. The Mechanical Contractor shall coordinate all requirements for all points of connection with the General Contractor and other trades prior to bid.

1.16 DRAWINGS

A. The work shall be installed as indicated on Drawings, however, changes to accommodate installation of this work with other work, or in order to meet Architectural or structural conditions, shall be made without additional cost to the owner.

B. For the purpose of clarity and legibility, the Drawings are essentially diagrammatic to the extent that many offsets, bonds, unions, special fittings and exact locations are not indicated. The Contractor shall make use of all data in all of the Contract Documents, and shall verify this information at the site.

1.17 INSPECTION

A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.

B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.18 DELIVERY, STORAGE AND PROTECTION OF PROPERTY

A. Place orders for all equipment in time to prevent any delay in construction schedule or completion of project. If any materials or equipment are not ordered in time, additional charges made by equipment manufacturers to complete their equipment in time to meet construction schedule, together with any special handling charges, shall be borne by the contractor.

B. Materials shall be delivered in ample quantities from time to time as may be necessary for the uninterrupted progress of the work. They shall be stored as to cause the least obstruction to the premises and distributed so as to prevent overloading to any portion of the structure.

C. The Contractor shall provide temporary storage and shop areas that are required at the site for the safe and proper storage of materials, tools, and other items used in the performance of this work. These areas shall be constructed only in approved locations and shall not interfere with the work of any other Contractor.

D. All work, equipment and materials shall be protected at all times. The Contractor shall make good all damage caused either directly or indirectly by his own workmen. The Contractor shall also protect his own work from damage. He shall close all pipe and duct openings with caps or plugs during installation. He shall protect all of his equipment and materials against dirt, water, chemical, and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

1.19 DAMAGE BY LEAKS, ETC.

A. The Contractor shall be responsible for all damage to any part of the premises or work of other Contractors, caused by leaks or breaks in the piping or equipment furnished and/or installed under this section, during the construction and guarantee period.

1.20 ACCESS TO EQUIPMENT FOR MAINTENANCE

A. Install all equipment, piping, etc. to permit access for normal maintenance. Maintain easy access to filters, motors, etc. Install all such equipment and accessories to facilitate maintenance. Perform any relocation of pipes, etc. required to permit access at request of owner at no additional cost to owner.

B. Furnish and install access doors or panels in walls, floors, and ceilings to permit access to equipment, dampers, and all other items requiring service. Coordinate location of access doors with other trades as required.

C. Size access panels to allow inspection and removal of all items served.

D. Use Milcor style as required for material in which door is installed. Where door is installed in fire rated construction, provide door bearing UL label required for condition.

2. PART 2 - PRODUCTS

2.1 GENERAL

A. All materials and equipment shall be new and of the best of their respective grades, free from all defects and of the make, brand or quality herein specified or as accepted by the owner.

B. All materials and equipment shall be identified by manufacturer's name or nameplate data. Unidentified material or equipment shall be removed from the site.

C. Equipment specified by manufacturer's number shall include all accessories, controls, etc., listed in the catalog as standard with the equipment. Optional or additional accessories shall be furnished as specified.

D. Where no specific make of material or equipment is mentioned, any first class product of a reputable manufacturer may be used, provided it conforms to the requirements of the system and meets with the approval of the owner.

E. Equipment and materials damaged during transportation, installation and operation shall be considered as "totally damaged" and shall be replaced with new. Any variance from this clause shall be made only with written approval of the owner.

2.2 MANUFACTURER

A. Split Heat Pump

1. York.
2. Approved Equal.

B. Air Handling Units.

1. Alliance Air Product.
2. Approved Equal.

C. Air Conditioning Units:

1. Carrier.
2. Approved Equal.

D. Exhaust Fans:

1. Greenheck.
2. Cook.
3. Twin City.

E. Fire and Smoke/Fire Dampers

1 Pottorff.

2 Ruskin.

F. Diffusers, Registers, and Grilles:

1 Krueger.

2 Titus.

3 Price.

4 Approved Equal.

G. Controls

1. Carrier. EMS (See Specification Section 15900)
2. Approved Equal.

H. Vibration Isolation:

1. M.W. Sausse.
2. Mason.

3. Approved Equal.

2.3 SPLIT HEAT PUMP UNIT.

SUMMARY

A. Factory assembled, single piece, air cooled heat pump unit designed for outdoor installation. Factory wired, piped, and tested for leakage and functionality to assure trouble-free installation and start¬up. in accordance with ARI Standard 340/360. Manufactured in a facility registered under the ISO 9002 manufacturing quality standard.

B. Designed and tested in accordance with ASHRAE 15 Safety Code for Mechanical Refrigeration and comply with NEC.

A. Cooling performance rated in accordance with DOE and ARI test procedures.

B. CSA listed and classified to UL 1995/CAN/CSA No. 236- M90 standards.

C. One year limited parts warranty on complete unit with an additional four year compressor warranty.

D. Operating Range shall be between 125° F to 40° F in cooling as standard from factory.

E. Furnish heat pump or equivalent in accordance with the performance schedule shown on the plans. Unit shall be stored and handled in accordance with unit manufacturer's instructions. Install each unit as shown on the plans in accordance with the manufacturer's recommendations and all applicable national and local codes.

F. Base bid shall be York heat pump unit with approved alternates being as per district standards. Alternates must still comply with the performance and features as specified within these specifications and indicated on the design documents. Job will be awarded on basis of specified product. Prior approved manufacturers' substitutions must be selected and approved within 14 calendar days after award of contract.

2.4 UNIT CONSTRUCTION

A. Constructed of zinc-coated, galvanized steel. Exterior surfaces bonded and coated with baked enamel finish by a powder paint process capable of withstanding a minimum of 1000 salt spray hours according to ASTM B117. Cabinet screws that comply with ASTM B117 salt spray test for a minimum of 750 hours.

B. Permanently attached heavy-gage perimeter base rails with forklift slots and lifting holes.

C. Removable access panels to all internal components. Separate access panel to controls. Access panels to allow outdoor coil cleaning.

D. Evaporator fan compartment top surface shall be insulated with a minimum 1/2-in. (12.7 mm) thick, flexible fiberglass insulation, coated on the air side and retained by adhesive and mechanical means. The evaporator wall sections will be insulated with a minimum semi-rigid foil-faced board capable of being wiped clean. Aluminum foil-faced fiberglass insulation shall be used in the entire indoor air cavity section.

E. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.

F. Fans and Motors:

1. Condenser fan motors: Totally enclosed, air over cooled. Inherent overload protection. Permanently lubricated bearings.

2. Condenser Fans: Direct driven propeller-type fans. Statically and dynamically balanced. Aluminum blades riveted to corrosion resistant steel spider brackets. Arranged for vertical air discharge. Equipped with PVC coated steel wire safety guards.

G. Refrigerant Components:

1. Refrigerant expansion device shall be of the TXV (thermostatic expansion valve) type.

H. Coils:

1. Draw thru configuration.

2. Constructed with aluminum plate fins mechanically bonded to seamless internally enhanced copper tubes with all joints brazed.

I. Compressor:

1. Hermetic scroll type, internally protected with high-pressure relief and over temperature protection.

2. Two stage units operate in 50% capacity increments.

3. Suction gas cooled.

4. Voltage range of ±10% of unit nameplate voltage.

5. Neoprene isolators minimize sound transmission and vibration.

6. Belly-band crankcase heaters keep refrigerant from diluting sump oil. Full charge of compressor oil.

7. Must cycle to allow cooling operation down to 40°F.

J. Controls: Factory Installed DDC Controls by Others (Alerton). Provide interlock as per control sheets.

K. Controls and Safeties:

1. All 24-volt control circuit, powered by a 24 volt transformer(s) and protected by a resettable breaker.

2. Conventional thermostat must provide operation for heat pumps without an "O" output from the thermostat.

3. Low voltage terminal strip for simple hook-up.

4. Compressor motor protection shuts down unit for motor over-current, over-temperature or low voltage conditions.

5. Safety lockouts provide reset capability at the space thermostat or base unit should any of the following standard safety devices trip and shut off compressor:

   a. Loss-of-charge/Low-pressure switch.

   b. High-pressure switch.

   c. Control board diagnostics and fault code display.

   d. Safety lockouts send a 24 volt signal to the control board's "X" terminal, allowing notification to the user via the thermostat fault light (if present).

6. Control board shall retain last 5 fault codes in non¬volatile memory, which will not be lost in the event of a power loss. An LED (light-emitting diode) indicator flashes a fault code that indicates which safety switch has tripped.

L. Electrical Requirements: Single-point connection electrical power. Heat pump fan motors and secondary of transformers shall be grounded.

M. Refrigerant Piping: Solid core filter-drier(s) ship loose for field installation. Liquid and suction line service valves with gauge ports. Suction and discharge line service ports accessible from unit. Ports capped for leak prevention. Liquid line magnetic check valves. Holding charge of R410A refrigerant. Provide installation guideline.

N. Special Features:

a. Non-fused disconnect switch. Factory-installed, internally mounted. Accessible from outside the unit. NEC and UL approved non-fused switch. Provides power off lockout capability.

b. Operation down to 0°F with a field-installed low ambient kit accessory. The controller modulates the fan motor speed in response to liquid line temperature or pressure.

c. Unit shall be Covered by a 1-year limited parts warranty on the complete unit and 5-year on compressor(s). In current production with published literature available to check performance, limitations, specifications, power requirements, dimensions, operation and appearance.

d. Each unit shall have Exterior panels of 18 gauge steel, finished with baked enamel to provide a long lasting quality appearance. Removable panels to provide easy access to the internal components for maintenance and service on heat pumps. The dimensions of each unit shall not exceed those specified in the manufacture's literature.

e. Provide hail guard at condenser coils.

f. See mechanical schedules for additional items.

2.5 AIR HANDLING UNIT.

A. Unit Base: Perimeter of unit base shall be constructed from ASTM A36 structural steel 'C' channel. Internal supports shall consist of structural rectangular tubing on minimum 24" centers. All fans and coils shall be supported on minimum ¼" thick structural tubular steel. The unit base shall be fully welded. Height and section of structural members shall take into account internal loading, unit height, length and width, and split sections so as to limit base deflection to 1/200 of span. Curb mounted units shall be provided with curb angle welded on inside of structural base.

1. Prior to welding, all structural 'C' channels shall be sandblasted to remove rust and mill scale. Wire brushing or chemical treatment is not acceptable.

2. Heavy removable lifting lugs shall be added to the perimeter channel along the longest length of the unit. Removable type lifting lugs shall be provided with welded attachments. Provide a minimum of 4 lugs per section to ensure proper rigging.

Unit floor shall be covered with 16 gauge bright galvanized sheets as standard. The floor shall be supported by stringers and structural members on maximum 24" centers. All seams shall be supported underneath by structural supports. Floor shall be attached to base structure by welding from underneath on maximum 6" centers. Floor seams shall consist of minimum 1" standing seams, caulked and covered with cleats to ensure water and air tightness. TEK screw attachments of floor skin to structural base frame is not acceptable.

3. Insulation under floor shall be sprayed urethane foam with a minimum thickness of 2.5" and a R value of 15 Hr-Ft2-°F/BTU.

4. Entire structural steel base shall be primer painted with industrial grade epoxy primer for total thickness of 4 mils minimum. Base paint system shall meet 5,000 hour performance in accordance to ASTM B117 Salt Fog Test.

5. Fan isolator support assemblies shall be attached to base structural members with minimum 3/8" Grade 5 bolts. Welded fan isolator assembly to the floor skin is not acceptable.

6. Coil drain pans shall be supported by structural steel members under the floor.

B. Unit Housing: The unit casing panels shall be constructed of 16 gauge galvanized steel, and shall utilize a standing seam modular panel type construction. The panels shall be attached to each other, to the roof, and to the floor using bolts so that all panels are removable. All seams shall be sealed with a high strength polyurethane sealant prior to assembling the panels. After assembly, exterior panel seams shall be filled with acrylic latex caulk for appearance. Bolting shall be zinc plated ¼-20 on maximum 8" centers. Sheet metal or 'Tek' fasteners are not acceptable for sealing pressure containing panels.

1. Fan sections shall include 20 gauge perforated galvanized interior sheet metal liners in fan blast area.

2. Cooling coil and direct evaporative sections shall include 20 gauge 304 stainless steel liner.
3. Insulation in sections lined with perforated sheets shall be faced with neoprene.
4. All floor openings shall have 1" minimum flange up around entire perimeter. All floor openings shall be covered with industrial grade bar grating.
5. Roof shall be sloped at ¼" per foot for all exterior units. Slope must be maintained after installation.
6. Access doors shall be provided full height (72") where unit height permits, and shall be 24" wide where section length permits, otherwise minimum of 18" shall be used. Doors shall be 2" thick, double wall and insulated type. Exterior door panels shall be painted galvanized steel with minimum 2,000 hour performance paint in accordance to ASTM B117 Salt Fog Test; interior panels are bright galvanized G90 steel. Door insulation shall be injected urethane foam with a minimum R value of 13-Ft2-°F/BTU. Door frames shall be heavy aluminum extrusion with one-piece, closed cell, replaceable santoprene gasket seal.
7. Door hinges shall be die-cast zinc with provision for adjustment without the use of shims or special tools. Door latches and handles are to be bolted to the unit and made with corrosion resistant materials. Bolts, nuts and shafts for door latches, handles and hinges shall be made of zinc plated steel. Door latch and pawl assembly shall be industrial quality and corrosion resistant with a handle on both the inside and outside of door. Latching mechanism shall be of conical roller design. Latch and pawl assembly shall be bolted together without the use of set screws allowed.
8. All doors to fan sections shall be provided with latches which require a tool to open.
9. Viewing windows shall have double thermal pane wire reinforced safety glass.

C. Insulation: Wall and ceiling panels shall be insulated with 2"-1.5#/cu.ft. fiberglass insulation. Insulation under solid lining shall be unfaced; otherwise, insulation shall be faced with an acrylic or neoprene coating. Insulation shall be tested and rated per ASTM C 423 and NFPA-90a rated. Insulation shall have thermal conductivity K factor of .24 Btu/Hr/Sq Ft/Degree F @ 75□F mean and the following sound attenuation characteristics:

Octave Bands 125 250 500 1K 2K 4K NRC

Absorption Coefficient .15 .77 1.111.081.001.031.00

D. Paint Finish: Exterior wall and roof panels shall be coated with air dry acrylic polyurethane to a minimum dry thickness of 3 mils. Finish shall have no blistering or rusting on unscribed areas after 2,000 hours in accordance with ASTM B-117 Salt Fog Test.

E. Fans:

1. Housed Fan Assembly: Fan housing shall be heavy gauge galvanized steel construction. Fan scroll shall be bolted to fan frame. Bearings shall be cast iron pillow block mounted self-aligning ball type. Bearings shall be rated for a minimum average life of 200,000 hours at the maximum horsepower and speed ratings for the fan class. Fan wheel and sheaves shall be keyed to the fan shaft. Each fan assembly, including sheaves and belts, shall be trim balanced at the factory in accordance with ANSI 204-96 to Balance Quality Grade G6.3. Fans shall be rated in accordance with AMCA standard 210 for air performance and AMCA 300 for sound. All fans shall carry the AMCA certification label.
2. Plenum Fan Assembly: Fan shall be 12-blade airfoil wheel direct drive arrangement 4 as indicated on the schedule and plans. Fans shall be rated in accordance with AMCA Standard 210 for air performance and AMCA 300 for sound. All fans shall carry the AMCA certification label.
3. Fan Assembly Isolation Base: Fan and motor shall be mounted on an integral fully welded structural steel base. Base shall be free floating at all four corners on spring type isolators with earthquake restraints rated for Seismic Zone 4 requirements. Isolator spring deflection shall be 2" minimum or as indicated on specifications.
4. Motors and Drive: Furnish premium-efficiency open drip proof, NEMA frame, ball bearing type motors, inverter duty. Motor horsepower shall be in accordance with the schedule and are minimum allowable. Minimum service factor shall be 1.15 and motors shall not be selected to

operate in the service factor. The fan motors shall be factory wired to an external junction box with flexible conduit of adequate length so that it will not have any effect on the vibration isolation.

F. Coil Sections:

1. Chilled water coils shall be of the plate fin extended surface type. Tubes shall be seamless copper with a 0.025" minimum wall thickness. Tubes shall be mechanically expanded into the fin collars to provide a permanent mechanical bond. Coil return bends shall be minimum one material thickness thicker than the tubes. Return bends shall be brazed. Hairpin return bends shall not be acceptable.
2. The secondary surface shall be die formed of aluminum with thickness as specified on the equipment schedule. Fin spacing shall not exceed 12 fins per inch. Headers shall be non-ferrous material, outside the airstream and provided with brazed male pipe connections. Drain and vent fittings shall be provided for complete coil drainage. All coil connections shall be extended to the exterior of the air handling unit.
3. All coils shall have counterflow construction with connections left or right hand as shown on the drawings. The use of internal restrictive devices to obtain turbulent flow will not be accepted.
4. Cooling coil casings shall be of minimum 16 gauge 304 stainless steel. All other coil casing shall be of 16 gauge galvanized steel. Tube sheets shall have extruded tube holes. All coil assemblies shall be tested under water at 300 psi and rated for 150 psi working pressure.
5. Main drain pans are recessed 16 gauge 304 stainless steel with a double sloped IAQ design to ensure complete condensate drainage. Drain pans are insulated with 2" of urethane foam with an R value of at least 11.5. The insulation is protected by a 20 gauge galvanized steel liner. Coils are to be installed above drain pan. Coils installed with coil casings in the main condensate drain pans are not acceptable.
6. Intermediate condensate pans are to be furnished on multiple coil units and single coils greater than 48" high. The pans shall be 16 gauge 304 stainless steel. Intermediate pans shall extend at least 6" in the direction of airflow and drain to the main drain pan through copper downspouts.

G. Filter Sections: Filter sections shall be factory fabricated as part of the air handling unit. Filters shall be arranged for upstream, downstream or side loading into galvanized filter frames. Provide filter holding frames to accommodate scheduled filters. Filter rack shall be thoroughly caulked and sealed for minimal filter bypass.

H. Damper Sections: Dampers shall be low leakage type with airfoil blade design. All dampers shall carry the AMCA Standard 500 certification label. Air leakage through a 48" x 48" damper shall not exceed 10 CFM/ft².

1. Blade gasket shall be extruded EPDM elastomer secured in an integral slot within the aluminum extrusion. Frame seals shall be extruded TPE thermoplastic. Overlapping blade design shall compress seals to ensure tight seal on closure.
2. Damper frame shall be extruded aluminum with a thickness of not less than .080" and a depth of 4". Pivot rods shall be 7/16" hexagon extruded aluminum interlocking into blade section.
3. Bearings shall be double seal with an inner bearing fixed to the rod within a polycarbonate outer bearing inserted into the frame so that the outer bearing cannot rotate. Bearings shall be designed so that there is no metal to metal contact.
4. Linkage hardware shall be installed outside of the frame and constructed of corrosion resistant aluminum and zinc plated steel.

I. Fan Air Flow Measuring Stations: The flow measuring station shall consist of total pressure taps located in the inlet cone of each fan, with static pressure tap located near fan inlet panel. Any flow measuring device which creates an obstruction in the fan inlet is not acceptable.

1. Provide a Dwyer magnehelic pressure gauge with CFM scale which indicates the fan volume. Flow gauges shall be calibrated to match the flow coefficient of the fan inlet cone provided.

2. Provide a Setra model 264 electronic differential pressure transmitter mounted to the exterior of the fan section. The transmitter shall be produce a 4 – 20 mA or 0 – 5 Vdc signal linear and scaled to air volume or velocity. The transmitter shall be capable or withstanding over pressurization up to 200 times greater than span and shall be factory calibrated.

J. Access Sections: Access sections shall be installed where indicated on the drawings and shall be as specified on the equipment schedule.

1. Access sections shall have double-walled hinged doors.

K. Sound Attenuator Section: Air handler manufacturer to provide sound attenuators to meet sound criteria for the project.

1. All acoustical performance and aerodynamic data for attenuator is derived from NVLAP accredited laboratory tests in accordance with ASTM E477-99, the standard method for testing duct silencers.
2. Standard Construction:

a. Maximum Differential Pressure: 8 in. wg (1987 Pa)
b. Outer casing: 22 gauge (0.85 mm) galvanized steel
c. Perforated material: 26 gauge (0.55 mm) galvanized steel
d. Fill material: Inorganic and of sufficient density, packed under 5% compression.
e. Meets NFPA 90A, UL-723 & ASTM C24 and E84

L. Electrical: Provide vapor tight marine lights as specified in the submittal documents, factory wired to a single weatherproof switch located on exterior of cabinet. Provide weatherproof, 15 amps, GFCI receptacle near the light switch wired to the lighting circuit. Separate 120/1/60 power to the light switch shall be provided and installed by others.

1. All wiring shall meet N.E.C requirements.
2. All wiring shall be run in EMT conduit, raceways are not acceptable. If the unit requires splits, junction boxes shall be furnished on each section to allow the electrical contractor to make final connections in the field. Wiring shall be clearly labeled to facilitate field connection.
3. Variable frequency drive for indoor units shall be housed in Nema 1 enclosure. Variable frequency drives for outdoor units shall be housed in suitable NEMA 3R rated enclosures, or in recessed enclosures provided inside the air handling unit, equipped with air-tight access doors and interior cooling provided by circulating conditioned air.
4. Motor starter panels shall carry the U.L. 508 listing.

M. Testing:

1. Factory Leak Test: Air Handling Unit manufacturer shall provide a witnessed factory leakage test at 1.5 times design static pressure up to a maximum of 12" w.g. Leakage rate at test pressure shall not exceed 0.5% of design air volume. Unit shall be tested with all openings sealed. A pressure blower with a variable frequency drive shall be used to set the test pressure. CFM shall be determined using a calibrated orifice. Unless specified otherwise, test pressures shall be positive on positively pressurized sections and negative on negatively pressurized sections of the air handler. A report of all test results shall be written and submitted to Owner's representative for approval.
2. Factory Cabinet Deflection Test: Air handling unit manufacturer shall provide a witnessed factory Panel Deflection Test at the unit design static pressure (1.5 times design static pressure optional). Panel deflection shall not exceed L/200 of longest plane being measured the test pressure. The casing deflection shall be measured at mid point of panel and at panel seam. A report of all test results shall be written and submitted to Owner's representative for approval.
3. Air Flow Test:
4. Factory Sound Test: Air handling unit manufacturer shall provide factory sound test witnessed by owner's representative, mechanical engineer of record, and mechanical contractor. Tests shall be in accordance to AMCA 320 for sound and AMCA 210 for airflow performance. Noise measurements shall be measured at the Inlet, Outlet and Casing Radiated positions. Sound

test must be performed with AMCA flow chamber with AMCA certified nozzles for verification of airflow and horsepower. Costs for travel and lodging to be provided by manufacturer's representatives.

N. Warranty: The manufacturer shall provide a one (1) year parts warranty from the date of startup or 18 months after shipment, whichever comes first.

2.4 HEAT PUMP

A. GENERAL

5. Factory- assembled, single- piece, heat pump unit. Contained within the enclosure shall be all factory wiring, piping, controls, refrigerant charge (R- 410A), and special features required prior to field start- up.

B. UNIT CABINET

1. Unit cabinet shall be constructed of phosphated, zinc- coated, pre- painted steel capable of withstanding 500 hours of salt spray.
2. Normal service shall be through a single removable cabinet panel.
3. The unit shall be constructed on a rust proof unit base that has an externally trapped, integrated sloped drain.
4. Indoor fan compartment top surface shall be insulated with a minimum 1/2- in. (12.7 mm) thick, flexible fiberglass insulation, coated on the air side and retained by adhesive and mechanical means. The indoor wall sections will be insulated with a minimum semi- rigid, foil- faced board capable of being wiped clean. Aluminum foil- faced fiberglass insulation shall be used in the entire indoor air cavity section.
5. Unit shall have a field- supplied condensate trap.
6. Metal Insulated Duct Covers for side discharge will be standard on all sizes.
7. Unit insulation conforms to ASHRAE 62P.

C. FANS

1. The indoor fan shall be 5- speed, direct- drive, as shown on equipment drawings.
2. fan wheel shall be made from steel and shall be double--inlet type with forward- curved blades withcorrosion resistant finish. Fan wheel shall be dynamically balanced.
3. Outdoor fan shall be direct- drive, propeller--type with aluminum blades riveted to corrosion resistant steel spiders, be dynamically balanced, and discharge air vertically.

D. Compressor:

1. Fully hermetic compressors with factory- installed vibration isolation.
2. Scroll compressors shall be standard on all units.
3. Compressor Protection:

Defrost control shall protect compressor by preventing "short cycling."

E. Coils:

Indoor and outdoor coils shall have aluminum plate fins mechanically bonded to seamless copper tubes with all joints brazed. Tube sheet openings shall be belled to prevent tube wear.

F. Refrigerant Metering Device:

Refrigerant metering device shall be thermostatic expansion valve for cooling, and fixed orifice for heating.

G. Filters:

Filter section shall consist of field- installed, throwaway, 1- in. (25 mm) - thick fiberglass filters of commercially available sizes.

H. Controls and Safeties:

1. Unit controls shall be complete with a self--contained, low- voltage control circuit.
2. Units shall incorporate an internal compressor protector that provides reset capability.

3. Mechanical control to be used with Alerton control.

I. Operating Characteristics:

1.Unit shall be capable of starting and running at 125_F (51.7_C) ambient outdoor temperature.

2. Compressor with standard controls shall be capable of operation down to 40_F (4.4_C) ambient outdoor temperature in cooling mode.

3. Unit shall be provided with 60- second fan time delay after the thermostat is satisfied.

J. Electrical Requirements:

All unit power wiring shall enter the unit cabinet at a single location.

K. Motors:

1. Compressor motors shall be of the refrigerant- cooled type with line--break thermal and current overload protection.

2. All fan motors shall have permanently lubricated bearings, and inherent, automatic reset, thermal overload protection.

3. Condenser fan motor shall be totally enclosed.

4. Evaporator Fan Motor to be ECM Motor.

5. Condenser fan motor shall be totally enclosed.

2.5 CEILING EXHAUST FANS

A. See the sizes and capacities indicated on the drawings, complete with direct drive blower, motor, grille, housing, mounting frame, backdraft damper, roof or wall cap discharge, U.L. label and shall be tested and rated in accordance with the applicable AMCA Codes.

Accessories.

1. See equipment schedule.
2. Provide fan speed control for air balance purposes.

2.6 ROOF-TOP EXHAUST FANS

B. Centrifugal Fan Unit: V-belt driven.

C. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheave selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

D. Accessories.

1. See equipment schedule.

2.7 FIRE AND SMOKE/FIRE DAMPERS.

A. See mechanical plans.

2.8 DUCTWORK AND ACCESSORIES

A. General: Non-combustible or conforming to requirements for Class 1 air duct materials, or UL 181.

B. Steel Ducts: ASTM A525 or ASTM A527 galvanized steel sheet, lock-forming quality, having zinc coating of 1.25 oz per sq. ft. for each side in conformance with ASTM A90. Round duct shall be spiral seam construction.

C. Spiral Ducts: Interlocking spiral of galvanized steel or aluminum construction; rated to (2 inches WG positive and 1.5 inches WG negative for low pressure ducts) (and 15 inches WG positive or negative for medium high pressure ducts.)

D. Insulated Flexible Ducts: Flexible duct wrapped with flexible glass fiber insulation, enclosed by Pressure Ductwork: seamless aluminum pigmented plastic vapor barrier jacket; maximum 0.23 K value at 75 degrees F w/metal connectors.

E. All flex ducts shall not exceed 7'-0" in length to respective diffusers, registers, and etc.

F. Fasteners: Rivets, bolts, or sheet metal screws.

G. Sealant: Non-hardening, water resistant, fire resistive, compatible with mating materials; liquid used alone or with tape, or heavy mastic.

H. Hanger Rod: Steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

I. Low Pressure Ducts:

1. Fabricate and support in accordance with 2010 CMC, SMACNA Low Pressure Duct Construction Standards and ASHRAE handbooks, except as indicated. Gages for galvanized steel ducts for low pressure systems where velocities do not exceed 2000 FPM shall be as follows:

RECTANGULAR DUCT		ROUND DUCT	
Dimension of Largest Side (L) in Inches	Gage	Diameter (D) in Inches	Ga.
$L \leq 12$	26	$D < 9$	26
$12 \leq L \leq 30$	24	$9 \leq D < 14$	24
$30 < L \leq 54$	22	$14 \leq D < 23$	22
$54 < L \leq 84$	20	$23 \leq D < 37$	20
$84 < L$	18	$37 \leq D < 51$	18
		$51 \leq D < 61$	16
		$61 \leq D < 84$	14

2. All joint and seam constructions as indicated in the CMC are acceptable.

3. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts. No variation of duct configuration or sizes permitted except by written permission.

4. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows are used, provide turning vanes.

5. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible. Divergence upstream of equipment shall not exceed 30 degrees; convergence downstream shall not exceed 45 degrees.

6. Use double nuts and lock washers on threaded rod supports.

J. Volume Control Dampers:

1. Fabricate in accordance with SMACNA Low Pressure Duct Construction Standards, and as indicated.

2. Opposed blade dampers shall have factory-fabricated blades, with factory assembled linkages, mounted in frames. Blades shall have interlocking edges and ends. Rectangular dampers 6" or more wide, shall be the multi-blade type. Blades on multi-blade type dampers must not be over 6" wide. Dampers shall be of the opposed blade type. Dampers shall have bar or channel frames and corner bracing. All blade and linkage bearings shall be self lubricating plastic. Damper assembly leakage not to exceed 1% with 4.0 W.C. static pressure.

3. Provide locking, indicating quadrant regulators on single and multi-blade dampers.

4. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.

K. Duct Test Holes:

1. Cut or drill temporary test holes in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

2.9 REFRIGERANT PIPING

A. Insulation and covering on all pipe and tubing shall have flame spread rating not to exceed 25 and a smoke density not to exceed 50 when tested in accordance with CMC.

B. Support in accordance with SMACNA Pipe Bracing Requirements.

C. Refrigeration Piping: Type 'L' hard temper copper tubing with wrought copper fittings, silver brazed, suitable for 400 psi working pressure.

2.10 DIFFUSERS, REGISTERS, AND GRILLES:

A. Fabricate of steel with steel or aluminum frame and baked enamel off-white finish.

B. Provide opposed blade damper and multi-louvered equalizing grid with damper adjustable from diffuser face as indicated on the drawings.

C. Ceiling Diffusers (CD): Krueger Model 124O, 4-way throw, with balancing damper, or approved equal.

D. Supply Register (SR) and Exhaust Register (EG): Krueger Type 88OH and S8OH, steel with opposed blade damper, or approved equal.

E. Accessories: See equipment schedule.

2.11 THERMOSTATS

A. EMS system.

1. Alerton.

2. Approved Equal

2.12 CONTROLS

A. The Mechanical Contractor shall be responsible for the proper coordination of all control work and electrical work in connection therewith. He shall also be responsible for the proper operation of the entire system.

B. The Electrical Contractor shall furnish and install all line voltage control wiring, and in all conduit. Wire sizing and length of run shall be coordinated with the manufacturer and Electrical Engineer. The Mechanical Contractor shall furnish and install all low voltage control wiring, and in conduit.

C. Electrical Work: All electric relays, hand-off automatic switches and all electrical wiring and all conduit will be provided under the Electrical Section, except as otherwise specified. Furnish and install additional conduit, wiring, relays, hand-off automatic switches made necessary by the use of approved substituted equipment under this Section with no additional cost to the owner.

D. Refer to drawings for control diagrams and additional requirements.

E. Calibration of Controls: The Mechanical Contractor shall carefully calibrate and adjust all controls as required to maintain comfort conditions and maximum energy conservation.

2.13 INSULATION

A. General:

1. All insulation shall have composite (insulation, jacket or facing, and adhesive used to adhere the facing or jacket to the insulation) fire smoke hazard ratings as tested by procedure ASTM E84, NFPA 255 and UL 723 not exceeding:

Flame Spread: 25

Smoke Developed: 50

2. All products or their shipping cartons shall bear a label indicating that flame and smoke ratings do not exceed above requirements. Any treatment of jackets or facings to impart flame and smoke safety shall meet the above requirements.

3. The Contractor shall certify that all products used have met the above criteria.

4. The insulation values shown are a minimum. If the requirements of Title 24 exceed these values, the amount of and/or type must be increased to meet the Title 24 requirements.

B. Duct Insulation:

1. Fiberglass Duct Wrap:

a. Insulation: ASTM C553; flexible, noncombustible blanket.

1) 'K' value: ASTM C518, 0.48 at 75 degrees F.

2) Maximum service temperature: 250 degrees F.

3) Density: 0.75 lb/ ft^3.

b. Vapor Barrier Jacket:

1) Kraft paper reinforced with glass fiber yarn and bonded to aluminized film vinyl.

2) Moisture vapor transmission: ASTM E96; 0.5 perm.

3) Secure with pressure sensitive tape.

c. Vapor Barrier Tape: Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

d. Tile Wire: Annealed steel, 16 gage.

2. Glass Fiber Duct Liner, Flexible:

a. Insulation: ASTM C553; flexible, noncombustible blanket.

1) 'K' value: ASTM C518, 0.24 at 75 degrees F.

2) Maximum service temperature: 250 degrees F.

3) Density: 1.5 to 3.0 lb/ft3.

4) Maximum Velocity on Coated Air Side: 4,000 ft/min.

b. Adhesive: Waterproof (fire-retardant) type.

c. Liner Fasteners: Galvanized steel, self-adhesive pad.

3. Glass Fiber Duct Liner, Rigid:

a. Insulation: ASTM C612; semi-rigid, noncombustible.

1) 'K' value: ASTM C518, 0.24 at 75 degrees F.

2) Maximum service temperature: 250 degrees F.

3) Density: 1.5 to 3.0 lb/cu ft.

4) Maximum Velocity on Coated Air Side: 4,000.

b. Adhesive: Waterproof (fire-retardant) type.

3. PART 3 - EXECUTION

3.1 GENERAL

A. Install all equipment in locations indicated on the Drawings. Contractor will be responsible to verify with the owner, if suitability is doubted. Contractor shall notify the owner before installation into any apparent improper locations of interference with other work such as electrical outlets, windows, cabinetwork or other features.

3.2 INSTALLATION

A. Rooftop Package Unit Air Conditioner: Install in accordance with manufacturer's instructions. Mount units on factory built roof-mounting frame providing watertight enclosure to protect ductwork and utility services, or on platforms. Install roof mounting frame level.

B. Ductwork and Accessories:

1. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.

2. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

3. Install accessories in accordance with manufacturer's instructions and to meet the provisions of "Seismic Restraint Manual: Guidelines For Mechanical Systems," Latest SMACNA guidelines.

4. Provide balancing dampers at points on low-pressure supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Use splitter dampers only where indicated.
5. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and motorized equipment.
6. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, and elsewhere as indicated. Provide minimum 12x 12 inch size for hand access, 30 x 30 inch size for shoulder access, and as indicated.
7. Provide duct test holes where indicated and required for testing and balancing purposes.
8. Check location of outlets and inlets and make necessary adjustments in position to conform to Architectural features, symmetry, and lighting arrangement.
9. Install diffusers to ductwork with airtight connection.
10. Provide balancing dampers on duct take-off to diffusers and registers, regardless of whether dampers are specified as part of the diffuser, or register assembly.
11. Paint ductwork visible behind air outlets and inlets matte black.

C. Thermostats and over-ride switches: Install at 48" above finished floor unless otherwise stated. Coordinate with other trades. Contractor shall be responsible for verifying, furnishing all controls and wiring for thermostats and shall co-ordinate all requirements with other trades including notifying electrical contractor of necessary conduit and power requirements. All costs for scope of work shall be submitted for final bid.

D. Insulation:

1. Duct Insulation:
   a. Unless specifically indicated on the drawings the Contractor may line or wrap ductwork to meet insulation requirements.
   b. Fiberglass duct wrap:
      1) Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
      2) Secure insulation without vapor barrier with staples, tape, or wires.
      3) Install without sag on underside of ductwork. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift ductwork off trapeze hangers and insert spacers.
      4) Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
      5) Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
   c. Duct (and Plenum) liner Application:
      1) Install as indicated (sound lining) on the drawings.
      2) Adhere insulation with adhesive for 100 percent coverage. Secure insulation with mechanical liner fasteners. Refer to SMACNA Standards for spacing. Seal and smooth joints. Seal liner surface penetrations with adhesive.
      3) Duct dimensions indicated are net inside dimensions required for airflow. Increase duct size to allow for insulation thickness.

E. Install Spring Curb Rail vibration isolation system per manufacturer's recommendations. Provide seismic clips (each end of each side –8 total) from A/C unit to roof curb, and z straps from A/C unit to equipment curb per manufacturer's recommendations. Submit shop drawings for location of points of attachment, and methods and materials.

3.3 CLEANING:

A. Clean duct system and force air at high velocity through duct to remove accumulated dust during construction. To obtain sufficient air, clean half the system at a time. Protect equipment that may be harmed by excessive dirt with temporary filters, or bypass during cleaning.

B. Clean duct systems with high power vacuum machines. Protect equipment that maybe harmed by excessive dirt with filters, or by during cleaning. Provide adequate access into ductwork for cleaning purposes.

C. All filters shall be replaced one week prior to occupancy of owner.

D. Coordinate schedule with Architect & District.

3.4 AIR SYSTEM TEST AND BALANCE

A. Perform all tests to the entire satisfaction of the owner. Air balancing contractor shall notify owner one week prior to scheduling air balance at the site.

B. Regulating and Adjusting Air Systems:

1. The Contractor shall have an experienced independent testing company certified member of the Associated Air Balance Council (A.A.B.C.) specializing in air conditioning system testing completely balance the air systems so that the volume of air indicated on the drawings is being delivered to the outlets. He shall adjust and re-adjust this part of the work until the operation complies with the requirements of the drawings and specifications.

2. Testing Procedure: Procedures shall conform to A.A.B.C. standards. Provide reports in sort cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.

3. The following test data shall be taken and three (3) copies submitted in tabulated form to the Architect for each system:

a. Test and adjust all supply, return & exhaust blower RPM to design requirements.

b. Test and record all motor full load amperes.

c. Test and record system static pressures, suction and discharge.

d. Test and adjust system for design re-circulated air, CFM.

e. Test and adjust system for design CFM outside air.

f. Adjust all supply and return outlets to within 5% of design CFM.

C. The VVT system shall be balanced along with the controls contractor to ensure proper calibration and setting of damper positions.

3.5 SOUND AND VIBRATION ISOLATION

A. All vibrating equipment shall be sound isolated from the structure.

B. The Contractor shall submit all necessary data for each vibration isolator, including static deflection and weight loading, for equipment in operation.

C. All vibrating equipment shall be provided with flexible connections. Submit for approval prior to installation.

3.6 JOB COMPLETION

A. Equipment Identification:

1. All equipment furnished under this section shall be provided with the manufacturer's metal identification labels securely attached and showing all pertinent data, including performance characteristics, size, model, and serial number. Labels shall not be obscured in any manner.

2. Identification name plates shall be provided on all equipment and control components, including room thermostat numbers coded to their respective automatic zone damper, valve, or air conditioning unit. Name plates shall be constructed of black bakelite with white center engraved letters three-sixteenth inch (3/16") high and shall be cemented to equipment with an epoxy resin. The Contractor shall submit to the Architect, a complete list of name plate titles for approval prior to installation.

B. Final Operation: Upon completion of the installation of the equipment and after all systems have been tested, cleaned, the Contractor shall place a competent person in charge who shall operate the equipment for a period of three eight-hour days. During this period of operation, all safety and operating controls shall be actuated to demonstrate proper operation. During this operating period, the Owner's representative shall be instructed in all details of operation and maintenance. All required instructions from the equipment manufacturer's representative shall be given during the period.

C. Operation Instructions:

1. Prepare a diagram of the entire control system with a full description of the heating, ventilating and air conditioning systems.

2. After approval by the Engineer, the control diagram and complete operating instructions shall be mounted under glass and installed where directed.

3. Prepare two (2) maintenance manuals which shall include all the necessary or pertinent data, such as:

   a. Names, addresses and emergency phone numbers of all suppliers and manufacturers.

   b. Part numbers of all replaceable items.

   c. Oiling and lubrication instructions.

   d. Air balance report.

   e. Control diagram and operation sequence, together with labeling of controls and instruments to match the diagram.

   f. A maintenance schedule which shall list all required maintenance on all equipment furnished under this section of the specifications and the intervals of which the items are to be performed.

D. Clean-Up:

1. After all heating, ventilating and air conditioning work has been tested and approved, the Contractor shall thoroughly clean all parts of the equipment installation. Exposed parts which are to be painted are to be thoroughly cleaned of cement plaster and other materials and all greases and oil spots removed with solvent. Exposed rough metal work to be carefully brushed down with steel brushes to remove rust and other spots and left in proper condition to receive painter's finish.

2. Remove all debris from the job site, all cartons, boxes, packing crates, excess materials not used occasioned by the work and to the satisfaction of the Owner.

3. If the above requirements of clean-up are not to the satisfaction of the Owner, the Owner reserves the right to order the work done and the cost of which shall be borne by the Contractor.

4. The Contractor shall remove on a daily basis all debris from the job site, to the satisfaction of the Owner.

5. If the above requirements of clean-up are not to the satisfaction of the Owner, the Owner reserves the right to order the work done by a third party and the cost of which shall be borne by the Contractor.

END OF SECTION

SECTION 15895

HVAC EQUIPMENT AND DUCT CLEANING

1. PART 1 - GENERAL

1.1 GENERAL CONDITIONS

A. General Conditions of the construction contract shall be a part of these specifications, and shall govern the HVAC Systems Rehabilitation Contractor. All work shall be done in accordance with requirements of the Owner and the construction contractor.

1. Contractor's License: The Contractor shall be licensed in the State of California. This License shall be a C-61 Specialty License in the D-64 Duct Cleaning Sub-Division.
2. "National Air Duct Cleaners Association (NADCA): The contractor shall be a Certified Member in good standing with NADCA.

1.2 QUALITY ASSURANCE

A. Contractor shall have thorough knowledge and experience in the rehabilitation and cleaning of projects of similar type, size, and degree of difficulty completed within the last two years.

1. All work shall be supervised by a foreman having thorough knowledge and experience in the cleaning of air conditioning systems. Experienced, qualified personnel shall perform the work.
2. Contractor shall be fully covered by Workmen's Compensation, Public Liability and Property Damage Insurance, and certificates of these coverage's and limits shall be provided to the Owner upon request.

B. Photo Documentation: Documentation shall include the use of a 35-mm camera and a fiberoptic boroscope, where required. Contractor shall take photos of conditions before and after cleaning for inclusion in a project report to be presented to the Owner at the conclusion of the work.

1.3 LABOR AND MATERIALS

A. Contractor shall furnish all labor, materials, supplies, tools, equipment, supervision, transportation and any other services or items necessary to accomplish the work.

B. Safety Procedures and Policy: Contractor shall provide adequate and necessary management personnel to ensure that all safety policies and project requirements are met.

1. Maintain safe and healthy employee working conditions and establish safe operating procedures at each job site.
2. Comply with the safety standards of all federal and state regulatory agencies as a minimum requirement for safety performance at each job site.
3. Comply with all of the safety requirements of the job site and safety requirements mandated by the owner.
4. Contractor shall provide all necessary safety devices and personal protective equipment for employee use, and shall require their use when needed.

2. PART 2 - PRODUCTS

2.1 MATERIALS AND PRODUCTS

A. Material Safety Data sheets for all materials and products used by Contractor shall be provided to Owner prior to start-up of cleaning operations.

B. Degreaser: Maintex 7-11 Armex Baking Soda Blasting Crystals or equal as approved by Owner.

C. Sanitizer Oxine BBJ Microblocide or other EPA registered equal as approved by Owner.

D. Re-Surfacing Treatments: Schuller Superseal Edgecoat Fosters 40-20 Vac-Systems Tough Coat Porta Sept by Porter Paints, containing EPA registered anti-microbial Swamp Cooler Repair condensate drain pan sealant or other EPA registered equal as approved by Owner.

E. Paint: Styletone Series 8 19 Machinery Grey Zynolite Spray Paint.

F. Insulating Lining Material: To match existing or Certainteed Tough Gard Certainteed Ultra-Lite Armaflex Astro-Foil or equal as approved by Owner.

G. Adhesives: Armstrong 520 DPIO/20 Super 77 Spray Adhesive or equal as approved by Owner.

H. Duct Sealant: DP 10/10 Top 12000 Silicone Sealant or equal as approved by Owner.

3. PART 3 - EXECUTION

3.1 METHODOLOGY

A. Duct Liner Adhesive: Shall be NFPA 225 and ANSI/NFPA 90A Class I rated for a maximum of 25 flame spread test, and 50 for smoke development. Wet flammability shall conform to ASTM D93. Water vapor performance of sealers and coatings shall conform to ASTM E96 with a maximum of 9 Perms.

B. Air Intake Screens, Fresh Air Louvers and Return Air Louvers: Shall be wire brushed, vacuumed and washed using a solution non-caustic to the painted surfaces.

C. Automatic and Manual Dampers: Shall be inspected and tested to ensure freedom of action. Any mechanical defects will be reported to owner for correction. All manual dampers shall be marked and reset in the exact position as found at the commencement of the project.

D. Supply Grilles, Return Grilles, Exhaust Grilles: Shall be removed and washed using a solution non-caustic to the finished surfaces.

E. Temporary Filters: Shall be placed behind all supplies grilles to trap any contaminants that might be discharged during the cleaning operation. The temporary filters will remain in place approximately two weeks after completion date, and then removed.

F. Supply Ducts, Return Ducts, and Exhaust Ducts: Shall be vacuumed in their entirety. All interior insulated ducts shall be vacuumed, and the insulation inspected for any physical damage. Any damage found will be reported to Owner for corrective action.

1. Access Panels: All ducts too small to allow direct entrance shall have access openings installed approximately every 10-15 feet as required, and at each elbow and vertical riser. Each access opening shall be recovered with a panel made of the same gauge metal, and installed in such a manner as to insure an air tight job. All sheet metal duct work shall be in accordance with SMACNA Standards,

G. Ceiling Access: Where required, shall be provided by general contractor.

H. Filter Frames: shall be cleaned by wire brushing and vacuuming prior to washing using a solution non-caustic to the finished surfaces. Where minor damage is discovered, the frames shall be repaired by straightening. Any major damage will be reported to Owner for corrective action.

I. Filters: shall be replaced by contractor after cleaning procedures.

J. Contractor shall keep the job site clean of all surplus materials and debris. Dispose of all debris and leave area swept clean at the end of each work shift.

END OF SECTION

SECTION 15900
ENERGY MANAGEMENT CONTROL SYSTEM

PART 1 – GENERAL

1.1 WORK INCLUDED

A. It is the Intent of this specification to provide Compton Education Center with a completely integrated management solution utilizing a totally native Alerton BACnet-based system, no exceptions. All building controllers, application controllers, and all input/output devices shall communicate using the protocols and network standards as defined by ANSI/ASHRAE Standard 135–2001, BACnet. In other words, all controllers, including unitary controllers, shall be native BACnet devices. The control system shall be Alerton BACtalk to match campus standards, no exceptions.

B. Provide all necessary BACnet-compliant hardware and software to meet the system's functional specifications. Provide Protocol Implementation Conformance Statement (PICS) for Windows-based control software and every controller in system, including unitary controllers.

C. The BMS shall provide Chilled Water and Hot Water Monitoring as shown on contract documents. The Control Contractor shall provide seamless integration to the existing workstations, controllers, and databases of the buildings being controlled.

D. The contractor shall provide a full integration into the existing Alerton Workstation. The Alerton hardware/software tools must be utilized to modify the programming and database changes in all new controllers; no other manufacturer tools are acceptable. This integration shall be seamless and complete; including but not limited to: all necessary hardware, system server, software, and new system graphic pages for all points and systems in these buildings, no exceptions.

E. Prepare individual hardware layouts, interconnection drawings, and software configuration from project design data.

F. Prepare individual hardware layouts, interconnection drawings, and software configuration from project design data.

G. Design, provide, and install all equipment cabinets, panels, data communication network cables needed, and all associated hardware.

H. Provide and install all interconnecting cables between supplied cabinets, application controllers, and input/output devices.

I. Provide and install all interconnecting cables between all operator's terminals and peripheral devices (such as printers, etc.) supplied under this section.

J. Provide complete manufacturer's specifications for all items that are supplied. Include vendor name of every item supplied.

K. Provide supervisory specialists and technicians at the job site to assist in all phases of system installation, startup, and commissioning

L. Provide a comprehensive operator and technician training program as described herein.

M. Provide as-built documentation, software, diagrams, and all other associated project operational documentation (such as technical manuals) on approved media, the sum total of which accurately represents the final system.

N. Provide new sensors, valves, and install only new electronic actuators. No used components shall be used as any part or piece of installed system.

1.2 SYSTEM DESCRIPTION

A. A distributed logic control system complete with all software and hardware functions shall be provided and installed. System shall be completely based on ANSI/ASHRAE Standard 135-2001, BACnet. This system is to control all mechanical equipment, including all unitary equipment (VAV boxes, heat pumps, fan-coils, AC units, etc.), lighting control, and all air handlers, boilers, chillers, and any other listed equipment using BACnet-compliant components. Non-BACnet-compliant or proprietary equipment or systems (including gateways) shall not be acceptable and are specifically prohibited.

B. Building controllers shall include complete energy management software, including scheduling building control strategies with optimum start and logging routines. All energy management software and firmware shall be resident in field hardware and shall not be dependent on the Master Network. Local operator's terminal software is to be used for access to field-based energy management functions only. Provide zone-by-zone direct digital logic control of space temperature, scheduling, runtime accumulation, equipment alarm reporting, and override timers for after-hours usage. E. All application controllers for every terminal unit (VAV, HP, UV, etc.) air handler, all central plant equipment, and any other piece of controlled equipment shall be fully programmable and communicate on a peer-to-peer basis. Application controllers shall be mounted next to controlled equipment and communicate with building controller via BACnet LAN.

C. Room sensors shall be provided with digital readout that allow the user to view room temperature, view outside air temperature, adjust the room setpoint within preset limits and set desired override time. User shall also be able to start and stop unit from the digital sensor. Include all necessary wiring and firmware such that room sensor includes field service mode. Field service mode shall allow technician to balance VAV zones and access any parameter in zone controller.

1.3 APPROVED MANUFACTURERS

A. The following Manufacturers' products may be installed for this Section of work (listed alphabetically):

1. Alerton Technologies, Inc (Campus Standard)

2. No others acceptable.

B. Only BTL approved equipment furnished by the above listed manufacturers will be acceptable. Products that not BTL approved will be rejected.

1.4 QUALITY ASSURANCE

A. Responsibility: The supplier of the FMCS shall be responsible for inspection and Quality Assurance (QA) for all materials and workmanship furnished.

B. Component Testing: Maximum reliability shall be achieved through extensive use of high-quality, pre-tested components. Each and every controller, sensor, and all other DDC components shall be individually tested by the manufacturer prior to shipment.

C. Tools, Testing and Calibration Equipment: The EMCS supplier shall provide all tools, testing, and calibration equipment necessary to ensure reliability and accuracy of the system.

D. The systems control manufacturer shall have been an established manufacturer of BACnet protocol systems for a minimum of five years.

E. Control system shall be engineered, programmed and supported completely by representative's local office that must be within 30 miles of project site. The control contractor shall be independent and standalone; and shall not be part of a Mechanical Contractor control division.

F. All system levels shall be compliant with the BACnet Standard 135-2004. Upon completion of commissioning process and prior to acceptance, contractor shall provide a protocol analyzer and demonstrate that all system components that communicate within the system utilize the BACnet protocol. Contractor may at their expense hire a qualified, independent registered engineer to perform test. Any components that do not fully comply with the BACnet standard shall be replaced until entire system architecture is re-tested and compliant. Conflict resolution shall be submitted to BTL (www.bacnetassociation.org) at Contractor's expense and BTL determination shall be final.

G. Prior to receiving approval to proceed on this project the contractor must provide and demonstrate the following:

1. Ten (10) customer references in Los Angeles County with installed native BACnet systems as specified for this project. These systems shall be online for no less than 2 years.
2. Five (5) large references in the Southwestern United States with installed native BACnet systems as specified for this project.
3. Reference Information must include the following:

i. Customer name
ii. Address
iii. Contact name
iv. Contact phone number
v. System description
vi. Statement of BACnet compliance

1.5 PROJECT MANAGEMENT

A. Have present at the project site, a project manager who shall, as a part of their duties, be responsible for the following activities:

1. Coordination between the Subcontractor and all other trades, Owner, Local Authorities, and design team.
2. Coordination of all activities between his subcontractors.
3. Attendance at subcontractor/general contractor meetings.
4. Scheduling of work progress, manpower loading, material delivery, equipment installation and checkout.
5. Coordination of all drawings and submittals between consultants, engineers, other sub-trades and his subcontractors.
6. Supervision of field technicians and interface with other trades.

1.6 REFERENCE STANDARDS

A. The latest edition of the following standards and codes in effect and amended as of supplier's proposal date, and any applicable subsections thereof , shall govern design and selection of equipment and material supplied:

1. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE).
2. ANSI/ASHRAE Standard 135-2001, BACnet.
3. Uniform Building Code (UBC), including local amendments.
4. UL 916 Underwriters Laboratories Standard for Energy Management Equipment. Canada and the US.
5. National Electrical Code (NEC).
6. FCC Part 15, Subpart J, Class A.
7. EMC Directive 89/336/EEC (European CE Mark)
8. City, county, state, and federal regulations and codes in effect as of contract date.

B. Except as otherwise indicated the system supplier shall secure and pay for all permits, inspections, and certifications required for his work and arrange for necessary approvals by the governing authorities.

1.7 SUBMITTALS

A. Drawings:
1. The system supplier shall submit engineered drawings, control sequence, and bill of materials for approval.
2. Drawings shall be submitted in the following standard sizes: 11" x 17" (ANSI B).
3. Eight complete sets (copies) of submittal drawings shall be provided.
4. Drawings shall be available on CD-ROM.

B. System Documentation: Include the following in submittal package:

1. System configuration diagrams in simplified block format
2. All input/output object listings and an alarm point summary listing.
3. Electrical drawings that show all system internal and external connection points, terminal block layouts, and terminal identification.
4. Complete bill of materials, valve schedule and damper schedule.
5. Manufacturer's instructions and drawings for installation, maintenance, and operation of all purchased items.
6. Overall system operation and maintenance instructions—including preventive maintenance and troubleshooting instructions.
7. For all system elements—building controller(s), application controllers, routers, and repeaters,—provide BACnet Protocol Implementation Conformance Statements (PICS) as per ANSI/ASHRAE Standard 135-2001.
8. A list of all functions available and a sample of function block programming that shall be part of delivered system.

C. Project Management: The vendor shall provide a detailed project design and installation schedule with time markings and details for hardware items and software development phases. Schedule shall show all the target dates for transmission of project information and documents and shall indicate timing and dates for system installation, debugging, and commissioning.

1.8 WARRANTY

A. Warranty shall cover all costs for parts, labor, associated travel, and expenses for a period of one year from completion of system acceptance.

B. Hardware and software personnel supporting this warranty agreement shall provide on-site or off-site service in a timely manner after failure notification to the vendor. The maximum acceptable response time to provide this service at the site shall be 24 hours Monday through Friday, 48 hours on Saturday and Sunday.

C. This warranty shall apply equally to both hardware and software.

1.9 RELATED WORK IN OTHER SECTIONS

A. Refer to Section 15000 for BASIC HVAC REQUIREMENTS

B. Refer to Section 16000 for BASIC ELECTRICAL REQUIREMENTS

C. Refer to Division 0 and Division 1 for related contractual requirements

PART 2 – PRODUCTS

2.1 BUILDING CONTROLLER

A. General Requirements:

1. Building Controller shall be of modular construction such that various modules may be selected to fit the specific requirements of a given project. Modules shall consist of a power supply module, a BACnet Ethernet-MS/TP module, a BACnet MS/TP only module and a modem module for telephone communication as a minimum. Those projects that require special interfaces may use Modbus modules as needed. However, all Ethernet communications and all

controllers including central plant controllers, advanced application controllers and unitary controllers supplied by BMS manufacturer shall utilize the BACnet protocol standard.

2. Modules shall be selected to fit the particular project application. Up to 7 modules shall be powered by a single power supply module. All modules shall be panel mounted on DIN rail for ease of addition and shall be interconnected via simple plug in cable. A module in the middle shall be replaceable without removing any other modules.

3. All modules shall be capable of providing global control strategies for the system based on information from any objects in the system regardless if the object is directly monitored by the building controller module or by another controller. The software program implementing these strategies shall be completely flexible and user definable. All software tools necessary for programming shall be provided as part of project software. Any systems utilizing factory pre-programmed global strategies that cannot be modified by field personnel on-site, via a wide area network or downloaded via remote communications are not acceptable. Changing global strategies via firmware changes is also unacceptable.

4. Programming shall be object-oriented using control function blocks, supporting DDC functions, 1000 Analog Values and 1000 Binary Values. All flowcharts shall be generated and automatically downloaded to controller. Programming tool shall be supplied and be resident on workstation. The same tool shall be used for all controllers.

5. Provide means to graphically view inputs and outputs to each program block in real-time as program is executing. This function may be performed via the operator's workstation or field computer.

6. Controller shall have a memory needed to ensure high performance and data reliability. Battery shall provide power for orderly shutdown of controller and storage of data in nonvolatile flash memory. Battery back-up shall maintain real-time clock functions for a minimum of 20 days.

7. Global control algorithms and automated control functions shall execute via 32-bit processor.

8. Schedules:
    a. Each building controller module shall support a minimum of 80 BACnet Schedule Objects and 80 BACnet Calendar Objects.

    b. Building controller modules shall provide normal 7 day scheduling, holiday scheduling and event scheduling.

9. Logging Capabilities:
    a. Each building controller shall log as minimum 320 values. Any object in the system (real or calculated) may be logged. Sample time interval shall be adjustable at the operator's workstation.
    b. Logs may be viewed both on-site and off-site via WAN or remote communication.
    c. Building controller shall periodically upload trended data to networked operator's workstation for long term archiving if desired.
    d. Archived data stored in database format shall be available for use in third-party spreadsheet or database programs.
10. Alarm Generation:
    a. Alarms may be generated within the system for any object change of value or state either real or calculated. This includes things such as analog object value changes, binary object state changes, and various controller communication failures.
    b. Each alarm may be dialed out as noted elsewhere.
    c. Alarm log shall be provided for alarm viewing. Log may be viewed on-site at the operator's terminal or off-site via remote communications.
    d. Controller must be able to handle up to 320 alarm setups stored as BACnet event enrollment objects – system destination and actions individually configurable.
11. Demand Limiting:
    a. Demand limiting of energy shall be built a built in function that shall be user configurable. Each controller module shall support shedding of up to 200 loads using a minimum of two types of shed programs.

b. Load shedding programs in Building Controller Modules shall operate as defined in section 2.1.J of this specification.

B. Ethernet – MS/TP Module:
1. Ethernet – MS/TP Module shall support every function as listed under paragraph A, General Requirements, of this section and the following:
a. All communication with operator workstation and all application controllers shall be via BACnet. Building controller Ethernet – MS/TP module shall incorporate as a minimum, the functions of a 2-way BACnet router. Controller shall route BACnet messages between the high-speed LAN (Ethernet 10/100MHz) and master slave token passing (MS/TP) LAN. Ethernet – MS/TP module shall also route messages from all other Building Controller modules onto the BACnet Ethernet network.
b. MS/TP LAN must be software configurable from 9.6 to 76.8Kbps.
c. The RJ-45 Ethernet connection must accept either 10Base-T or 100Base-TX BACnet over twisted pair cable (UTP).
2. BACnet Conformance:
a. Ethernet – MS/TP module shall as a minimum support MS/TP and Ethernet BACnet LAN types. It shall communicate directly via these BACnet LANs as a native BACnet device and shall support simultaneous routing functions between all supported LAN types. Global controller shall be a BACnet conformance class 3 device and support all BACnet services necessary to provide the following BACnet functional groups:
1) Clock Functional Group
2) Files Functional Group
3) Reinitialize Functional Group
4) Device Communications Functional Group
5) Event Initiation Functional Group
b. Please refer to Section 22.2, BACnet Functional Groups, in the BACnet standard for a complete list of the services that must be directly supported to provide each of the functional groups listed above. All proprietary services, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.
c. Standard BACnet object types supported shall include as a minimum: Analog Value, Binary Value, Calendar, Device, File, Group, Notification Class, Program and Schedule object types. All proprietary object types, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.
d. The Building Controller shall comply with Annex J of the BACnet specification for IP connections. This device shall use Ethernet to connect to the IP internetwork, while using the same Ethernet LAN for non-IP communications to other BACnet devices on the LAN. Must support interoperability on wide area networks (WANs) and campus area networks (CANs) and function as a BACnet Broadcast Management Device (BBMD).

C. MS/TP Module:
1. MS/TP Module shall support every function as listed under paragraph A, General Requirements, of this section and the following.
a. Building Controller MS/TP module communications shall be via BACnet master slave token passing (MS/TP) LAN to all advanced application and application specific controllers. MS/TP module shall also route messages to Ethernet-MS/TP module for communication over WAN.
b. MS/TP LAN must be software configurable from 9.6 to 76.8Kbps
c. Configuration shall be via RS-232 connection.
2. BACnet Conformance:
a. MS/TP module shall as a minimum support MS/TP BACnet LAN type. It shall communicate directly via this BACnet LAN as a native BACnet device and shall support simultaneous routing functions between all supported LAN types. Controller shall be a BACnet conformance class 3 device and support all BACnet services necessary to provide the following BACnet functional groups:
1) Clock Functional Group
2) Files Functional Group
3) Reinitialize Functional Group

4) Device Communications Functional Group
5) Event Initiation Functional Group

b. Please refer to Section 22.2, BACnet Functional Groups, in the BACnet standard for a complete list of the services that must be directly supported to provide each of the functional groups listed above. All proprietary services, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.

c. Standard BACnet object types supported shall include as a minimum: Analog Value, Binary Value, Calendar, Device, File, Group, Notification Class, Program and Schedule object types. All proprietary object types, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.

D. Power Supply Module:
1. Power supply module shall power up to 7 Building Controller Modules. Input for power shall accept between 17 and 30 VAC, 47 to 65 Hz.
2. Power supply module shall include rechargeable battery for orderly shutdown of controller modules including storage of all data in flash memory and for continuous operation of real time clocks for minimum of 20 days.

E. Modbus Module:
1. Modbus Module shall support every function as listed under paragraph A, General Requirements, of this section and the following.
a. Building Controller Modbus module communications shall be via one of three types of ports: EIA-485, EIA-422 or RS-232 connection. Modbus module shall convert Modbus data into BACnet objects. Modbus module shall also route messages to Ethernet-MS/TP module for BACnet Ethernet communication over WAN.
b. Modbus Module shall support ASCII or RTU Modbus communication at 9600 or 4800 baud.
c. EIA-422 and EIA-232 connection shall support one connection of Modbus unit.
d. EIA-485 connection shall support connection of up to 247 Modbus units.
e. Configuration shall be via RS-232 connection.
2. BACnet Translation.

F. All Modbus data shall be translated into BACnet objects by the Modbus module. All configuration tools shall be supplied to assure data is translated as necessary to the correct format and value.

G. Standard BACnet object types supported shall include as a minimum: Analog Value, Binary Value, Calendar, Device, File, Group, Notification Class, Program and Schedule object types. All proprietary object types, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.

2.2 EXPANDABLE CENTRAL PLANT AND AIR HANDLING UNIT CONTROLLERS

A. General:
1. Expandable application controller shall be capable of providing control strategies for the system based on information from any or all connected inputs. The program that implements these strategies shall be completely flexible and user definable. Any systems utilizing factory pre-programmed global strategies that cannot be modified by field personnel on-site via simple download are not acceptable. Changing global strategies via firmware changes is also unacceptable. Program execution of controller shall be a minimum of once per second.
2. Programming shall be object-oriented using control program blocks. Controller shall support a minimum of 500 Analog Values and 500 Binary Values. Each and every analog and binary value shall support standard BACnet priority arrays. Programming tool shall be provided with system and shall be the same tool that is used to program the Building Controller. All flowcharts shall be generated and automatically downloaded to controller. No re-entry of database information shall be necessary.
3. Provide means to graphically view inputs and outputs to each program block in real-time as program is executing. This function may be performed via the operator's terminal or field computer.

4. Controller shall have adequate data storage to ensure high performance and data reliability. Battery shall retain static RAM memory and real-time clock functions for a minimum of 1.5 years (cumulative). Battery shall be a field-replaceable (non-rechargeable) lithium type. Unused battery life shall be 10 years.
5. The onboard, battery-backed real time clock must support schedule operations and trend logs.
6. Global control algorithms and automated control functions should execute via 32-bit processor.
7. Controller shall include both on-board 10BASE-T/100BASE-TX Ethernet BACnet communication over twisted pair cable (UTP) and shall include BACnet IP communication. In addition, controller shall include BACnet PTP connection port.
8. The base unit of the controller shall host up to 8 expansion modules with various I/O combinations. These inputs and outputs shall include universal 12-bit inputs, binary triac outputs, and 8-bit switch selectable analog outputs (0-10V or 0-20 mA). Inputs shall support 3K and 10K thermistors, 0-5VDC, 0-10VDC, 4-20mA, dry contacts and pulse inputs directly.
9. All outputs must have onboard Hand-Off-Auto switches and a status indicator light. HOA switch position shall be monitored. Each analog output shall include a potentiometer for manually adjusting the output when the HOA switch is in the Hand position.
10. The position of each and every HOA switch shall be available system wide as a BACnet object. Expandable Central Plant Controller shall provide up to 176 discreet inputs/outputs per base unit.

B. BACnet Conformance:
1. Central Plant/AHU Controller shall as a minimum support Point-to-Point (PTP), MS/TP and Ethernet BACnet LAN types. It shall communicate directly via these BACnet LANs as a native BACnet device and shall support simultaneous routing functions between all supported LAN types. Building controller shall be a BACnet conformance class 3 device and support all BACnet services necessary to provide the following BACnet functional groups:
   a. Clock Functional Group
   b. Files Functional Group
   c. Reinitialize Functional Group
   d. Device Communications Functional Group
   e. Event Initiation Functional Group
2. Please refer to section 22.2, BACnet Functional Groups, in the BACnet standard for a complete list of the services that must be directly supported to provide each of the functional groups listed above. All necessary tools shall be supplied for working with proprietary information.
3. Standard BACnet object types supported shall include as a minimum: Analog Input, Binary Input, Analog Output, Binary Output, Analog Value, Binary Value, Device, File, Group, Event Enrollment, Notification Class, Program and Schedule object types. All necessary tools shall be supplied for working with proprietary information.
4. The Controller shall comply with Annex J of the BACnet specification for IP connections. This device shall use Ethernet to connect to the IP internetwork, while using the same Ethernet LAN for non-IP communications to other BACnet devices on the LAN. Must support interoperability on wide area networks (WANs) and campus area networks (CANs) and function as a BACnet Broadcast Management Device (BBMD).

C. Schedules: Each Central Plant/AHU controller shall support a minimum of 50 BACnet Schedule Objects.

D. Logging Capabilities:
1. Each controller shall support a minimum of 200 trend logs. Any object in the system (real or calculated) may be logged. Sample time interval shall be adjustable at the operator's workstation.
2. Controller shall periodically upload trended data to system server for long term archiving if desired.
3. Archived data stored in database format shall be available for use in third-party spreadsheet or database programs

E. Alarm Generation:
1. Alarms may be generated within the system for any object change of value or state either real or calculated. This includes things such as analog object value changes, binary object state changes, and various controller communication failures.

2. Alarm log shall be provided for alarm viewing. Log may be viewed on-site at the operator's terminal or off-site via remote communications
3. Controller must be able to handle up to 200 alarm setups stored as BACnet event enrollment objects – system destination and actions individually configurable.

2.3 TERMINAL UNIT APPLICATION CONTROLLERS (Heat Pumps, AC Units, Fan Coils)

A. Provide one native BACnet application controller for each piece of unitary mechanical equipment that adequately covers all objects listed in object list for unit. All controllers shall interface to building controller via MS/TP LAN using BACnet protocol. No gateways shall be used. Controllers shall include input, output and self-contained logic program as needed for complete control of unit.

B. BACnet Conformance:
1. Application controllers shall as a minimum support MS/TP BACnet LAN types. They shall communicate directly via this BACnet LAN at 9.6, 19.2, 38.4 and 76.8 Kbps, as a native BACnet device. Application controllers shall be of BACnet conformance class 3 and support all BACnet services necessary to provide the following BACnet functional groups:
   a. Files Functional Group
   b. Reinitialize Functional Group
   c.Device Communications Functional Group
2. Please refer to Section 22.2, BACnet Functional Groups in the BACnet standard for a complete list of the services that must be directly supported to provide each of the functional groups listed above. All proprietary services, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.
3. Standard BACnet object types supported shall include as a minimum–Analog Input, Analog Output, Analog Value, Binary Input, Binary Output, Binary Value, Device, File and Program Object Types. All proprietary object types, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.

C. Application controllers shall include universal inputs with 10-bit resolution that can accept 3K and 10K thermistors, 0–5 VDC, 4–20 mA, dry contact signals and a minimum of 3 pulse inputs. Any input on controller may be either analog or digital. Controller shall also include support and modifiable programming for interface to intelligent room sensor. Controller shall include binary outputs on board with analog outputs as needed.

D. All program sequences shall be stored on board controller in EEPROM. No batteries shall be needed to retain logic program. All program sequences shall be executed by controller 10 times per second and shall be capable of multiple PID loops for control of multiple devices. Programming of application controller shall be completely modifiable in the field over installed BACnet LANs or remotely via modem interface. Operator shall program logic sequences by graphically moving function blocks on screen and tying blocks together on screen. Application controller shall be programmed using same programming tools as building controller and as described in operator workstation section. All programming tools shall be provided and installed as part of system.

E. Application controller shall include support for intelligent room sensor (see Section 2.9.B.) Display on room sensor shall be programmable at controller and include an operating mode and a field service mode. All button functions and display data shall be programmable to show specific controller data in each mode based on which button is pressed on the sensor. See sequence of operation for specific display requirements at intelligent room sensor.

2.4 TERMINAL BOX CONTROLLERS—SINGLE DUCT

A. Provide one native BACnet application controller for each terminal box that adequately covers all objects listed in object list for unit. All controllers shall interface to building controller via MS/TP LAN using BACnet protocol. No gateways shall be used. Controllers shall include on board CFM flow sensor, inputs, outputs and programmable, self-contained logic program as needed for control of units.

B. BACnet Conformance

1. Application controllers shall as a minimum support MS/TP BACnet LAN types. They shall communicate directly via this BACnet LAN at 9.6, 19.2, 38.4 and 76.8 Kbps, as a native BACnet device. Application controllers shall be of BACnet conformance class 3 and support all BACnet services necessary to provide the following BACnet functional groups:
   a. Files Functional Group
   b. Reinitialize Functional Group
   c.Device Communications Functional Group
2. Please refer to Section 22.2, BACnet Functional Groups, in the BACnet standard, for a complete list of the services that must be directly supported to provide each of the functional groups listed above. All proprietary services, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.
3. Standard BACnet object types supported shall include as a minimum—Analog Input, Analog Output, Analog Value, Binary Input, Binary Output, Binary Value, Device, File and Program Object Types. All proprietary object types, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.

C. Application controllers shall include universal inputs with 10-bit resolution that can accept 3K and 10K thermistors, 0–5 VDC, and dry contact signals. Inputs on controller may be either analog or digital. Controller shall also include support and modifiable programming for interface to intelligent room sensor with digital display. Controller shall also include binary outputs on board. For applications using variable speed parallel fans, provide a single analog output selectable for 0-10 V or 0-20 mA control signals. Application controller shall include microprocessor driven flow sensor for use in pressure independent control logic. All boxes shall be controlled using pressure independent control algorithms and all flow readings shall be in CFM (LPS if metric).

D. All program sequences shall be stored on board application controller in EEPROM. No batteries shall be needed to retain logic program. All program sequences shall be executed by controller 10 times per second and shall be capable of multiple PID loops for control of multiple devices. Programming of application controller shall be completely modifiable in the field over installed BACnet LANs or remotely via modem interface. Operator shall program logic sequences by graphically moving function blocks on screen and tying blocks together on screen. Application controller shall be programmed using the same programming tool as Building Controller and as described in operator workstation section. All programming tools shall be provided as part of system.

E. Application controller shall include support for intelligent room sensor (see Section 2.9.B.) Display on room sensor shall be programmable at application controller and include an operating mode and a field service mode. All button functions and display data shall be programmable to show specific controller data in each mode based on which button is pressed on the sensor. See sequence for specific display requirements for intelligent room sensor.

F. On board flow sensor shall be microprocessor driven and precalibrated at the factory. Precalibration shall be at 16 flow points as a minimum. All factory calibration data shall be stored in EEPROM. Calibration data shall be field adjustable to compensate for variations in terminal box type and installation. All calibration parameters shall be adjustable through intelligent room sensor. Operator workstation, portable computers and special hand-held field tools shall not be needed for field calibration.

G. Provide duct temperature sensor at discharge of each terminal box that is connected to controller for reporting back to operator workstation.

2.5 SENSORS, BTU METER, and MISCELLANEOUS DEVICES

A. Temperature Sensors: All temperature sensors to be solid state electronic, factory-calibrated to within 0.5°F, totally interchangeable with housing appropriate for application. Wall sensors to be installed as indicated on drawings. Mount 48 inches about finished floor. Duct sensors to be installed such that the sensing element is in the main air stream. Immersion sensors to be installed in wells provided by control contractor, but installed by mechanical contractor. Immersion wells shall be filled with thermal compound before installation of immersion sensors. Outside air sensors shall be

installed away from exhaust or relief vents, not in an outside air intake and in a location that is in the shade most of the day.

B. BTU Meter: Provide an Onicon System-10 BTU Meter. The BTU Meter shall provide the following points both at the Integral LCD and as outputs to the Building Control System: Energy Total, Energy Rate, Flow Rate, Supply Temperature, Return Temperature. Output signal shall be BACnet MSTP. Each BTU Meter shall be factory programmed for its specific application, and shall be re-programmable using the front panel keypad with no special interface or computer required.

C. Intelligent Room Sensor with LCD Readout:
   1. Sensor shall contain a backlit LCD digital display and user function keys along with temperature sensor. Controller shall function as room control unit, and shall allow occupant to raise and lower setpoint, and activate terminal unit for override use—all within limits as programmed by building operator. Sensor shall also allow service technician access to hidden functions as described in sequence of operation.
   2. The Intelligent Room Sensor shall simultaneously display room setpoint, room temperature, outside temperature, and fan status (if applicable) at each controller. This unit shall be programmable, allowing site developers the flexibility to configure the display to match their application. The site developer should be able to program the unit to display time-of-day, room humidity and outdoor humidity. Unit must have the capability to show temperatures in Fahrenheit or Centigrade.
   3. Override time may be set and viewed in half-hour increments. Override time count down shall be automatic, but may be reset to zero by occupant from the sensor. Time remaining shall be displayed. Display shall show the word "OFF" in unoccupied mode unless a function button is pressed.
   4. See sequence of operation for specific operation of LCD displays and function keys in field service mode and in normal occupant mode. Provide intelligent room sensors as specified in point list.
   5. Field service mode shall be customizable to fit different applications. If intelligent room sensor is connected to terminal controller, terminal box shall be balanced and all air flow parameters shall be viewed and set from the intelligent room sensor with no computer or other field service tool needed.

D. Wall Sensor: Standard wall sensor shall use solid-state sensor identical to intelligent room sensor and shall be packaged in aesthetically pleasing enclosure. Sensor shall provide override function, warmer/cooler lever for set point adjustment and port for plug-in of Field Service Tool for field adjustments. Override time shall be stored in controller and be adjustable on a zone-by-zone basis. Adjustment range for warmer/cooler lever shall also be stored in EEPROM on controller. All programmable variables shall be available to Field Service Tool through wall sensor port.

E. LCD Operator Terminal:
   1. The LCD operator terminal is a small wall- or panel-mounted operator terminal that connects directly to the BACnet LAN. The communication design and messaging structure shall comply with ANSI/ASHRAE Standard 135-2001, BACnet. Each operator terminal shall be able to display any BACnet object from anywhere in the BACnet network.
   2. Each of these operator's terminals shall have a keypad and an adjustable backlit LCD, with a simple menu structure to give occupants and technicians intuitive access to system information. It shall have a minimum 4-line by 20-character display to allow an operator to query and adjust system values.
   3. The system shall allow the connection of up to 16 LCD operator terminals to each Building Controller. The operator shall have the ability to connect to each of these operator terminals with a laptop computer via an RS-232 cable to gain system access, troubleshooting, and display programming.
   4. Provide LCD operator terminals in the locations shown on the drawings.

F. Field Service Tool:
   1. Field service tool shall allow technician to view and modify all setpoints and tuning parameters stored in application controller. In addition, technician shall be able to view status of all inputs and outputs on digital readout. Each piece of data shall have a data code associated with it that is customizable.
   2. Field service tool shall plug into wall sensor and provide all the functionality specified. Operator workstation shall include the capability to disable operation of the field service tool.

3. Provide XX Field Service Tools for this project.

G. Network Connection Tool:
   1. Network connection tool shall allow technician to connect a laptop to any MS/TP network or at any MS/TP device and view and modify all information throughout the entire BACnet network. Laptop connection to tool shall be via Ethernet or PTP.
   2. Provide quick connect to MS/TP LAN at each controller. Tool shall be able to adjust to all MS/TP baud rates specified in the BACnet standard.
   3. Proved XX Network Connection Tools for this project.

2.6 ELECTRONIC ACTUATORS AND VALVES

A. Quality Assurance for Actuators and Valves:
   1. UL Listed Standard 873 and C.S.A. Class 4813 02 certified.
   2. NEMA 2 rated enclosures for inside mounting, provide with weather shield for outside mounting.
   3. Five-year manufacturers warranty. Two-year unconditional and three-year product defect from date of installation.

B. Execution Details for Actuators and Valves:
   1. Furnish a Freeze-stat and install "Hard Wire" interlock to disconnect the mechanical spring return actuator power circuit for fail-safe operation. Use of the control signal to drive the actuators closed is not acceptable.
   2. Each DDC analog output point shall have an actuator feedback signal, independent of control signal, wired and terminated in the control panel for true position information and troubleshooting. Or the actuator feedback signal may be wired to the DDC as an analog input for true actuator position status.
   3. Terminal box damper actuation shall be Floating type or Analog (2-10vdc, 4-20ma).
   4. Booster-heat valve actuation shall be Floating type or Analog (2-10vdc, 4-20ma).
   5. Primary valve control shall be Analog (2-10vdc, 4-20ma).

C. Actuators for Damper and Control Valves ½" to 6" shall be Electric unless otherwise specified, provide actuators as follows:
   1. UL Listed Standard 873 and Canadian Standards association Class 481302 shall certify Actuators.
   2. NEMA 2 rated actuator enclosures are. Use additional weather shield to protect actuator when mounted outside.
   3. 5 year Manufacturers Warranty. Two-year unconditional + Three year product defect from date of installation.
   4. Mechanical spring shall be provided when specified. Capacitors or other non-mechanical forms of fail-safe are not acceptable.
   5. Position indicator device shall be installed and made visible to the exposed side of the Actuator. For damper short shaft mounting, a separate indicator shall be provided to the exposed side of the Actuator.
   6. Overload Protection: Actuators shall provide protection against actuator burnout by using an internal current limiting circuit or digital motor rotation sensing circuit. Circuit shall insure that actuators cannot burn out due to stalled damper or mechanical and electrical paralleling. End switches to deactivate the actuator at the end of rotation are acceptable only for Butterfly Valve actuators.
   7. A push button gearbox release shall be provided for all non-spring actuators.
   8. Modulating actuators shall be 24Vac and consume 10VA power or less.
   9. Conduit connectors are required when specified and when code requires it.

D. Damper Actuators:
   1. Outside Air and Exhaust Air Damper Actuators shall be Mechanical Spring Return. Capacitors or other non-mechanical forms of fail-safe are not acceptable. The actuator mounting arrangement and spring return feature shall permit normally open or normally closed positions of the damper as required.
   2. Economizer Actuators shall utilize Analog control 2-10 VDC, Floating control is not acceptable.
   3. Electric damper actuators (including terminal box actuators) shall be direct shaft mounted and use a V-bolt and toothed V-clamp causing a cold weld effect for positive gripping. Single bolt or setscrew type fasteners are not acceptable.

4. One electronic actuator shall be direct shaft mounted per damper section. No connecting rods or jackshafts shall be needed. Small outside air and return air economizer dampers may be mechanically linked together if one actuator has sufficient torque to drive both and damper drive shafts are both horizontal installed.
5. Multi-section dampers with electric actuators shall be arranged so that each damper section operates individually. One electronic actuator shall be direct shaft mounted per damper section. (See below execution section for more installation details.)

E. Valve Actuators ½" to 6":
1. Mechanical spring shall be provided on all actuators for pre-heat coil and actuators for AHU heating or cooling coil when units are mounted outside. See plans for fail save flow function: Normal Open or Normal Closed. Capacitors or other non-mechanical forms of fail-safe are not acceptable.
2. All zone service actuators shall be non-spring return unless otherwise specified.
3. The valve actuator shall be capable of providing the minimum torque required for proper valve close off for the required application.
4. All control valves actuators shall have an attached 3-foot cable for easy installation to a junction box.
5. Override handle and gearbox release shall be provided for all non-spring return valve actuators.

F. Control Valves ½" to 6": The BAS contractor shall furnish all specified motorized control valves and actuators. BAS contractor shall furnish all control wiring to actuators. The Plumbing contractor shall install all valves. Equal Percentage control characteristic shall be provided for all water coil control valves. Linear valve characteristic is acceptable for 3-way valves 2½ inch and above.
1. Characterized Control Valves shall be used for hydronic heating or cooling applications and small to medium AHU water coil applications to 100GPM. Actuators are non-spring return for terminal unit coil control unless otherwise noted. If the coil is exposed to the Outside Air stream then see plans for Spring Return requirement.
   a. Leakage is Zero percent, Close-off is 200psi, Maximum differential is 30psi. Rangeablity is 500:1.
   b. Valves 1/2 inch through 2 inches shall be nickel-plated forged brass body, NPT screw type connections.
   c. Valves 1/2 inch through 1-1/4 inches shall be rated for ANSI Class 600 working pressure. Valves 1-1/2 inch and 2 inches shall be rated for ANSI Class 400 working pressure.
   d. The operating temperature range shall be 0° to 250° F.
   e. Stainless steel ball & stem shall be furnished on all modulating valves.
   f. Seats shall be fiberglass reinforced Teflon.
   g. Two-way and three-way valves shall have an equal percentage control port. Full stem rotation is required for maximum flow to insure stable BTU control of the coil.
   h. Three-way valve shall be applicable for both mixing and diverting.
   i. The characterizing disc is made of TEFZEL and shall be keyed and held secure by a retaining ring.
   j. The valves shall have a blow out proof stem design.
   k. The stem packing shall consist of 2 lubricated O-rings designed for on-off or modulating service and require no maintenance.
   l. The valves shall have an ISO type, 4-bolt flange, for mounting actuator in any orientation parallel or perpendicular to the pipe.
   m. A non-metallic thermal isolation adapter shall separate valve flange from actuator.
   n. One fastening screw shall secure the direct coupling of the thermal isolation adapter between the actuator and the valve. This will prevent all lateral or rotational forces from affecting the stem and it's packing O-rings.
2. Globe valves ½" to 2" shall be used for steam control or water flow applications.
   a. Valves shall be bronze body, NPT screw type, and shall be rated for ANSI Class 250 working pressure.
   b. Valves 1/2 inch (DN15) through 2 inches (DN50) with spring return actuators shall close off against 50 psi pressure differential with Class III leakage (.1%).
   c. The operating temperature range shall be 20° to 280° F.
   d. Spring loaded TFE packing shall protect against leakage at the stem.
   e. Two-way valves shall have an equal percentage control port.
   f. Three-way valves shall a linear control and bypass port.
   g. Mixing and diverting valves must be installed specific to the valve design.

3. Globe Valve 2 ½ to 6":
    a. Valves 2-1/2 inch (DN65) through 6 inches (DN50) shall be iron body, 125 lb. flanged with Class III (.1%) close-off leakage at 50 psi differential.
    b. Valves with spring return actuators shall close off against 50 psi pressure differential with Class III leakage (.1%).
    c. Flow type for two-way valves shall be equal percentage. Flow type for three-way valves shall be linear.
    d. Mixing and diverting valves must be installed specific to the valve design.

G. Butterfly Valves:
1. Butterfly Valves shall be sized for modulating service at 60-70 degree stem rotation. Isolation valves shall be line-size. Design velocity shall be less than 12 feet per second when used with standard EPDM seats
    a. Body is Cast Iron.
    b. Disc is Aluminum Bronze standard.
    c. Seat is EPDM Standard.
    d. Body Pressure is 200 psi, -30F to 275F.
    e. Flange is ANSI 125/250.
    f. Media Temperature Range is –22F to 240F
    g. Maximum Differential Pressure is 200 psi for 2" to 6" size.

H. Butterfly Valve Industrial Actuators:
1. Actuators shall be approved under Canadian Standards Association or other Nationally Recognized Testing Laboratory to UL standards. CSA Class 4813 02 or equal. Enclosure shall be NEMA 4 (weatherproof) enclosure and will have an industrial quality coating.
    a. Actuator shall have a motor rated for continuous duty. The motor shall be fractional horsepower; permanent split capacitor type designed to operate on a 120 VAC, 1 pH, 60 Hz supply. Two adjustable cam actuated end travel limit switches shall be provided to control direction of travel. A self-resetting thermal switch shall be imbedded in the motor for overload protection.
    b. Reduction gearing shall be designed to withstand the actual motor stall torque. Gears shall be hardened alloy steel, permanently lubricated. A self-locking gear assembly or a brake shall be supplied.
    c. Actuator shall have a 6 ft wiring harness provided for ease in field wiring (above 1500 in-lbs). Two adjustable SPDT cam-actuated auxiliary switches, rated at 250 VAC shall be provided for indication of open and closed position. Actuator shall have heater and thermostat to minimize condensation within the actuator housing.
    d. Actuator shall be equipped with a hand wheel for manual override to permit operation of the valve in the event of electrical power failure or system malfunction. Hand wheel must be permanently attached to the actuator and when in manual operation electrical power to the actuator will be permanently interrupted. The hand wheel will not rotate while the actuator is electrically driven.
    e. The actuator shall be Analog, floating, or two position as called out in the control sequence of operation. All Analog valves shall be positive positioning, and respond to a 2-10 VDC, 4-20 mA, or adjustable signal as required. Analog actuators shall have a digital control card allowing any voltage input for control and any DC voltage feedback signal for position indication.
2. Performance Verification Test:
    a. Control loops shall cause productive actuation with each movement of the actuator and actuators shall modulate at a rate which is stable and responsive. Actuator movement shall not occur before the effects of previous movement have affected the sensor.
    b. Actuator shall have capability of signaling a trouble alarm when the actuator Stop-Go Ratio exceeds 30%.
3. Actuator Mounting for Damper and Valve arrangements shall comply to the following:
    a. Damper Actuators: Shall not be installed in the air stream.
    b. A weather shield shall be used if actuators are located outside. For Damper Actuators use clear plastic enclosure.
    c. Damper or valve actuator ambient temperature shall not exceed 122 degrees F through any combination of medium temperature or surrounding air. Appropriate air gaps, thermal isolation washers or spacers, standoff legs, or insulation shall be provided as necessary

d. Actuator cords or conduit shall incorporate a drip leg if condensation is possible. Water shall not be allowed to contact actuator or internal parts. Location of conduits in temperatures dropping below dew point shall be avoided to prevent water from condensing in conduit and running into actuator.

e. Damper mounting arrangements shall comply to the following:
   1) The ventilation subcontractor shall furnish and install damper channel supports and sheet metal collars.
   2) No jack shafting of damper sections shall be allowed.
   3) Multi-section dampers shall be arranged so that each damper section operates individually. One electronic actuator shall be direct shaft mounted per section.

f. Size damper sections based on actuator manufacturers specific recommendations for face velocity, differential pressure and damper type. In general:
   1) Damper section shall not exceed 24 ft-sq. with face velocity £ 1500 FPM.
   2) Damper section shall not exceed 18 ft-sq. with face velocity £ 2500 FPM.
   3) Damper section shall not exceed 13 ft-sq. with face velocity £ 3000 FPM.

g. Multiple section dampers of two or more shall be arranged to allow actuators to be direct shaft mounted on the outside of the duct.

h. Multiple section dampers of three or more sections wide shall be arranged with a 3-sided vertical channel (8" wide by 6" deep) within the duct or fan housing and between adjacent damper sections. Vertical channel shall be anchored at the top and bottom to the fan housing or building structure for support. The sides of each damper frame shall be connected to the channels. Holes in the channel shall allow damper drive blade shafts to pass through channel for direct shaft mounting of actuators. Open side of channel shall be faced down stream of the airflow, except for exhaust air dampers.

i. Multiple section dampers to be mounted flush within a wall or housing opening shall receive either vertical channel supports as descried above or sheet metal standout collars. Sheet metal collars (12" minimum) shall bring each damper section out of the wall to allow direct shaft mounting of the actuator on the side of the collar.

4. Valve Sizing for Water Coil
   a. On/Off Control Valves shall be line size.
   b. Modulating Control Valve Body Size may be reduced at most two pipe sizes from the line size or not less than ½ the pipe size. The BAS contractor shall size all water coil control valves for the application as follows:
      1) Booster-heat valves shall be sized not to exceed 4-9psi differential pressure. Size valve for 50% Valve Authority. Valve design pressure drop is equal to the sum of coil drop plus the balance valve drop.
      2) Primary valves shall be sized not to exceed 5-15psi differential pressure. Size valve for 50% Valve Authority. Valve design pressure drop is equal to the sum of coil drop plus the balance valve drop.
      3) Butterfly valves shall be sized for modulating service at 60-70 degree rotation. Design velocity shall be 12 feet per second or less when used with standard EPDM seats.
   c. Valve Mounting arrangements shall comply to the following:
      1) Unions shall be provided on all ports of two-way and three-way valves.
      2) Install three-way equal percentage Characterized Control valves in a mixing configuration with the "A" port piped to the coil.
      3) Install 2½ inch and above, Three-Way globe valves, as manufactured for mixing or diverting service to the coil.

2.7 ENCLOSURES

A. All controllers, power supplies and relays shall be mounted in enclosures.

B. Enclosures may be NEMA 1 when located in a clean, dry, indoor environment. Indoor enclosures shall be NEMA 4 when installed in other than a clean environment.

C. Enclosures shall have hinged, locking doors.

D. Provide laminated plastic nameplates for all enclosures in any mechanical room or electrical room. Include location and unit served on nameplate. Laminated plastic shall be 1/8" thick sized appropriately to make label easy to read.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Prior to starting work, carefully inspect installed work of other trades and verify that such work is complete to the point where work of this Section may properly commence.

B. Notify the owners' representative in writing of conditions detrimental to the proper and timely completion of the work.

C. Do not begin work until all unsatisfactory conditions are resolved.

3.2 INSTALLATION (GENERAL)

A. Install in accordance with manufacturer's instructions.

B. Provide all miscellaneous devices, hardware, software, interconnections installation and programming required to ensure a complete operating system in accordance with the sequences of operation and point schedules.

3.3 LOCATION AND INSTALLATION OF COMPONENTS

A. Locate and install components for easy accessibility; in general, mount 48 inches above floor with minimum 3'-0" clear access space in front of units. Obtain approval on locations from owner's representative prior to installation.

B. All instruments, switches, transmitters, etc., shall be suitably wired and mounted to protect them from vibration, moisture and high or low temperatures.

C. Identify all equipment and panels. Provide permanently mounted tags for all panels.

D. Provide stainless steel or brass thermowells suitable for respective application and for installation under other sections—sized to suit pipe diameter without restricting flow.

3.4 INTERLOCKING AND CONTROL WIRING

A. Provide all interlock and control wiring. All wiring shall be installed neatly and professionally, in accordance with Specification Division 16.

B. Provide wiring as required by functions as specified and as recommended by equipment manufacturers, to serve specified control functions. Provide shielded low capacitance wire for all communications trunks.

C. Control wiring shall not be installed in power circuit raceways. Magnetic starters and disconnect switches shall not be used as junction boxes. Provide auxiliary junction boxes as required. Coordinate location and arrangement of all control equipment with the owner's representative prior to rough-in.

D. Provide power for all control components from nearest electrical control panel or as indicated on the electrical drawings—coordinate with electrical contractor.

E. All control wiring in the mechanical, electrical, telephone and boiler rooms to be installed in raceways. Plenum rated wire above ceiling is acceptable, where allowed by NEC code.

F. Control power supply shall be from emergency power source for all equipment connected to emergency power.

3.5 TRADE RESPONSIBILITY MATRIX

	Item	Furnish By	Install By	Power By	Control Wiring By
1	Equipment Motors	M	M	E	N/A
2	Magnetic Motor Starters				
	a. Automatically controlled, with or without HOA switches.	E	E	E	HDCS
	b. Manually controlled.	E	E	E	N/A
	c. Manually controlled, and which are furnished as part of factory wired equipment.	M	M	E	E
	d. Special duty type (part winding, multi-speed, etc.	M	Note 1	E	Note 1
	e. Variable frequency drives with manual bypass	M	E	E	HDCS Note 2
3	General equipment disconnect switches, thermal overload switches, manual operating switches.	E	E	E	N/A
4	Sprinkler system water flow and tamper switches	M	M	E	E
5	Line voltage contactors.	E	E	E	E
6	Control relay transformers (other than starters)	HDCS	HDCS	E	HDCS
7	Main fuel oil tank alarms (high and low level), remote indication lights and HDCS monitoring.	M	M	E	HDCS
8	Day fuel tank oil alarms (high and low level), remote indication lights and FMCS monitoring.	M	M	E	HDCS
9	Line voltage control items such as line voltage thermostats not connected to HDCS	E	E	E	E
10	Loose controls and instruments furnished as part of the packaged mechanical equipment or required for operation, such as pumping systems, float controls, etc.	M	M	M	M
11	HDCS control and instrumentation panels	HDCS	HDCS	E	HDCS
12	Automatic control valves, and sensor wells for HDCS	HDCS	M	E	HDCS
13	Duct smoke detectors, smoke/fire dampers (secondary monitoring)	M	M	E	HDCS
14	Emergency power off (EPO) shut down push buttons and break glass stations	M	M	E	E
15	Control interlock wiring or software integration wiring for chillers, boilers, pumps, cooling towers, VFD's, and other HDCS connected equipment	HDCS	HDCS	E	HDCS
16	Airflow control devices and transmitters	M	M	E	HDCS
17	Air terminal devices (VAV's, CAV's, Isolation Room controls, etc.)	M	M	E	HDCS
18	Intelligent devices and control units furnished with packaged mechanical equipment such as air conditioning units, split system fan coils, heat pumps, etc.	M	M	E	HDCS

	Abbreviations
M	Mechanical Contractor, Division 15
E	Electrical Contractor, Division 16
HDCS	Direct Digital Control System, Division 15950
N/A	Not applicable

	Notes
1	Magnetic motor starters (special duty type) shall be set in place under Electrical division except when part of factory wired equipment, in which Case set in place under Mechanical divisions
2	Where a remote motor disconnect is required in addition to the one provided integral to a Variable Frequency Drive (VFD), the HDCS Contractor shall provide the necessary control interlock between the disconnects.

3.6 DDC OBJECT TYPE SUMMARY

A. Provide all database generation.

B. Displays: System displays shall show all analog and binary object types within the system. They shall be logically laid out for easy use by the owner. Provide outside air temperature indication on all system displays associated with economizer cycles.

C. Run Time Totalization: At a minimum, run time totalization shall be incorporated for each monitored supply fan, return fan, exhaust fan, hot water and chilled water pumps. Warning limits for each point shall be entered for alarm and or maintenance purposes.

D. Trendlog: All binary and analog object types (including zones) shall have the capability to be automatically trended.

E. Alarm: All analog inputs (High/Low Limits) and selected binary input alarm points shall be prioritized and routed (locally or remotely) with alarm message per owner's requirements.

F. Database Save: Provide back-up database for all stand-alone application controllers on disk.

3.7 FIELD SERVICES

A. Prepare and start logic control system under provisions of this section.

B. Start-up and commission systems. Allow sufficient time for start-up and commissioning prior to placing control systems in permanent operation.

C. Provide the capability for off-site monitoring at control contractor's local or main office. At a minimum, off-site facility shall be capable of system diagnostics and software download. Owner shall provide phone line for this service for 1 year or as specified.

D. Provide Owner's Representative with spare parts list. Identify equipment critical to maintaining the integrity of the operating system.

3.8 AS BUILT DOCUMENTATION

A. After completion of the project, insert final approved shop drawings include the following information:
1. An operator's manual including detailed man-machine interface.
2. An operator's reference table listing the addresses of all connected input points and output points. Show settings where applicable.
3. A programmer's manual including all information necessary to perform the programming function.
4. A language manual including a detailed description of the language used and all routines, modules, etc., used by the system.
5. Flow charts of the software programs utilized in the system.
6. Complete program listing file, and parameter listing file for all programs.

B. Provide two (2) AutoCad (latest version) CD and one (1) full size reproducible of each control diagram and equipment schedule reflecting the "as-built" condition. Size shall be the same as the construction document drawings.

3.9 TRAINING

A. Provide application engineer to instruct owner in operation of systems and equipment.

B. Provide system operator's training to include (but not limited to) such items as the following: modification of data displays, alarm and status descriptors, requesting data, execution of commands and request of logs. Provide this training to a minimum of 3 persons.

C. Provide on-site training above as required, up to 24 hours as part of this contract.

3.10 DEMONSTRATION

A. Provide systems demonstration under provisions of Section 15010.

B. Upon completion of the installation, start up the system and perform all necessary testing, debugging and calibration of each component in the entire system. Perform an acceptance test in the presence of the Owner's Representative. When the system performance is deemed satisfactory in whole or in part of the by the Owner's Representative, the part(s) of the system will be accepted.

C. Provide certificate stating that control system has been tested and adjusted for proper operation.

D. Final system acceptance shall be contingent upon completion of final review and correction of all deficiencies. Satisfactory completion of the operational tests which shall demonstrate compliance with all performance and requirements of the Contract Documents.

PART 4 - SEQUENCE OF OPERATIONS

4.1 GENERAL

A. Provide a complete and operational temperature control and building automation system based on the following points and sequence of operation. The system shall be complete as to sequences and standard control practices. The determined point list is the minimum amount of points that are to be provided. If additional points are required to meet the sequence of operation, they will be provided.

B. BACnet Object List:
   1. The following points as defined for each piece of equipment are designated as follows:
      a. Binary Out (BO) - Defined as any two-state output (start/stop) (enable/disable), etc.
      b. Binary In (BI) - Defined as any two-state input (alarm, status), etc.
      c. Analog In (AI) - Defined as any variable input (temperature) (position), etc.
      d. Analog Out (AO) - Defined as any electrical variable output. 0–20mA, 4–20mA and 0–10VDC are the only acceptable analog outputs. The driver for analog outputs must come from both hardware and software resident in the controllers. Transducers will not be acceptable under any circumstance.

END OF SECTION

SECTION 16010

GENERAL ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SCOPE

A. Work of this section includes everything necessary for or incidental to completing the electrical work, to provide a complete and operable electrical system, except as herein specifically excluded.

1.2 GENERAL REQUIREMENTS

A. Electrical System Characteristics: 480/277V. 3PH, 4W., 208/120V. 3PH, 4W.

B. Guarantee: Furnish a written guarantee for a period of one-year from date of acceptance.

C. Codes and Regulations: Work done under this Section shall comply with the latest edition of the following: California Electrical Code, State of California Title 24, State Building Standards, Occupational Safety and Health Administration (OSHA) requirements, State of California Title 17 and to all local codes having jurisdiction. In the case where the codes have different levels of requirements, the most stringent rule shall apply.

D. Wherever a discrepancy in quantity or size of conduit, wire, equipment, devices, circuit breakers, etc., (all materials), arises on the Drawing and/or Specifications, the Contractor shall be responsible for providing and installing all material and services required by the strictest condition noted on Drawings and/or in Specifications to insure complete and operable systems as required by the Owner and Engineer.

E. The General and Supplementary Conditions, as well as Special Conditions apply in addition to items in the Electrical Section. Special attention is directed to the following sections:

1. Drawings and Specifications at the site.
2. Shop drawings and samples.
3. Record drawings.
4. Cutting and Patching.
5. Cleaning up.
6. Guarantee.
7. Tests.

F. Additional Work: Refer to Mechanical and Plumbing specifications for additional Electrical requirements.

G. Provide minimum of twenty percent (20%) spare receptacles, switches, lamps of each kind, fluorescent and HID ballasts, and lamp drivers of each type, contacts in relays and contactors of each type, ports on network hubs, terminals on 110 blocks and RJ45 connectors.

H. Testing:

1. Scan:
   a. Infrascan test of the distribution branch circuit panels shall be required.
   b. Infrascan certified reports shall be submitted on completion to the Owner and Engineer.
   c. Scans shall be performed by an independent testing laboratory with total connected loads in operation.

2. Megger:
   a. New branch circuit - phase, neutral and ground conductors.
   b. New insulated bonding conductors.

3. Current leakage test between the following:
   a. Grounding pole of receptacles and exposed conductive surface of non-electrical equipment.
   b. Grounding pole of receptacles and conductive surface of fixed or portable electrical equipment.

4. All circuits shall be tested for continuity and circuit integrity. Adjustments shall be made for circuits not complying with testing criteria.

5. Grounding System: Shall be tested by an independent testing laboratory to meet resistance specified in Part 3.1, D.3 of these Specifications. It shall be this Contractor's responsibility to make adjustments, as required, to upgrade non-complying systems to proper and safe operation.

6. All certified testing reports shall be submitted to the Owner at completion of project.

I. All Core Cutting, Drilling, and Patching:

1. For the installation of work under this Section, the aforementioned shall be performed under this Section of the Specifications and the Concrete section of the Specifications.

2. No holes will be allowed in any structural members without the written approval of D.S.A. or the Structural Engineer.

3. For penetrations of concrete slabs or concrete footings, the work will be as directed in the Concrete Section of Specifications.

4. The contractor shall be responsible for patching and repairing surfaces where he is required to penetrate for work under this contract.

5. Penetrations shall be sealed to meet the rated integrity of the surface required to be patched and repaired. The patched surface shall be painted or finished to match the existing surface.

J. Verifying Drawings and Job Conditions:

1. This Contractor shall examine all Drawings and Specifications in a manner to be fully cognizant of all work required under this Section.

2. This Contractor shall visit the site and verify existing conditions. Where existing conditions differ from Drawings, adjustment shall be made and allowances included for all necessary equipment to complete all parts of the Drawings and Specifications.

K. Shop Drawings:

1. Drawings shall be submitted in six (6) bound sets accompanied by Letter of Transmittal, which shall give a list of the number and dates of the drawings submitted. Drawings shall be complete in every respect and bound in sets.

2. The Drawings submitted shall be marked with the name of the project, numbered consecutively and bear the approval of the Contractor as evidence that the Drawings have been checked by the Contractor. Any Drawings submitted without this approval will be returned to the Contractor for resubmission.

3. If the shop drawings show variations from the requirements of the Contract because of standard shop practice or other reasons, the Contractor shall make specific mention of such variations in his letter of transmittal. If the substitution is accepted, the Contractor shall be responsible for proper adjustment which may be caused by the substitution. Samples shall be submitted when requested.

4. Shop drawings shall be submitted on the following but not limited to:

   a. Lighting fixtures, lamps, ballasts and drivers.

   b. Switchgear, panels and circuit breakers.

   c. Fire alarm system.

   d. Switches/Sensors/Disconnect switches.

e. Receptacles.

f. Communication system.

g. Fuses.

h. Pullboxes.

i. Terminal Cabinets.

j. Lighting control panels.

k. Wire/Cable.

l. Conduit and fittings.

m. Transformers.

L. Drawings of Record: The Contractor shall provide and keep up-to-date, a complete record set of blueprints. These shall be corrected daily and show every change from the original Drawings. This set of prints shall be kept on the job site and shall be used only as a record set. This shall not be construed as authorization for the Contractor to make changes in the layout without definite instruction in each case. Upon completion of the work, a set of reproducible Contract Drawings shall be obtained from the General Contractor and all changes as noted on the record set of prints shall be incorporated thereon with black ink in a neat, legible, understandable and professional manner. Refer to the Supplementary General Conditions for complete requirements.

1.3 WORK IN COOPERATION WITH OTHER TRADES

A. Examine the Drawings and Specifications and determine the work to be performed by the site utilities contractor, electrical, mechanical, plumbing, building contractor and other trades. Provide the type and amount of electrical materials and equipment necessary to place this work in proper operation, completely wired, tested and ready for use. This shall include all conduit, wire, disconnects, relays, and other devices for the required operation sequence of all electrical, mechanical and other systems or equipment.

B. Provide power and control circuits, conduit and wire as indicated on the Mechanical and Plumbing drawings as required for complete and operable systems.

C. The electrical contractor shall be responsible for obtaining back-boxes for all communication/ signal system devices/equipment from the low voltage contractor's for rough-in. He shall coordinate the delivery of the backboxes to avoid building construction delays. In the event that the backboxes are not delivered as scheduled, the electrical contractor shall be responsible for installing the correct backboxes, patching and refinishing walls disturbed by the installation of the subject backboxes.

1.4 TESTING AND ADJUSTMENT

A. Upon completion of all electrical work, this Contractor shall test all circuits, switches, motors, breakers, motor starter(s) and their auxiliary circuits and any other electrical items to insure perfect operation of all electrical equipment.

B. Equipment and parts in need of correction and discovered during such testing shall be immediately repaired or replaced with all new equipment and that part of the system shall then be retested. All such replacement or repair shall be done at no additional cost to the Owner.

C. All circuit shall be tested for continuity and circuit integrity. Adjustments hall be made for circuits not complying with testing criteria.

D. All certified testing reports shall be submitted to the Engineer at completion of project.

1.5 IDENTIFICATION

A. Identification nameplates shall be Micarta 1/8" thick and of approved size, with bevelled edges and engraved white letters 1/4" high minimum on black background. Nameplates shall be provided for all circuits in the distribution switchboards, and selector switches. Inscriptions on equipment shall be identical to those indicated in panels and/or motor control centers and other similar devices. Each nameplate shall be provided with drillings and suitable mounting screws corresponding to finish of the nameplate. The inscriptions in each nameplate shall be as indicated on the Drawings.

B. Identification of Air Conditioning Equipment: Equipment to be so identified shall include, but shall not be limited to: Pressure and temperature controllers; switches; equipment motors and boxes or cans housing other control items. Mechanical equipment nameplates shall have letters a minimum of 3/8" high.

C. Identification of Signal/Communication Outlet Wall Plates: Outlet wall plates shall be engraved on the backside with its related signal/communication system and its serving conduit origin point.

1.6 MAINTENANCE, SERVICING, INSTRUCTION MANUALS AND WIRINGDIAGRAMS

A. Prior to final acceptance of the job, the Electrical Contractor shall furnish to the Owner at least four (4) copies of operating and maintenance and servicing instructions, as well as four (4) complete wiring diagrams for the following item(s) or equipment:

1. Communications system.
2. Fire alarm system.
3. Panelboards.
4. Switchboards.
5. Disconnect switches.
6. Lighting controls.
7. Fluorescent ballasts.
8. Lamp drivers.
9. Circuit breakers.
10. Transformers.

B. All wiring diagrams shall specifically cover the system supplied. Typical drawings will not be accepted. Two (2) copies shall be presented to the Electrical Engineer and four (4) copies to the Owner.

1.7 ELECTRICAL CONTRACTOR'S RESPONSIBILITY

A. It shall be the Electrical Contractor's responsibility to obtain a complete set of Drawings and Specifications. He shall check the Drawings of the other trades and shall carefully read the entire Specifications and determine his responsibilities.

B. The contractor shall be responsible for reviewing the plans and specifications to ensure each room, where electrical line or low voltage equipment is to be installed, has sufficient space to accommodate the system cabinets, equipment and terminations while maintaining code mandated clearances about said equipment. The contractor shall identify problem areas prior to bid, include all costs required for corrective measures in his bid and submit alternate equipment and materials suitable for the installation to the Architect/Engineer for acceptance as part of the product submittal process.

1.8 FINAL INSPECTION AND ACCEPTANCE

A. After all requirements of the Specifications and/or the Drawings have been fully completed, representatives of the Owner will inspect the work. Contractor shall provide competent personnel to demonstrate the operation of any item or system to the full satisfaction of each representative.

B. Final acceptance of the work will be made by the Owner after receipt of approval and recommendation of acceptance from each representative.

1.9 RECORD DRAWINGS

A. Contractor shall furnish one set of reproducible record drawings before final payment of retention.

1.10SUBSTITUTIONS

A. Substitution to specified equipment shall be submitted and received by the Engineer fifteen (15) days after the bid date for review and approval. Obtain D.S.A. approval for all substitutions.

B. To receive consideration, requests for substitutions must be accompanied by documentary proof of its equality with the specified material. Documentary proof shall be in letter form and identify the specified values/materials alongside proposed equal values/materials. In addition, catalog brochures and samples must be included in the submittal.

C. In the event that authorization is given for a substitute equal to bid, after award of contract the Contractor shall submit to the Engineer certified quotations from suppliers of both the specified and proposed equal material for price comparison and delivery dates.

D. In the event of cost reduction, the Owner will be credited with 100 percent of the reduction, arranged by Change Order.

E. The Contractor warrants that substitutions proposed for specified items will fully perform the functions required.

F. Substitutions or requests for substitution shall not be accepted and rejected for failure to comply with items A-E above.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials and Equipment: All electrical materials and equipment shall be new and shall be listed by Underwriter's Laboratories and bear their label, or listed and certified by a nationally recognized testing authority where UL does not have an approval. Custom made equipment must have complete test data submitted by the manufacturer attesting to its safety. In addition, the materials and equipment shall comply with the requirements of the following:

1. American Society of Testing Materials (ASTM).

2. Insulated Cable Engineers Association (ICEA).

3. National Electrical Manufacturer's Association (NEMA).

4. National Fire Protection Association (NFPA).

5. American National Standard Institute (ANSI).

B. Panelboards - Power Distribution:

1. Power distribution panelboards shall be floor mounted, dead front, totally metal enclosed, NEMA 1 enclosure for indoor applications, NEMA 3R for outdoor applications, requiring front access only equipped with thermal-magnetic bolt-on type circuit breakers. Panels shall be minimum 32" wide, 24" deep and 90" high unless otherwise required by quantity of circuits indicated on the Single Line Diagram. Panelboard and panelboard components shall be as manufactured by Eaton or approved equal Square D, General Electric, or ITE Siemens.

2. Circuit breakers shall be fully rated to provide the symmetrical interrupting capacity indicated on the single line diagram. Circuit breakers shall be the number of poles and current capacity as indicated on the single line diagram.

3. Provide screw-on nameplates for all feeder circuit breakers and the panelboard cover. Nameplates shall be 1/8" thick, Micarta or Lamacoid plate or approved size, with bevelled edges and engraved white letters on black background.

4. All wiring shall be neatly arranged and laced together.

5. All circuit breakers shall be provided with a device for locking circuit breaker in "OFF" position.

6. Phase, neutral and ground bus bars shall be full size, rectangular in cross section, constructed of copper and interconnections.

7. Panelboards shall be service entrance rated when used as the main panel in a building.

C. Panelboards – Branch Circuit:

1. Branch circuit panelboards shall be of the dead front safety type equipped with thermal-magnetic bolt-on type 40 deg C. circuit breakers. Panels shall be minimum 20" wide and 5-3/4" deep unless otherwise noted on plan. Panels shall be 3 phase, 4 wire, number of circuits shall be as indicated on the panel schedules. Provide panels with main circuit breakers/lugs and branch circuit breakers of the rating indicated on the panel schedule.

2. Circuit breakers shall be fully rated to provide the symmetrical interrupting capacity indicated on the panel schedule. Circuit breakers shall be the number of poles and current capacity as indicated on the panel schedule. Branch circuit panelboards shall be Eaton or approved equal Square D, General Electric or ITE Siemens to match the power distribution panelboard.

3. Trims shall have doors equipped with flush type combination lock and catch, two milled type keys supplied with each panel. All locks shall be keyed alike and each door shall have a plastic covered directory frame with a typed identification card of all circuit and panel numbers for branch circuit panelboards and engraved lamacoid nameplates for power distribution panelboards.

4. Provide nameplate for all panelboards, 1/8" thick, Micarta or Lamacoid plate of approved size, with bevelled edges and engraved white letters on black background. Install nameplates on exterior trim of panel, above the panel door.

5. All wiring shall be neatly arranged and laced together.

6. All circuit breakers shall be provided with a device for locking circuit breaker in "OFF" position.

7. Phase, neutral and ground bus bars shall be full size, rectangular in cross section, constructed of copper and interconnections.

8. Panels used to provide power for exterior lighting circuits shall be provided complete with an auxiliary section for mounting of associated lighting contactors.

D. Lighting Fixtures:

1. Furnish, install and connect a lighting fixture at each outlet where a lighting fixture type symbol (designated on plans) is shown as being installed. Each fixture shall be complete with all required accessories including sockets, glassware, boxes, spacers, mounting devices, fire rating enclosure and lamps.

2. Ballasts shall be low power factor (0.71 to 0.78), programmed start, electronic type for use with "T8", California Energy Commission (CEC) approved, UL listed (Class P) CSA certified, high frequency operation (over 20 Khz) with no visible flicker, sound levels shall not exceed Class A ambient noise levels. Ballast shall be firmly and securely fastened in place. Ballasts shall be as manufactured by Advance or approved equal Universal or Valmont. Ballasts shall be manufacturer guaranteed for two (2) years, including all labor and materials.

3. All noisy ballasts shall be replaced at no cost to the Owner.

4. Sockets shall be General Electric or Bryant, white, twist-turn contact type. Push contact type sockets will not be allowed.

5. Lamps:
   A. Fluorescent 32 watt T-8 lamps shall be rated not less than 3100 lumens output after 100 hours of operation, 80 CRI minimum and 4100° Kelvin color temperature unless otherwise noted on the Lighting Fixture Schedule.
   B. Compact fluorescent lamps shall be of the wattage indicated on the Lighting Fixture Schedule, 4-pin type, 80 CRI minimum and 4100° Kelvin color temperature unless otherwise noted on the Lighting Fixture Schedule.
   C. LED shall have 4100° Kelvin color temperature. LED life per L70.

6. LED Driver shall be Class 1, 120-277V, 50/60HZ (constant current) with surge protection in accordance with IEEE/ANSI C62.41.2 guidelines with a surge current rating of 10,000 amps. Operating temperature range from -30°C to 40°C (-22°F to 104°F).

7. Refer to Architectural reflected ceiling plan for type of ceiling being installed in each room and provide each fixtures with required mounting devices and accessories for the particular ceiling.

8. All light fixtures shall be individually supported and properly anchored to the surfaces indicated on the Architectural elevations.

9. Locations of fixtures shall be per the architectural reflected ceiling plan and shall be coordinated at time of rough-in.

E. Conduit:

1. Rigid conduit shall be full weight threaded type aluminum or steel, except where specifically required to be steel. Steel conduit shall be protected by overall zinc coating to inside and outside surfaces, applied by the hot dip, metallizing or sherardizing process.

2. Galvanized Rigid Conduit (GRC), shall be full weight threaded type aluminum or steel, except where specifically required to be steel. Steel conduit shall be protected by overall zinc coating to inside and outside surfaces, applied by the hot dip, metallizing, or sherardizing process.

3. Intermediate Metal Conduit (IMC), shall be hot-dipped galvanized in accordance with UL 1242 and meeting Federal Specification WWC-581 (latest revision).

4. Electrical Metallic Tubing (EMT), shall be zinc-coated steel with baked enamel or plastic finish on inside surfaces.

5. Flexible metal conduit shall be constructed of aluminum or hot-dipped galvanized steel strips wound spirally with interlocking edges to provide greatest flexibility with maximum strength. Interior surfaces shall be smooth and offer minimum drag to pulling in conductors. Used only as directed by the Engineer.

6. Liquid-tight conduit (Seal-Tite) shall be galvanized steel flexible conduit as above except with moisture and oil-proof jacket, pre-cut lengths and factory installed fittings. For outdoor installations and motor connection.

7. Non-Metallic Conduit:

   a. Polyvinyl chloride (PVC) rigid conduit, Schedule 40, Type II for underground installation only.
   b. Conduit and fitting shall be produced by the same manufacturer.

F. Fittings:

1. Condulet type fittings shall be smooth inside and out, taper threaded with integral insulating bushing and of the shapes, sizes and types required to facilitate installation or removal of wires and cables from the conduit and tubing system. These fitting shall be of metal, smooth inside and out, thoroughly galvanized, and sherardized cadmium plated.

2. Metallic condulet covers shall have the same finish as the fitting and shall be provided for the opening of each fitting where conductor do not pass through the cover.

3. Connector, coupling, locknut, bushings and caps used with rigid conduit shall be steel, threaded and thoroughly galvanized. Bushings shall be insulated.

4. EMT fittings, connectors and couplings, shall be steel, zinc or cadmium plated, raintight, threadless, compression or tap-on multiple point, steel locking ring type with insulated throat.

5. Flexible steel conduit connectors shall be or malleable iron clamp or squeeze type or steel twist-in type with insulated throat. The finish shall be zinc or cadmium plating.

6. Die cast, set screw or indenter type fittings are not acceptable.

7. Conduit unions shall be "Erickson" couplings, or approved equal. The use of running threads will not be permitted.

G. 600 Volt Conductors - Wire and Cable:

1. All conductors shall be copper.

2. Type THHN/THWN thermoplastic, 600 volt, UL approved, dry and wet locations, for conductor sizes up to and including #4 AWG.

3. Type XHHW cross-linked synthetic polymer, 600 volt, UL approved, for dry and wet locations, for conductor sizes #2 AWG. and above.

4. Cross-linked synthetic polymer, XHHW, 600 volts, UL approved, for installation underground, in concrete or masonry.

5. Wire and cable shall be new, manufactured not more than six (6) months prior to installation, shall have size, type of insulation, voltage rating and manufacturer's name permanently marked on outer covering at regular intervals.

6. Wire and cable shall be factory color coded by integral pigmentation with a separate color for each phase and neutral. Each system shall be color coded and it shall be maintained throughout.

7. Systems Conductor Color Coding:

   a. Power 480/277V, 3PH, 4W:

      (1) Phase A = Brown
      (2) Phase B = Orange
      (3) Phase C = Yellow
      (4) Neutral = White

   b. Power 208/120V, 3PH, 4W:

      (1) Phase A = Black
      (2) Phase B = Red
      (3) Phase C = Blue
      (4) Neutral = White
      (5) Switchlegs = Purple (Switchlegs shall also be identified separately by numerical tags).
      (6) Travelers = Purple with Black stripe.

   c. Ground Conductors:

      (1) Green

   d. Communication/Fire Alarm System:

      (1) As recommended by the manufacturer.

8. All color coding for #8 conductor and above shall be as identified above, utilizing phase tape at each termination.

9. No conductors carrying 120 volt or more shall be smaller than #12 AWG.

H. Junction and Pullboxes:

1. For interior dry locations, boxes shall be galvanized one-piece drawn steel, knockout type, with removable, machine screw secured covers.

2. For outside, damp or interior/exterior surface mounted locations, boxes shall be heavy cast aluminum or cast iron with removable, gasketed, non-ferrous machine screw secured covers.

3. All boxes shall be sized for the number and sizes of conductors and conduits entering the box and equipped with plaster rings where required. Each conductor shall be terminated at an insulated, barriered terminal connector and completely identified with an engraved fiber identification marker, Electrovert or Underwriter's Safety Device Company.

I. Outlet Boxes:

1. Interior flush boxes shall be galvanized, one-piece drawn steel, 4" square minimum, provided with plaster rings and covers. Where required, provide 3/8" fixture studs and plaster rings. Boxes shall be suitable for terminating the conduit specified on plan.

2. For communication/signal system devices, outlet boxes shall be 4 11/16" square minimum, larger than standard boxes where recommended by the system manufacturer, and provided complete with plaster rings and covers. Boxes shall be suitable for terminating the conduit specified on plan.

3. For locations where standard boxes are not suitable due to number and size of conduit to be terminated, special boxes shall be designed to fit space or meet other requirements and submitted for approval.

4. For surface mounting, wet or damp locations, outlet boxes shall be heavy cast aluminum or cast iron with threaded hubs, covers shall be watertight with gaskets and non-ferrous screws.

5. Floor boxes shall be cast iron, fully adjustable type, with flange and brass covers suitable for the outlets/connectors specified on plan and in the project manual. Boxes shall be suitable for terminating the conduit specified on plan. Wiremold Omnibox series or approved equal

J. Switches:

1. Local single pole switches shall be flush tumbler, A.C. rated, quiet type, heavy duty, industrial grade, back or side wired with binding screws, standard rocker Hubbell #1221, 20A, 120/277V, or approved equal, color as elected by Architect. Two pole three-way and other switches shall be similar. Refer to Device Plate Section of Specifications for other requirements.

2. Switches located outdoors or in damp or wet locations shall be the same as above provided with locking weatherproof lift cover.

3. Switches controlling or disconnecting single phase motor loads in excess of 1/3HP shall be horsepower rated and approved or motor control service. Switches shall be complete with overload device of proper motor nameplate rating, where required.

4. Disconnect (safety) switches shall be fused, heavy duty type meeting NEMA Specifications. Switches shall be provided with rejection type fuse blocks. Provide switches with the number of poles, the voltage, current and horsepower ratings as required. Provide externally operable, quickmake, quick-break type mechanism with cover interlock and padlockable in either the open or closed position. Unless indicated otherwise, provide switches indoors in NEMA Type 1 enclosure and in NEMA Type 3R rain-tight enclosure where indicated to be outdoors or weatherproof. Provide nameplate indicating equipment served. Provide unit as manufactured by Challenger or approved equal Siemens or Westinghouse.

K. Receptacles:

1. Convenience outlet shall consist of duplex convenience receptacle mounted in an outlet box in the wall, flush with the finish surface and shall be complete with plate.

2. Receptacles for convenience outlets, unless otherwise indicated, shall be industrial heavy duty type, duplex 3W grounding type, 20A, 125V, Hubbell-Bryant #5362-*. (*) color as selected by Architect.

3. Ground fault interrupter receptacles shall be industrial heavy duty 20A, 125V, Hubbell-Bryant #GF-5362 or approved equal, color as selected by Architect.

4. Receptacles located outdoors shall be industrial heavy duty ground fault interrupter type, 20A, 125V, Hubbell-Bryant #GF-5362 or approved equal, color as selected by Architect. Provide in weatherproof box with metallic lockable lift cover U.L. listed for "wet" locations when in operation.

5. Specialty receptacles, identified on plans, for use with Owner furnished equipment shall be provided complete with outlet box, wall plate and receptacle to match the configuration of the plug being provided with the subject equipment.

L. Device Plates:

1. Shall be smooth thermoplastic wall plates, for the number of gang and types of openings necessary. Color shall match device or as selected by the Architect.

2. Plates shall be fitted, when specified for more than two gangs.

3. All switch and receptacle plates shall be engraved with related serving panel and circuit number identification on the front.

4. Plates for interior high abuse, damp or wet areas (i.e. kitchen, multi-purpose rooms, restrooms/toilets) shall be stainless steel complete with neoprene gaskets (weatherproof).

M. Terminal Cabinets:

1. Terminal cabinets shall be fabricated of hot dipped galvanized code gauge sheet metal for flush or surface mounting, as indicated on plan, size as indicated on plan but in no case less than 24" high, 30" wide and 6" deep. Doors shall be hinged and lockable. Locks shall be keyed to match the branch circuit panelboards. Terminal cabinet trims shall match the branch circuit panels.

2. Provide each terminal cabinet with a full size plywood backboard and terminal blocks (minimum 25% or 12 spare terminal blocks). All wires terminating on the terminal blocks shall be identified with an engraved fiber tag.

3. Surface mounted terminal cabinets shall be installed complete with full length skirts of the same construction and finish as the terminal cabinet.

4. Where mounted outdoors, terminal cabinets shall be NEMA 3R, weatherproof complete with gaskets and required sealant to prevent moisture from entering the terminal cabinet.

N. Plywood Backboards:

1. Where indicated for telephone or communications system terminals or other equipment assemblies, provide full room height and width backboards. Use Douglas Fir Plywood, fire resistive, exterior grade, finished one side and prime coat painted on all surfaces with finish coat of gray enamel intumescent paint. Unless otherwise indicated, use 3/4" thick plywood. Where terminal cabinets are used, provide full size plywood backboard to mount inside the terminal cabinet.

O. Painting:

1. Terminal cabinets, panels, junction boxes, pull boxes, etc., and conduit installed outdoors and in public view shall be painted with colors selected by the Architect to match the subject exterior surface. Refer to painting section of the specifications for additional requirements.

P. Seismic Design and Anchoring of Electrical Equipment:

1. Seismic anchorage of electrical equipment shall conform to C.C.R. Title 24, 2010 CBC with California Amendments. Anchorage details for roof/floor mounted equipment shall be as shown on plans.

Q. Transformers (600V and below):

1. Transformers shall be self-cooled type with copper windings, Class H insulation and a temperature rise of 115°C in 40°C ambient under continuous full load conditions, kilovolt ampere ratings shall be as shown on the Drawings. Design, construction, and operational characteristics shall be in accordance with ASA, AIEE, and NEMA standards. All insulating materials shall be in accordance with NEMA ST20-1972 Standards for a 220°C, UL component recognized insulation system. Primary windings shall be rated at 480V, with six (6) 2-1/2 percent full capacity taps, two above and four below normal. Secondary windings shall be rated at 208/120V, 3 phase with neutral brought out. Windings shall be of the fire-resistant type, designed for natural convection cooling through air circulation. Coils with exposed wire shall not be accepted. Core mounting frame and enclosures shall be of the welded and bolted construction, seismic rated, with sufficient mechanical rigidity and strengths to withstand shipping, erection and short circuit stresses. Enclosure shall be suitable for outdoor installation and shall have suitable ventilating openings with rodent-proof screens. Transformers shall be furnished complete with mounting channel and mounting bolts. Enclosures shall be provided with lifting lugs and jacking plates as required. Noise level shall be guaranteed by the manufacturer not to exceed 45 decibels for transformers up to and including 50 KVA, 50 decibles up to and including 112-1/2KVA, 55 decibels up to and including 300KVA as measured by NEMA Standards. Transformers shall be provided with vibration dampers consisting of Korfund spring loaded shock mounts and Elasti-zorb sheeting. Size and number of shock mounts shall be in accordance with manufacturer's recommendations for accommodation of weight and dampening of critical sound frequencies. Mounting bolts on floor mounted transformer shall extend into pads only and shall not be in direct contact with building structural members. All conduit shall be isolated from transformer enclosures by the use of neoprene grommets at conduit entrances to enclosures and the use of a grounding bushing. Flexible jumpers shall be installed for grounding continuity from enclosure to conduit or bus ducts. Primary and secondary terminals shall be terminated at a Micarta terminal board. A separate neutral grounding.

2. Floor mounted transformer shall be installed on concrete pad, 12" from walls and all case ventilation openings (6" where allowed by the manufacturer and approved by the Electrical Engineer).

3. Each Transformer Must Receive The Following Commercial Tests: Ratio, Polarity, Exciting Current, No-Load Loss, Resistance, Copper Loss, Impedance, Induced and Applied Potential Test. Approval shall be granted unless certified test reports covering commercial tests are made available for each unit with shop drawing submittal.

4. Each transformer shall be furnished with a manufacturer's nameplate located on the front of the unit. The nameplate shall be anodized aluminum with the following information etched or stenciled on the face: Voltage, KVA Rating; Phase; DB Rating; tap adjustments and wiring diagrams.

5. For exterior locations each transformer shall be provided complete with weathershields.

PART 3 - EXECUTION

3.1 PREPARATION AND INSTALLATION

A. Installation of Conduit and Outlet Boxes:

1. All conduit exposed or installed in concrete and masonry, shall be galvanized rigid steel conduit (GRC), or intermediate metal conduit (IMC).

2. Rigid conduit may be installed under floor slabs, under concrete sidewalls an as noted on the Drawings. Rigid conduit installed under slabs shall be 1" trade size minimum and shall be wrapped with 20 mil. polyvinyl chloride plastic tape.

3. All conduit except as hereinafter specified, installed in concrete/masonry, damp locations, hazardous locations, surface mounted up to 8'-0" above finished floor or subject to mechanical injury shall be heavy wall, threaded, galvanized rigid steel conduit (GRC), or intermediate metal conduit (IMC).

4. Flexible steel conduit shall only be permitted to be used at light fixture outlets and connections to vibrating electrical equipment. All flexible steel conduit runs shall be less than 6'-0". All outdoor installation shall be made using liquid-tight flex with approved fittings. Use of flexible conduit shall be as approved by the Engineer.

5. Intermediate metal conduit (IMC), is approved for use in all locations as approved for GRC or EMT and in accordance with Article 345 of CEC and UL Information card #DYBY.

6. All conduit installed in the dry walls or ceilings of the building shall be steel tube (EMT), Galvanized Rigid Steel (GRC), or Intermediate Metal Conduit (IMC).

7. Conduit shall be run so as not to interfere with other piping fixtures or equipment.

8. The ends of all conduit shall be cut square, carefully reamed out to full size and shall be shouldered in fitting.

9. No running threads will be permitted in locations exposed to the weather, in concrete or underground. Special union fittings shall be used in these locations.

10. Underground conduit shall be, unless otherwise indicated, Schedule 40 PVC (polyvinyl chloride) installed at depth of not less than 24" below grade. Concrete encased with 2" minimum between conduits and 3" minimum between the last conduit and the edge of the duct-bank. Conduit separation shall be maintained using plastic spacers located at 10'-0" intervals. Where power and communication/signal conduits are run in a common trench a (12") inch minimum separation shall be maintained between power and communication/signal conduits. The grounding wire in plastic conduit shall be rated in accordance with Section 250-of 2010 CEC. Conduit encasement will not be required for conduits installed under the building slab (building footprint).

11. All underground or imbedded conduit shall be 1" minimum trade size for steel and for PVC.

12. Where underground conduit runs stub-up, conduit shall transition to GRC underground. The contractor shall use GRC elbows and GRC risers wrapped in 20 mil. PVC tape for stub-ups.

13. PVC conduit shall not be run in walls or above grade.

14. Where underground conduit runs penetrate floor slab, conduit shall terminate 6" above finished floor with a grounding bushing.

15. Where conductors enter a raceway in a cabinet, pull box, junction box, or auxiliary gutter, the conductors shall be protected by a plastic bushing type fitting providing a smoothly rounded insulating surface.

16. Where conduit extends through roof to equipment on roof area, this Contractor shall provide 24 gauge galvanized sheet metal flashing cones with 4" flanges on roof surface. This flashing shall be delivered to the roofing contractor for installation. The actual location of all such roof penetrations and outlet shall be verified by the Contractor.

17. All conduit underground, in masonry and concrete and where concealed under floor slabs shall have joints painted with thread compound prior to makeup.

18. All conduit and modular wiring shall be supported at intervals not less than 6'-0" and within 12" from any outlet and at each side of bends and elbows. Conduit supports shall be galvanized, heavy stamped, two hole conduit clamp properly secured.

19. Where conduit racks are used the rack shall consist of two piece conduit clamps attached to galvanized steel slotted channels, properly secured via threaded rods attached directly to the building structure.

20. Nail-in conduit supports will not be allowed. One piece set-screw type conduit clamps or perforated iron for supporting conduit will not be permitted.

21. Seismic Conduit Support:

    a. All conduit shall be supported in such a manner that it is securely attached to the structure of the building. Attachment is to be capable of supporting the tributary weight of conduit and contents in any direction. Maximum spacing of support and braces are to be as follows:

CONDUIT SIZE	MAXIMUM SPACING
1/2" to 3" Standard incl.	6'-0"
3-1/2" to 4" Standard incl.	8'-0"

22. All conduit runs shall be installed parallel or perpendicular to walls, structural members, or intersection of vertical planes and ceilings. Field made bends and offset shall be avoided where possible. Crushed or deformed raceway shall not be installed.

23. Open knockouts in outlet boxes only where required for inserting conduit.

24. Outlet boxes on metal studs shall be attached to metal hangers, tack welded or bolted to studs; on wood studs attachment shall be with wood screws, nails not acceptable.

25. Surface mounted panels secured to stud walls shall be secured to wall using 1/2" x 3" screws into steel backing plate provided by the Architect.

26. Provide four (4) ¾" conduit stub-ups into accessible ceiling space from all recessed panels.

27. All boxes shall be covered with outlet box protector, Appleton SB-CK. Keep dirt from entering box or panels. If dirt does get in, it shall be removed prior to pulling wires.

28. All boxes installed outdoors shall be suitable for outdoor installations, gasketed, screw cover and painted as directed by the Architect with weatherproof paint to match building.

29. All conduit entries to outdoor mounted panels, cabinets, boxes, etc., shall be made using Myers "SCRU-TITE" hubs Series ST.

30. All conduit shall have a 200 lb test poly-propylene pull line left in place for future use in all runs tagged with a plastic tag at terminating end indicating the location of the opposite end of the conduit.

31. All rotating electrical equipment shall be supplied with flexible, liquid-tight conduit with appropriate slack and shall not exceed thirty-six (36) inches.

32. All multiple conduit runs within suspended ceilings shall be suspended from building structure by means of unistrut hangers/rack, see note 19. Refer to note 18 for support of single conduit runs within suspended ceilings. Conduit shall not be allowed to lay on ceiling or be supported from ceiling suspension wires or other suspension system.

33. All conduit shall be installed concealed in walls, floors or ceilings. Exposed conduit will not be permitted unless specifically approved in writing by the Architect/Engineer. When approved by the Architect/Engineer exposed conduits shall be painted to match the finish of the wall or ceiling to which it is supported to.

34. Provide conduit stub-ups into ceiling spaces from all wall mounted communications/signal devices (except Fire Alarm) for routing of wire/cable from the devices to the designated terminal backboard or cabinet.

35. Provide conduit system for low voltage wire/cables where wire/cables are routed in walls and in inaccessible (hard-lid) ceilings

36. Provide complete conduit system for routing of Fire Alarm system wire/cables.

37. Provide conduit only for routing of HVAC control wiring. Refer to Mechanical drawings for conduit requirements.

B. Installation of 600 Volt Conductors:

1. All line voltage wire, including control circuits, shall be installed in conduit.

2. All communications wire/cable shall be plenum rated listed for "open wiring". Communications wire/cable shall be supported by "J" hooks installed along the perimeter walls of the building or full-height interior walls.

3. All circuits and feeder wires for all systems shall be continuous from the service point to terminal or farthest outlet. No joints shall be made except in pull, junction or outlet boxes, or in panel or switchboard gutters.
4. Thoroughly clean all conduit and wire-ways and see that all parts are perfectly dry before pulling any wires. No joint shall be made except in pull, junction or outlet boxes, or in panel or switchboard gutters.

5. Install UL approved, fixture wire from all lighting fixture lamp sockets into fixture outlet or junction box.

C. Joints in 600 Volt Conductors:

1. Joints in 600 volt conductors smaller than No. 4 AWG shall be made with Scotchlok spring type connectors. Wires No 4 AWG and larger shall be joined together with approved type of pressure connector and taped with #33 3M tape, three (3) layers minimum to provide insulation not less than that of conductor. Connections to switch or busbar shall be made with one-piece copper lugs. Splicing of all 600 volt or less in-line connections #2 AWG through 350 MCM shall be made with 3M brand PST connector.

1. Joints/splices shall be done in junction or pull boxes.

2. Splices of communications wire/cable will not be permitted. Communications wire/cable shall run continuously from its point of origin to its destination point.

D. Grounding:

1. Provide grounding for entire electric installation as shown on plans and as required by applicable codes. Included as requiring grounding are:

   a. Conduit.
   b. Neutral or identified conductors of interior wiring system.
   c. Switchboards and Branch Circuit Panelboards.
   d. Non-current carrying metal parts of fixed equipment.
   e. Telephone distribution equipment.

2. Grounding and bonding conductors shall be sized per the latest edition of the California Code of Regulations, Title 24, State of California and CEC,

3. Provide and install a grounding conductor in all feeder and branch circuit conduits.

4. Where required to be installed, ground rods shall be 3/4" x 10', copper clad, installed individually or grouped as required to meet the specified resistance. Provide ground rods with all required clamps, fittings, wire and concrete boxes.

5. Building grounding system resistance to ground shall not exceed 25 ohm.

E. Prefabricated Equipment: Installation of all prefabricated items and equipment shall conform to the requirements of the manufacturer's specifications and installation instruction pamphlets. Where code requirements affect installation of materials and equipment, the more stringent requirements, code or manufacturer's instructions and/or specifications, shall govern the work.

END OF SECTION

SECTION 16060

OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY

PART 1 GENERAL

1.1 SUMMARY

A. Section includes short circuit and protective device coordination study encompassing portions of electrical distribution system from emergency and normal power source or sources up to and including breakers in service entrance panels, branch circuit panels, switchboards, fused disconnect switches in transformers and fused switches in the main service switchboard.

1.2 REFERENCES

A. Institute of Electrical and Electronics Engineers:
   1. IEEE 242 - Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems (Buff Book).

B. National Fire Protection Association:
   1. NFPA 70 - California Electrical Code.

1.3 DESIGN REQUIREMENTS

A. Complete Short Circuit and Protective Device Coordination Study to meet requirements of NFPA 70.

B. Report Preparation:
   1. Prepare study prior to ordering distribution equipment to verify equipment ratings required.
   2. Perform study with aid of computer software program.
   3. Obtain actual settings for packaged motor characteristics for equipment incorporated into Work.
   4. Calculate short circuit interrupting and, when applicable, momentary duties for assumed 3-phase bolted fault short circuit current and phase to ground fault short circuit current at each of the following:
      a. Utility supply bus.
      b. Low-voltage switchgear.
      c. Switchboards.
      d. Distribution panelboards.
      e. Branch circuit panelboards.
      f. Each other significant equipment location throughout system.

C. Report Contents:
   1. Include the following:
      a. Calculation methods and assumptions.
      b. Base per unit value selected.
      c. One-line diagram.
      d. Source impedance data including power company system available power and characteristics.
      e. Typical calculations.
         1) Fault impedance.
         2) X to R ratios.
         3) Asymmetry factors.
         4) Motor fault contribution.
         5) Short circuit kVA.
         6) Symmetrical and asymmetrical phase-to-phase and phase-to-ground fault currents.
         7) Tabulations of calculation quantities and results.
      f. One-line diagram revised by adding actual instantaneous short circuits available.
      g. State conclusions and recommendations.

2. Prepare time-current device coordination curves graphically indicating coordination proposed for system, centered on conventional, full-size, log-log forms.
3. Prepare with each time-curve sheet complete title and one-line diagram with legend identifying specific portion of system covered by that particular curve sheet.
4. Prepare detailed description of each protective device identifying its type, function, manufacturer, and time-current characteristics. Tabulate recommended device tap, time dial, pickup, instantaneous, and time delay settings.
5. Plot device characteristic curves at point reflecting maximum symmetrical fault current to which device is exposed. Include on curve sheets the following:
   a. Power company relay characteristics.
   b. Power company fuse characteristics.
   c. Low voltage equipment circuit breaker trip device characteristics.
   d. Low voltage equipment fuse characteristics.
   e. Cable damage point characteristics.
   f. Pertinent transformer characteristics including:
      1) Transformer full load current.
      2) Transformer magnetizing inrush.
      3) ANSI transformer withstand parameters.
      4) Significant symmetrical fault current.
   g. Pertinent motor characteristics.
   h. Other system load protective device characteristics.

1.4 SUBMITTALS

A. Qualifications Data: Submit the following for review prior to starting study.
   1. Submit qualifications and background of firm.
   2. Submit qualifications of Professional Engineer performing study.

B. Software: Submit for review information on software proposed to be used in performing study.

C. Product Data: Submit the following:
   1. Report: Summarize results of study in report format including the following:
      a. Descriptions, purpose, basis, and scope of study.
      b. Tabulations of circuit breaker, fuse and other protective device ratings versus calculated short-circuit duties, and commentary regarding same.
      c. Protective device time versus current coordination curves, tabulations of relay and circuit breaker trip settings, fuse selection, and commentary regarding same.
      d. Fault current calculations including definition of terms and guide for interpretation of computer printout.

D. Submit copies of final report signed by professional engineer. Make additions or changes required by review comments.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with City requirements.

B. Maintain one copy of each document on site.

C. Use commercially available software, designed specifically for short circuit and protective device coordination studies with minimum of five years documented availability.

D. Perform study in accordance with IEEE 242.

1.6 QUALIFICATIONS

A. Study Preparer: Company specializing in performing work of this section with minimum five years documented experience and having completed five projects of similar size and complexity within the past two years.

B. Perform study under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of California with minimum of five years experience in power system analysis.

C. Demonstrate company performing study has capability and experience to provide assistance during system start up.

1.7 SEQUENCING

A. Submit short circuit and protective device coordination study to Architect/Engineer prior to receiving final approval of distribution equipment shop drawings and prior to releasing equipment for manufacturing.

B. When formal completion of study will cause delay in equipment manufacturing, obtain approval from Architect/Engineer for preliminary submittal of study data sufficient in scope to ensure selection of device ratings and characteristics will be satisfactory.

1.8 SCHEDULING

A. Schedule work to expedite collection of data to ensure completion of study for final approval of distribution equipment shop drawings prior to release of equipment for manufacturing.

1.9 COORDINATION

A. Coordinate work with local power company.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 FIELD QUALITY CONTROL

A. Provide assistance to electrical distribution system equipment manufacturer during start up of electrical system and equipment.

3.2 ADJUSTING

A. Perform field adjustments of protective devices and modifications to equipment to place equipment in final operating condition. Adjust settings in accordance with approved short circuit and protective device coordination study.

END OF SECTION

SECTION 16550

INVERTER

1.0 SCOPE

A. This product specification describes a continuous duty, on-line, solid state, uninterruptible power system (UPS). The inverter shall operate as a line interactive design – utilizing Pulse Width Modulated (PWM) design, battery charger, solid state inverter, fail-safe bypass system, and integral battery subsystem. Inverter shall be as manufactured by Emergi-Lite "FTC" single phase series or approved equal by the engineer.

B. Transfers to and from battery operation shall be uninterrupted. Furthermore, there shall be no mechanical switching when the inverter transfers to and from battery operation.

C. The inverter and batteries shall be designed to fit into a NEMA 1 enclosure intended for indoor installations. It shall be of modular construction for ease of servicing in the field.

D. Primary application of the inverter is to provide emergency power for egress lighting.

E. Primary input power source to the inverter shall be utility power.

2.0 APPLICABLE DOCUMENTS

A. The following documents given below form a part of this specification to the extent specified herein. In the event of conflict between the documents referenced herein and the contents of this specification, the contents of this specification shall be considered superseding requirements. The following documents shall be for reference purpose only.

1. UL 1778 Listed Underwriters Laboratories Inc. standard for UPS systems
2. UL 924 Listed Underwriters Laboratories Inc. Standards for Lighting Systems.
3. ANSI/IEEE C62.41 "Guideline on Surge Withstandability" – Category "B."

3.0 System Description and Operation

A. System Definition
1. The inverter shall consist of a Pulse Width Modulated (PWM) design battery charger, inverter, batteries, fail-safe bypass, protective devices, and monitoring circuitry as specified herein which shall automatically assure interruption, upon failure or deterioration of the input AC power source. Continuity of conditioned and regulated power to the critical load shall be maintained when input power is lost and until input power returns within specifications or until the batteries have been charged.

B. Modes of Operation
1. Normal – The PWM shall continuously supply power to the critical load. The charger shall derive power from the charging circuit and supply DC power to the batteries. The charger shall maintain the batteries in a fully charged state even at low input voltage conditions.
2. Emergency – Upon failure of the input AC power source, the critical load shall be supplied by the inverter, which, without any mechanical switching, shall obtain its power from the battery through the load until the inverter assumes 100% of the load. There shall be no interruption or disturbances to the critical load upon failure or restoration of the input AC power source.
3. Recharge – Upon restoration of the input AC power source (prior to complete battery discharge), the inverter shall automatically return to normal operation.
   If the batteries become completely discharged (batteries have reached the DC cutoff point) before the input power is restored, the inverter shall automatically restart and resume normal operation – including the automatic recharge of the batteries.
4. Fail-safe Bypass Mode – The inverter shall automatically transfer the critical load to the bypass source in case of an internal inverter failure (inverter output voltage not present).
5. Downgrade – If the battery only is to be taken out of service for maintenance, it shall be disconnected from the inverter by means of a battery circuit breaker. The inverter shall continue to function as specified, except for power outage protection and dynamic response characteristics.

C. Major Components
1. Ferroresonant Transformer – The PWM shall provide conditioned, regulated, sine wave power to load during all modes of operation (except when the inverter is in bypass). The PWM shall be configured such that there are no direct electrical connections between the input and output. The PWM shall have separate windings for the battery charger section and the inverter section.
2. Charger – The charger shall be of solid state construction. The charger shall rectify AC power supplied by the circuit to regulated DC power for the batteries. This shall be an automatic function. The charger shall be a 3 stage temperature-compensated charger so that the charger level for the batteries is automatically adjusted based on internal ambient temperature.
3. Inverter – The inverter shall be of solid state construction. In case of the loss of input power to the PWM, the inverter shall convert DC power from the batteries to AC power.
4. Fail-safe Bypass – The bypass shall consist of a fail-safe design. In case of inverter failure (inverter output power not present), the fail-safe bypass shall automatically transfer power for the load to the bypass source. The fail-safe bypass shall be break-before-make.
5. Batteries – Upon loss of input power, the batteries shall supply DC power to the inverter.
6. Monitoring and metering – The inverter shall include inverter status indicators and remote monitoring capabilities. The inverter shall contain the following monitoring and metering functions:
    a. Status Indicators for:
    "AC Line Present" – green LED
    "Battery Charger" – green LED
    "UPS Output Power Present" – green LED
    "On Battery" – amber LED
    "Summary Alarm" – red LED
    b. Remote monitoring capabilities shall be form C dry contacts for the following conditions:
    Input power present
    UPS on battery operation
    Low battery condition
    UPS on bypass
    c. A latching test switch shall be provided so that battery operation of the inverter may be verified. In case the UPS is left on battery operation and the front door is closed, a door interlock provision shall cause the inverter to return to normal mode operation.

7. Protection:
    a. The inverter shall have a main input circuit breaker for over current protection.
    b. The battery subsystem shall be protected by a circuit breaker.
    c. Thermal protection shall consist of temperature sensors located on the inverter heat sink.
    First stage, 100 degrees F, shall turn on the cooling fan.
    Second stage, 165 degrees F, shall power-down the HEU.

D. Options – The following options shall be provided:
1. 20 year rated, sealed bateries.
2. Seismic mounting.
3. Three (3) output circuit breakers.
4. Internal by-pass switch.

4.0 SYSTEM PACKAGE AND CONSTRUCTION

A. Materials and Process
1. The open frame, supporting the inverter electronics, transformer, I/O connections, logic board, display, etc., shall be steel. Steel parts shall be zinc washed.
2. The enclosure shall be aluminum with a natural finish.

B. Standard Parts
1. Except as otherwise specified herein or authorized, commercial-grade parts shall be used.
2. External hardware shall be tamper-resistant.

5.0 ELECTRICAL SPECIFICATIONS

A. Input Specifications
1. Nominal input voltage: 120 VAC single phase.
2. Input voltage range: +10 to –15% of nominal.
3. Input frequency: 60Hz +/-3 Hz.
4. Input configuration: 2 wire ("hot and neutral") plus ground.
5. Input power Walk-in: Limit inrush current to less than 125%, 10 times for 1 line cycle.

6. Input protection: Single pole circuit breaker.
7. Harmonic Distortion: <10%.

B. Output Specifications
1. Power rating (continuous):
2.25 kVA/2.25kW /24 amperes: @ 120
Output power rating shall be the same regardless of whether or not the inverter is in normal mode or emergency mode of operation.
Number of phases: One.
2. Nominal output voltage: 120 VAC ±2%.
3. Output configuration: 2 wire plus ground.
4. Output frequency: 60 HZ ±0.5 HZ when the inverter is running on internal clock.
5. Output voltage distortion with 100% linear load: 3% maximum THD for linear load.
6. Crest factor: 2.8.
7. Load power factor: 0.5 lag to 0.5 lead.
8. Transfer time: Transfers to and from battery operation shall be uninterrupted (no break transfers). Transfers shall be electronically switched – no mechanical switching means shall be used.
9. Overload capability: 125% for five (5) minutes.
10. Protection: Provide two 20A, 1 pole circuit breakers.
11. Customer connection: Terminal block.

C. Battery Specifications
1. Configuration: Six (6) 12 volt 38 ampere-hour sealed, lead acid, maintenance-free, types AGM, and batteries.
2. Run time: 90 minutes at 100% load.

6.0 PHYSICAL SPECIFICATIONS

A. The inverter system shall consist of a single cabinet housing both the electronic sub-assemblies and the batteries.
1. Maximum dimensions: The overall dimensions shall not exceed 47" H x 30"W x 25"D.
2. The inverter enclosure shall be NEMA 1-type construction.
a. The cabinet shall be ventilated. Intake air shall be from the lower area of the front door. Exhaust air shall be through the front and rear near the top.
b. Forced cooling shall be provided.
Screening shall be used to keep insects and debris from entering the UPS through the fan exhaust.
c. Intake air vent shall be screened and shall prevent water from entering the enclosure.
Replaceable dust filters, readily available, shall be utilized.
d. The front door shall have a gasket.
3. The door assembly shall consist of a continuous hinge; three-point door latch with a single keyed locking handle and additional padlock hasp.
4. The cabinet shall have a red finish.
5. The cabinet shall be designed such that it can be anchored to a single foundation.
a. The foundation including the anchor bolts shall be provided by others.
b. Skirting with tamper-proof hardware shall be provided so that debris and animals cannot enter through the bottom of the cabinet.
c. The mounting of the inverter to the concrete pad (supplied by others) shall be such that the nuts (holding the inverter to the anchor bolts embedded in the concrete pad) are not accessible from the outside.

B. Power and control cable entry: Bottom entry.

C. Labels – shall be located inside the enclosure.

7.0 OPERATING ENVIRONMENT

A. Temperature:
1. The inverter shall operate satisfactorily when the ambient temperature outside of the inverter enclosure is between 32 degrees F to 104 degrees F.

B. Relative humidity: 0 to 95% non-condensing.

C. Audible Noise: 45 dBA @ 1M from surface in emergency mode.

8.0 STORAGE ENVIRONMENT

A. Temperature: -4 degrees F to +158 degrees F.
This storage temperature shall be acceptable only when the batteries are in a fully charged state.

B. Relative humidity: 0 to 95% non-condensing.

9.0 RELIABILITY AND MAINTAINABILITY

A. The inverter shall be designed for ease of maintenance and serviceability.
   1. All components shall be front-accessible.
   2. Rear wall components shall be accessible.

END OF SECTION

SECTION 16721

FIRE ALARM SYSTEM

PART 1 – GENERAL

1.1. SUMMARY

This Section covers fire alarm systems, including initiating devices, notification appliances, controls, and supervisory devices.

Work covered by this section includes the furnishing of labor, equipment, and materials for installation of the fire alarm system as indicated on the drawings and specifications.

The Fire Alarm System shall consist of all necessary hardware equipment and software programming to perform the following functions:

1. Fire alarm system detection and notification operations.

Network fire alarm control panels shall include all features as described in this specification for stand-alone FACPs and shall have network communication capabilities as described herein.

2. All points monitored and controlled by a single node shall be capable of being programmed as "Public". Each point made public to the network may be programmed to be operated by any other node connected to the network.

3. Network communications shall be capable of supporting "point lists" that can be handled as though they were a single point.

4. The network shall provide a means to log into any node on the system via a laptop computer or CRT/Keyboard and have complete network access (Set Host) for diagnostics, maintenance reporting, and information gathering of all nodes in the system. The means shall include the capability to log into any node on the system via TCP/IP Ethernet network communications protocol compatible with IEEE Standard 802.3. Ethernet access to any fire alarm panel shall be capable of providing access only to authenticated users through a cryptographically authenticated and secure SSL tunnel. Provisions for a standard RJ-45 Ethernet connection to the owner's Ethernet network must be provided at each node as part of the contract. Systems not meeting this requirement must provide all diagnostic tools required to support this function from selected points on the network. This Section covers fire alarm systems, including initiating devices, notification appliances, controls, and supervisory devices.

1.2. SCOPE OF WORK

Provide and install the new control panel and provide new monitor modules to superve the existing zones remaining in operation. Connect the existing audible alarm devices to the new fire alarm control panel power supply to maintain the existing alarm circuits in operation.

The remodeled Auditorium, toilets and the HVAC system shall be provided with new fire alarm system devices, equipment and wiring connected to the new fire alarm system. Refer to the fire alarm plan drawings for the areas being remodeled under the scope of work.

The scope of work includes connecting the existing fire alarm system devices at the Music building to the new control panel.

A. The contractor shall schedule a site visit with the College Maintenance & Operations (M&O) department prior to start of the demolition phase to assess the status and function of the existing system. The contractor shall submit a pre-construction report to the M&O department outlining any deficiencies found during the site visit. At the conclusion of the construction phase the existing system devices remaining in operation shall function as described in the pre-construction report.

B. At no time during the construction phase shall it be acceptable for the existing fire alarm system to be inoperable or not protecting the areas connected to the fire alarm system. The contractor shall provide a 24 hours per day, seven days per week firewatch whenever

the system is inoperative or shut-down for any reason. A firewatch plan to be implemented during system shut-downs or inoperable periods shall be submitted to the M&O department for approval prior to start of the demolition phase.

C. The new fire alarm system shall be fully compatible with the College's existing fire alarm system. The contractor shall perform required programming to fully integrate the new fire alarm control panel into the existing fire alarm network system including the methodology used to identify the zones in alarm on the fire alarm annunciator.

1.3. ACCEPTABLE EQUIPMENT AND SERVICE PROVIDERS

Manufacturers: The equipment and service described in this specification are those supplied and supported by SimplexGrinnell to match existing and represent the base bid for the equipment.

Being listed as an acceptable Manufacturer in no way relieves obligation to provide all equipment and features in accordance with these specifications.

Alternate products must be submitted to the Architect/Engineer for review two weeks prior to bid. The Architect/Engineer shall notify the submitting party if the alternate product may be used in the bid. Alternate or as-equal products submitted under this contract must provide a detailed line-by-line comparison of how the submitted product meets, exceeds, or does not comply with this specification.

The equipment and service provider shall be a nationally recognized company specializing in fire alarm and detection systems. This provider shall employ factory trained and NICET certified technicians, and shall maintain a service organization within 50 miles of this project location. The equipment and service provider shall have a minimum of 10 years experience in the fire protective signaling systems industry.

1.4. RELATED DOCUMENTS

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

The work covered by this section is to be coordinated with related work as specified elsewhere in the specifications. Requirements of the following sections apply:

5. Division 16.
6. Division 15.

The system and all associated operations shall be in accordance with the following:

7. Requirements of the following Model Building Code: UBC 2010 Edition.
8. Requirements of the following Model Fire Code: UFC 2010 Edition.
9. Requirements of the following Model Mechanical Code: UMC 2010 Edition.
10. NFPA 72, National Fire Alarm Code, 2010 Edition.
11. NFPA 70, California Electrical Code, 2010 Edition.
12. Local Jurisdictional Adopted Codes and Standards
13. ADA Accessibility Guidelines

PART 2 - PRODUCTS

2.1 FIRE ALARM CONTROL PANEL

General: Provide a complete, non-coded addressable, microprocessor-based fire alarm system with initiating devices, notification appliances, and monitoring and control devices as indicated on the drawings and as specified herein.

B. Power Requirements

1. The control unit shall receive AC power via a dedicated fused disconnect circuit.

2. The system shall be provided with sufficient battery capacity to operate the entire system upon loss of normal AC power in a normal supervisory mode for a period of 24 hours with 5 minutes of alarm operation at the end of this period. The system shall automatically transfer to battery standby upon power failure. All battery charging and recharging operations shall be automatic.
3. All circuits requiring system-operating power shall be 24 VDC nominal voltage and shall be individually fused at the control unit.
4. The incoming power to the system shall be supervised so that any power failure will be indicated at the control unit. A green "power on" LED shall be displayed continuously at the user interface while incoming power is present.
5. The system batteries shall be supervised so that a low battery or a depleted battery condition, or disconnection of the battery shall be indicated at the control unit and displayed for the specific fault type.
6. The system shall support NAC Lockout feature to prevent subsequent activation of Notification Appliance Circuits after a Depleted Battery condition occurs in order to make use of battery reserve for front panel annunciation and control.
7. The system shall support 100% of addressable devices in alarm or operated at the same time, under both primary (AC) and secondary (battery) power conditions.
8. Loss of primary power shall sound a trouble signal at the FACP. FACP shall indicate when the system is operating on an alternate power supply.

C. Software: The fire alarm system shall allow for loading and editing instructions and operating sequences as necessary.

1. The system shall be capable of on-site programming to accommodate system expansion and facilitate changes in operation.
2. All software operations shall be stored in a non-volatile programmable memory within the fire alarm control unit. Loss of primary and secondary power shall not erase the instructions stored in memory.
3. Panels shall be capable of full system operation during new site specific configuration download, master exec downloads, and slave exec downloads.
4. Remote panel site-specific software and executive firmware downloads shall be capable of being performed over proprietary fire alarm network communications[and via TCP/IP Ethernet network communications. Ethernet access to any fire alarm panel shall be capable of providing access only to authenticated users through a cryptographically authenticated and secure SSL tunnel.]
5. Panels shall automatically store all program changes to the panel's non-volatile memory each time a new program is downloaded. Panels shall be capable of storing the active site-specific configuration program and no less than 9 previous revisions in reserve. A compare utility program shall also be available to authorized users to compare any two of the saved programs. The compare utility shall provide a deviation report highlighting the changes between the two compared programs.
6. Panels shall provide electronic file storage with a means to retrieve a record copy of the site-specific software and up to 9 previous revisions. Sufficient file storage shall be provided for other related system documentation such as record drawings, record of completion, owner's manuals, testing and maintenance records, etc.
7. The media used to store the record copy of site-specific software and other related system documentation shall be electrically supervised. If the media is removed a trouble shall be reported on the fire alarm control panel.

D. History Logs: The system shall provide a means to recall alarms and trouble conditions in chronological order for the purpose of recreating an event history. A separate alarm and trouble log shall be provided.

E. Recording of Events: The system shall be capable of recording all alarm, supervisory, and trouble events by means of system printer. The printout shall include the type of signal (alarm, supervisory, or trouble) the device identification, date and time of the occurrence. The printout shall differentiate alarm signals from all other printed indications.

F. Wiring/Signal Transmission:

1. Transmission shall be hard-wired using separate individual circuits for each zone of alarm operation, as required or addressable signal transmission, dedicated to fire alarm service only.
2. System connections for initiating device circuits shall be Class B, Style D, signaling line circuits shall be Class B, Style 4 and notification appliance circuits shall be Class B, Style Y.
3. Circuit Supervision: Circuit faults shall be indicated by a trouble signal at the FACP. Provide a distinctive indicating audible tone and alphanumeric annunciation.
4. Constant Supervision Audio: When provided, audio notification appliance circuits shall be supervised during standby by monitoring for DC continuity to end-of-line resistors.

G. Supplemental Notification and Remote User Access (Fire Panel Internet Interface)

1. Fire Alarm Control Panel (FACP) shall [have the capability] [provide the necessary hardware] to provide supplemental notification and remote user access to the FACP using Ethernet and TCP/IP communications protocol compatible with IEEE Standard 802.3.
2. A standard RJ-45 Ethernet connection shall connect to the owners Ethernet network. Provisions for that connection must be provided at each fire alarm control panel as part of the contract.
3. The means of providing supplemental email and SMS text messaging notification shall be agency listed for specific interfaces and for the purpose described in this section. The use of non-listed external third party products and interfaces is not acceptable.
4. The fire panel internet interface shall be capable of sending automated notification of discrete system events via email and SMS text messaging to up to 50 individual user accounts and via email to up to 5 distribution list.
5. Each user account and distribution list shall be capable of being configurable for the specific type of events to be received. Each account shall be configurable to receive notification upon any combination of the following types of events:
   a) Fire Alarm,
   b) Priority 2,
   c) Supervisory,
   d) Trouble,
   e) Custom Action Messages,
   f) Fire Panel Internet Interface Security Violations
6. Each user account and distribution list shall be capable of being configurable for the specific content to be received. Each account shall be configurable to receive any combination of the following message content:
   a) Summary,
   b) Event Information,
   c) Message,
   d) mergency Contacts,

e) Host Fire Alarm Control Panel Information

7. Each user account and distribution list shall be capable of being configurable for the type of Fire Alarm Control Panel Logs and Reports to be received. Each account shall be configurable to receive any combination of the following Logs and Reports via email:
   a) Alarm Log,
   b) Trouble Log,
   c) Analog Sensor Status Report,
   d) Analog Sensor Service Report,
   e) Almost Dirty, Dirty and Excessively Dirty Sensor Report,
   f) CO Analog Sensor Service Report,
   g) Addressable Appliance Candela Report,
   h) Addressable Appliance Status Report
8. Each user account and distribution list shall be capable of receiving email distribution of Fire Alarm Control Panel Logs and Reports On-Demand or automatically on a Pre-Determined schedule. Receipt of Logs and Reports shall be capable of being scheduled as follows:
   a) Weekly, or
   b) Bi-weekly, or
   c) Monthly
9. The Fire Alarm Control Panel Logs and Reports shall be sent in CSV file format which can be imported into common database applications for viewing, sorting, and customization.
   a) Each user account shall be capable of being configured to receive system events via email and/or SMS text messaging.
   b) Each distribution list shall be capable of supporting up to 20 email address recipients.
10. The means to provide email notification shall be compatible with SMTP mail servers, ISP email services, and Internet email services. Communication with the email server shall be verified at selectable intervals of 5 to 30 minutes.
11. Email operation shall be capable of being disabled for service by the system administrator.
12. An email log shall be accessible to authorized users. The email log shall display the 25 most recent email notifications sent.
13. The fire panel internet interface for supplemental notification and remote user access shall support:
   a) Secure HTTPS/SSL encrypted connections,
   b) Up to 50 individual password protected user accounts,
   c) Dynamic and Static IP addressing,
   d) IP Address Blocking,

e) Restricted number of log-in attempts before lock-out configurable from 1 to 20,

f) Lock-out duration after unsuccessful log-in attempts configurable from 0 to 24 hours,

g) Email notification to Administrators of unsuccessful log-in attempts,

h) Automatic lock-out reset upon a new event,

i) Automatic inactivity logout configurable from 10 minutes to 24 hours,

j) Firmware updates over ethernet,

k) Set-up and configuration via Local Service Port or via Remote Services over LAN/WAN connection.

14. Authorized users shall be capable of accessing the fire alarm panel using a compatible web browser (Internet Explorer 6.0 or higher) and a secure HTTPS/SSL encrypted connection.

15. The fire panel internet interface shall support concurrent connections for up to 5 users plus 1 administrator.

16. Authorized users with remote access shall be capable of:

    a) Viewing the fire panel internet interface web home page

        1) The fire panel internet interface home page shall display system status information and provide links to detailed status information and fire alarm panel reports and history logs

        2) The web browser on the user's computer shall automatically refresh system status information upon a new event

            (i) Systems that require a manual refresh to acquire updated system status information shall not be accepted

    b) Viewing the fire alarm panel detailed card status information

    c) Viewing the fire alarm panel detailed point status information
    d) Viewing the fire alarm panel reports and history logs
    e) Viewing the fire panel internet interface email log
    f) Viewing system summary information
    g) Accessing Custom Hypertext Links

17. The fire panel internet interface home page shall support customization to display the following information:

    a. Customer Name and Address,

    b. Fire Panel Location or Building Name,

    c. Up to 10 Custom Hypertext Links with Text Descriptions

H. Required Functions: The following are required system functions and operating features:

2. Priority of Signals: Fire alarm events have highest priority. Subsequent alarm events are queued in the order received and do not affect existing alarm conditions. Priority Two, Supervisory and Trouble events have second-, third-, and fourth-level priority, respectively. Signals of a higher-level priority take precedence over signals of lower priority even though the lower-priority condition occurred first. Annunciate all events regardless of priority or order received.

3. Non interfering: An event on one zone does not prevent the receipt of signals from any other zone. All zones are manually resettable from the FACP after the initiating device or devices are restored to normal. The activation of an addressable device does not prevent the receipt of signals from subsequent addressable device activations.

4. Transmission to an approved Supervising Station: Automatically route alarm, supervisory, and trouble signals to an approved supervising station service provider, under another contract.

5. Annunciation: Operation of alarm and supervisory initiating devices shall be annunciated at the FACP and the remote annunciator, indicating the type of device, the operational state of the device (i.e alarm, trouble or supervisory) and shall display the custom label associated with the device.

6. Selective Alarm: A system alarm shall include:

   a. Indication of alarm condition at the FACP and the annunciator(s).

   b. Identification of the device /zone that is the source of the alarm at the FACP and the annunciator(s).

   c. Operation of audible and visible notification appliances until silenced at FACP.

   d. Shutting down supply and return fans serving zone where alarm is initiated.

   e. Closing smoke dampers on system serving zone where alarm is initiated.

   f. Transmission of signal to the supervising station.

7. Supervisory Operations: Upon activation of a supervisory device such as a [fire pump power failure,][low air pressure switch, and][none] tamper switch, the system shall operate as follows:

   a. Activate the system supervisory service audible signal and illuminate the LED at the control unit and the remote annunciator.

   b. Pressing the Supervisory Acknowledge Key will silence the supervisory audible signal while maintaining the Supervisory LED "on" indicating off-normal condition.

   c. Record the event in the FACP historical log.

   d. Transmission of supervisory signal to the supervising station.

   e. Restoring the condition shall cause the Supervisory LED to clear and restore the system to normal.

8. Alarm Silencing: If the "Alarm Silence" button is pressed, all audible alarm signals shall cease operation.

9. System Reset

   a. The "System Reset" button shall be used to return the system to its normal state. Display messages shall provide operator assurance of the sequential steps ("IN PROGRESS", "RESET COMPLETED") as they occur. The system shall verify all circuits or devices are restored prior to resetting the system to avoid the potential for re-alarming the system. The display message shall indicate "ALARM PRESENT, SYSTEM RESET ABORTED."

   b. Should an alarm condition continue, the system will remain in an alarmed state.

10. A manual evacuation (drill) switch shall be provided to operate the notification appliances without causing other control circuits to be activated.

11. WALKTEST: The system shall have the capacity of 8 programmable passcode protected one person testing groups, such that only a portion of the system need be

disabled during testing. The actuation of the "enable one person test" program at the control unit shall activate the "One Person Testing" mode of the system as follows:

a. The city circuit connection and any suppression release circuits shall be bypassed for the testing group.

b. Control relay functions associated with one of the 8 testing groups shall be bypassed.

c. The control unit shall indicate a trouble condition.

d. The alarm activation of any initiating device in the testing group shall cause the audible notification appliances assigned only to that group to sound a code to identify the device or zone.

e. The unit shall automatically reset itself after signaling is complete.

f. Any opening of an initiating device or notification appliance circuit wiring shall cause the audible signals to sound for 4 seconds indicating the trouble condition.

12. Install Mode: The system shall provide the capability to group all non-commissioned points and devices into a single "Install Mode" trouble condition allowing an operator to clearly identify event activations from commissioned points and devices in occupied areas.

    a. It shall be possible to individually remove points from Install Mode as required for phased system commissioning.

    b. It shall be possible to retrieve an Install Mode report listing that includes a list of all points assigned to the Install Mode. Panels not having an install mode shall be reprogrammed to remove any non-commissioned points and devices.

2.2 Analog Smoke Sensors:

1. Monitoring: FACP shall individually monitor sensors for calibration, sensitivity, and alarm condition, and shall individually adjust for sensitivity. The control unit shall determine the condition of each sensor by comparing the sensor value to the stored values.

2. Environmental Compensation: The FACP shall maintain a moving average of the sensor's smoke chamber value to automatically compensate for dust, dirt, and other conditions that could affect detection operations.

3. Programmable Sensitivity: Photoelectric Smoke Sensors shall have 7 selectable sensitivity levels ranging from 0.2% to 3.7%, programmed and monitored from the FACP.

4. Sensitivity Testing Reports: The FACP shall provide sensor reports that meet NFPA 72 calibrated test method requirements.

5. The FACP shall automatically indicate when an individual sensor needs cleaning. The system shall provide a means to automatically indicate when a sensor requires cleaning. When a sensor's average value reaches a predetermined value, (3) progressive levels of reporting are provided. The first level shall indicate if a sensor is close to a trouble reporting condition and will be indicated on the FACP as "ALMOST DIRTY." This condition provides a means to alert maintenance staff of a sensor approaching dirty without creating a trouble in the system. If this indicator is ignored and the second level is reached, a "DIRTY SENSOR" condition shall be indicated at the FACP and subsequently a system trouble is reported [to the Supervising Station][none]. The sensor base LED shall glow steady giving a visible indication at the sensor location. The "DIRTY SENSOR" condition shall not affect the sensitivity level required to alarm the sensor. If a "DIRTY SENSOR" is left unattended, and its average value increases to a third predetermined value, an "EXCESSIVELY DIRTY SENSOR" trouble condition shall be indicated at the control unit.

6. The FACP shall continuously perform an automatic self-test on each sensor that will check sensor electronics and ensure the accuracy of the values being transmitted. Any sensor that fails this test shall indicate a "SELF TEST ABNORMAL" trouble condition.

7. Multi-Sensors shall combine photoelectric smoke sensing and heat sensing technologies. An alarm shall be determined by either smoke detection, with selectable sensitivity from 0.2 to 3.7 %/ft obscuration; or heat detection, selectable as fixed temperature or fixed with selectable rate-of-rise; or based on an analysis of the combination of smoke and heat activity.

8. Programmable bases. It shall be possible to program relay and sounder bases to operate independently of their associated sensor.

9. Magnet test activation of smoke sensors shall be distinguished by its label and history log entry as being activated by a magnet.

2.3 Manual Fire Alarm Stations

1. Manual Fire Alarm Stations shall be non-coded, non-break glass, double action type, with a key operated test reset lock in order that they may be tested, and so designed that after actual emergency operation, they cannot be restored to normal except by use of a key. The reset key shall be so designed that it will reset the manual Pull Station and open the FACP cabinet without use of another key. An operated station shall automatically condition itself so as to visually detected, as operated, at a minimum distance of fifty feet, front or side. Manual stations shall be constructed of die cast metal with clearly visible operating instructions on the front of the station in raised letters. Stations shall be suitable for semi-flush mounting on a standard single gang box, and shall be installed within the limits defined by the Americans with Disabilities Act (ADA) dependent on Manual Station accessibility or per local requirements.

2.4 Notification Devices

1. The visible and audible/visible signal shall be listed by Underwriters Laboratories Inc. Each indicating appliance circuit shall be electrically supervised for opens, grounds and short circuit faults, on the circuit wiring, and shall be so arranged that a fault condition on any indicating appliance circuit or group of circuits will not cause an alarm to sound. The occurrence of any fault will light the trouble LED and sound the system trouble sounder, but will not interfere with the proper operation of any circuit which does not have a fault condition. The notification appliance (combination audible/visible units only) shall produce a peak sound output of 90dba or greater as measured in an anechoic chamber. The visible signaling appliance shall maintain a minimum flash rate of 1Hz or greater regardless or power input voltage. The appliance shall also be capable of meeting the candela requirements of the blueprints presented by the Engineer and ADA. The appliance shall have an operation current of 57ma or less at 24VDC for the 15/75Cd.

2. The unit shall be provided with terminals with barriers for input/output wiring and be able to mount a single gang or double gang box or double workbox with the use of an adapter plate.

2.5 Duct Dectectors

1. Duct Detectors shall be provided with housings and smoke detectors. Remote Test Switch shall be included with the unit.

PART 3 - EXECUTION

3.1. INSTALLATION:

A. Installation shall be in accordance with the CEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.

B. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.

C. All fire detection and alarm system devices, control panels and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas.

D. Manual fire alarm boxes shall be suitable for surface mounting or semi-flush mounting as shown on the plans, and shall be installed not less than 42 inches (1067 mm), nor more than 48 inches (122 mm) above the finished floor to center of device.

3.2. TEST:

The service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment shall be provided to technically supervise and participate during all of the adjustments and tests for the system. All testing shall be in accordance with NFPA 72, Chapter 10.

A. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.

B. Open initiating device circuits and verify that the trouble signal actuates.

C. Open and short signaling line circuits and verify that the trouble signal actuates.

D. Open and short notification appliance circuits and verify that trouble signal actuates.

E. Ground all circuits and verify response of trouble signals.

F. Check presence and audibility of tone at all alarm notification devices.

G. Check installation, supervision, and operation of all intelligent smoke detectors using the walk test.

H. Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.

I. When the system is equipped with optional features, the manufacturer's manual shall be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.

3.3. FINAL INSPECTION:

A. At the final inspection, a factory-trained representative of the manufacturer of the major equipment shall demonstrate that the system functions properly in every respect.

B. Provide the NFPA certificate to the Owner, local Fire Marshal, Architect and D.S.A.

3.4. INSTRUCTION:

A. Instruction shall be provided as required for operating the system. Hands-on demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided.

B. The contractor and/or the systems manufacturer's representatives shall provide a typewritten "Sequence of Operation."

END OF SECTION

SECTION 16750

DATA NETWORK AND NETWORK WIRE/CABLING SYSTEM

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. All applicable portions of Section 16010 shall apply to this section as though written herein completely.

B. The work under this section includes all labor, materials, equipment, and accessories required to furnish and install a complete Network and Network Wire and Cabling System as indicated on the drawings and as specified herein.

C. The scope of work includes disconnecting and removing all existing devices, equipment, conduit and wiring in the Auditorium. Work associated with disconnecting and removing devices, equipment and cabling shall be coordinated with the College's IT Department.

D. The contractor shall schedule a site visit with the College Maintenance & Operations (M&O) department and I.T Department prior to start of the demolition phase to assess the status of the existing system in the areas not being remodeled as part of the scope of work. The contractor shall submit a pre-construction report to the M&O department outlining the state of the existing system and any deficiencies found during the site visit. At the conclusion of the construction phase the system in the existing areas of the building(s) not being remodeled shall function as described in the pre-construction report.

E. All new network wire/cable shall be provided, installed and terminated under this contract.

1.2 RELATED WORK

Documents affecting work of this section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and sections of Divisions 1 and 16 of these specifications.

A. The work described by this part includes the furnishing of all materials, equipment, supplies, labor and the performing of all operations necessary for the installation of complete and operating systems.

B. All conduits, outlet boxes, back boxes, junction boxes, terminal cabinets, backboards, wiring, cables, equipment, devices, etc., shall be furnished and installed complete under this section. Conduit and junction box sizes shall be determined by the Installing Communications Contractor for the particular wire and cable fills required for the systems installed. (Conduit sizes shall comply with the California Electrical Code). The entire responsibility of the system, including the installation, operation, function, testing and maintenance for one (1) year after final acceptance under this section shall be the responsibility of the communications contractor.

C. The Installing Communications Contractor shall furnish and install all equipment, cables, devices, and other materials even though not specifically mentioned herein, which are necessary for the proper integration of the system so that the system shall perform the functions listed herein in compliance with all specified requirements.

1.3 GENERAL REQUIREMENTS

A. The installing Communications Contractor shall hold a valid State of California C-10 License, shall have completed at least 20 projects of equal scope, shall have been in business of furnishing and installing communication systems of this type for at least five years, and capable of being bonded to assure the owner of performance and satisfactory service during the guarantee period.

B. The installing Communications Contractor shall be a factory authorized distributor and warrantee station for the brand of equipment offered and shall maintain a fully equipped service organization capable of furnishing adequate repair service to the equipment. The Installing Communication Contractor shall maintain a spare set of all major parts for the system at all times. All circuit boards, amplifiers and control sub systems shall be 100% backed up with stock at contractors' shop.

C. Installing contractor shall be a Systimax GigaSPEED certified installer or approved equal Amp DN&I, Panduit Certification Plus, Leviton/Superior Essex or Belden CDT and shall provide a 20 year application warranty. All products provided and installed by the certified installer shall be of the type and manufacturer required to meet the warranty criteria.

1.4 SUBMITTAL AND MANUALS

A. Comply with all requirements of the General Conditions, Supplementary Conditions and applicable sections of Divisions 1 and 16 of these specifications.

B. Additional requirements of this section are:

1. Within thirty-five (35) calendar days after the date of award of the Contract, the Contractor shall submit to the Architect for review, eight copies of a complete submission.

2. The submission shall consist of five major sections with each section separated with index tabs. Each page in the submission shall be numbered chronologically and shall be summarized in the index.

3. The first section shall be the "Index" which shall include the project title and address, name of the firm submitting the proposal and name of the Architect.

4. The second section shall include a copy of the Installing Communication Contractors valid C-10 California State Contractors License, letters of factory authorization and guaranteed service, list of 20 projects of equal scope and list of proposed instrumentation to be used by the Contractor.

5. The third section shall contain the comparative specification listing, including a complete listing of the characteristics of the equipment to be furnished next to all of the specified equipment's features and functions as stated in the specifications and data sheets.

6. The fourth section shall contain an original factory data sheet for every piece of equipment in the specifications.

7. The fifth section shall contain a wiring designation schedule for each circuit leaving each piece of equipment, system/device wiring diagrams, floor plans and site plans indicating equipment/device locations and interconnecting wiring.

C. The Contractor shall provide two copies of an "Operating and Servicing Manual" for the system. The manuals shall be bound in flexible binders. All data shall be printed material or typewritten. Each manual shall include the following: Instructions necessary for the proper operation and servicing of the system; complete as-built installation drawings of the system; a wiring destination schedule for each circuit leaving for each piece of equipment; a schematic diagram of major components with all transistor and IC complements and replacement number.

PART 2 - EQUIPMENT

2.1 NETWORK WIRE AND CABLE SYSTEM

A. Provide all necessary labor, equipment and materials for a complete system.

B. Copper Wire Cable (unshielded twisted pairs):

1. Provide Category 6 (4 pair) cables from each data system outlet indicated on the drawings to each building patch panel.

2. Category 6 cables shall be copper wire, individually insulated and color coded, with an overall non-conductive, with required rated jacket as manufactured by AMP, WEST PENN or AT&T and meet EIA/TIA 568B wiring standard.

3. All cables installed underground will be duct rated for that use.

C. System Outlets

1. Unless noted otherwise on plan, each Data outlet indicated on plan shall be cabled with two (2) 4-pair, category 6, 24 AWG cable, terminating on RJ45 jacks equipped with 110 type terminations, and on the data category 6 patch panels, using 110 type hardware as shown in the drawings. Data terminations will be allocated to specific termination areas and use colored designation strips. Data cable color shall be blue.

2. Each Voice/Data outlet shall be cabled with two (2) 4-pair, category 6, 24 AWG cables (data), terminating on RJ45 jacks equipped with 110 type terminations and one (1) category 6, 24 AWG cable (voice), terminating on RJ45 jacks equipped with 110 type terminations. Voice and data terminations will be allocated to specific voice termination areas and data terminating areas and use different colored designation strips. Data cable color shall be blue. Voice cable color shall be beige.

3. Unless noted otherwise on plan, each Voice outlet indicated on plan shall be cabled with one (1) 4-pair, category 6, 24 AWG cables, terminating on RJ45 jacks equipped with 110 type terminations using 110 type hardware as shown in the drawings. Voice terminations will be allocated to specific termination areas and use colored designation strips. Voice cable color shall be beige.

4. Provide Leviton QuickPort #42080 series faceplates with Leviton #61110 series connectors and blanks as required. Provide blue inserts for data cables and ivory inserts for voice cables.

D. Provide the following networking distribution equipment as required to terminate the required quantity of cables at the existing IDF:

1. 48 port patch panel, to match existing, as required to terminate each Category 6 data cable indicated on plan.

2. Provide a Category 6 patch cord for each position in use plus 20% spare.

E. Copper Wire Cable Installation:

1. Copper wire cables connecting to equipment racks shall be installed with not less than 6 feet of slack cable between the rack and terminal backboard.

2. Provide 18 inches of cable slack at computer data system outlets.

3. The minimum bending radius for all cables and the maximum pulling tension shall not exceed manufacturers recommendations.

4. Cables installed in on terminal backboards shall be installed on wall mounted cable support racks.

5. Cable pulling shall use a split mesh grip over the cable jacket connection directly to optical fibers and copper wire conductors shall not occur.

6. A dynameter to measure pulling tension shall be used on all cable runs in excess of 200 feet or more with 180 degrees in bends. The actual pulling tension value shall be calculated and recorded for each pull.

7. Pulling eyes on copper conductor shall not be used.

8. Cable pulling lubricants shall be continuously applied to all cables and be specifically approved by the cable manufacturer.

9. Where cables are "pulled through" or pulled from a "center of run pull" without splices or terminations leadout the cables at pullboxes and conduits taking care to feed them in again by hand for the next run.

10. For each cable pull where a cable direction changes is required, flexible feed-in tubes, pullout devices, multi-segmented sheaves, etc. shall be used to insure proper cable pulling tensions and side wall pressures. Cables shall not be pulled directly around a short right angle bend. Any device or surface the cable comes in contact with when under pull-in tension shall have a minimum radius 50% greater than the final specified minimum installed cable bending radius.

11. Separation of individual twisted pair to be no more than .5" from termination point.

F. Splicing of cables or conductors is not permitted.

G. All cables, outlets and terminations shall be labeled and designated in accordance with the College standards.

H. The labor employed by the contractor shall be regularly employed in the installation and repair of communication systems and shall be acceptable to the owner and architect to engage in the installation and service of this system.

I. Each individual copper wire conductor in all terminated and unterminated cables provided in the contract shall be tested after installation, splicing and termination is completed. Testing shall be done by an independent testing laboratory.

J. Upon completion of above tests Contractor is to submit a report presenting test results for all measurements. With the report, submit written certification that the installation conforms to specifications. Provide data on 3.5" disks in Microtest format.

K. Test Parameters:

1. Category 6 cables shall be tested to meet EIA/TIA 568-B.1 and 568-B.2, 250 MHz performance specifications and for continuity, opens, breaks, shorts, and grounds, near end cross-talk, impedance, capacitance, and resistance.

L. LAN Electronics for Data Network:

1. Provided and installed by the College IT Department.

PART 3 - EXECUTION

3.1 INSTALLATION

A. The wiring of the system shall be executed in accordance with the drawings and the equipment manufacturer's wiring diagrams. Should any variations in these requirements occur, the contractor shall notify the architect before making any changes. It shall be the responsibility of the factory authorized distributor of the approved equipment to install the equipment and guarantee the system to operate as per plans and specifications.

B. Furnish all conductors, equipment plugs, terminal strips, etc., and labor to install a complete and operable system.

C. The cables within the rack or cabinets shall be carefully cabled and laced with T&B model ty-rap series 500 cable straps. All cables numbered for identification.

D. Splices are not permitted.

E. Maximum distance for copper cable is 300'-0". Contractor shall verify distances between the outlets and the IDF after the installation of the conduits is complete. The contractor shall notify the Architect/Engineer of any condition where the wire length would exceed the specified maximum distance and obtain direction from the Architect/Engineer before proceeding with the installation of the cable.

F. The labor employed by the contractor shall be regularly employed in the installation and repair of communication systems and shall be acceptable to the owner and architect to engage in the installation and service of this system.

G. The contractor shall thoroughly clean all equipment and materials. All exposed parts of the equipment, cabinets, and other equipment shall be left in a clean condition, unblemished and free of all dirt, dust, smudges, spots, fingerprints, etc., The contractor shall remove all debris and rubbish occasioned by the electronic systems work from the site. The contractor shall thoroughly clean all buildings of any dirt, debris, rubbish, marks, etc., Caused by the performance of this work.

H. The contractor shall provide not less than eight (8) hours for instruction of personnel in the operation and maintenance of the systems. This instruction time shall be divided a directed by the Owner.

I. The contractor shall be responsible for reviewing the plans and specifications to ensure each room, where data network equipment is to be installed, has sufficient space to accommodate the system cabinets, equipment and terminations while maintaining code mandated clearances about said equipment. The contractor shall identify problem areas prior to bid, include all costs required for corrective measures in his bid and submit alternate equipment and materials suitable for the installation to the Architect/Engineer for acceptance as part of the product submittal process

3.2 WARRANTY

A. The entire system shall be warranted free of mechanical or electrical defects for a period of one (1) year after final acceptance of the installation. Any material showing mechanical or electrical defects shall be replaced promptly at no expense to the purchaser.

B. The contractor shall maintain a competent service organization and shall, if requested, submit a service maintenance agreement to the owner after the end of the guarantee period.

C. A typewritten notice shall be posted at the equipment rack which shall indicate the firm, address and telephone number to call when service is necessary. The notice shall be mounted in a neatly finished metal frame with a clear plastic window and securely attached to the inside of the door.

3.3 TESTING

A. Provide all instruments for testing and demonstrating in the presence of the owner's inspector that the frequency response is as stated in the factory data sheets. Check all circuits and wiring to verify they are free of shorts and grounds. Perform all tests stated in each separate system specification.

B. The owner reserves the right to make independent tests of all equipment furnished to determine whether or not the equipment complies with the requirements specified herein and to accept or reject any or all of the equipment on the basis of the results thereby obtained.

END OF SECTION

City of Compton
DEPARTMENT OF PUBLIC WORKS & MUNICIPAL UTILITIES
WATER UTILITY DIVISION

(310) 605-5595
Fax. (310) 763-4567

Dear Sir or Madam:

SUBJECT: FIRE HYDRANT FLOW TEST RESULTS

ZONE/GATE BOOK PAGE: __B4_

GATE VALVE NO: __NA__

FIRE HYDRANT ID NO: __NA___

FIRE HYDRANT LOCATION: __N of Music Bldg_____

FIRE HYDRANT OUTLET SIZE: ___2 ½ __ inches

STATIC WATER PRESSURE: ___60 _psi

RESIDUAL WATER PRESSURE __45_psi

PITOT GAUGE READING: __30__ psi

WATER FLOW: __920__ gpm

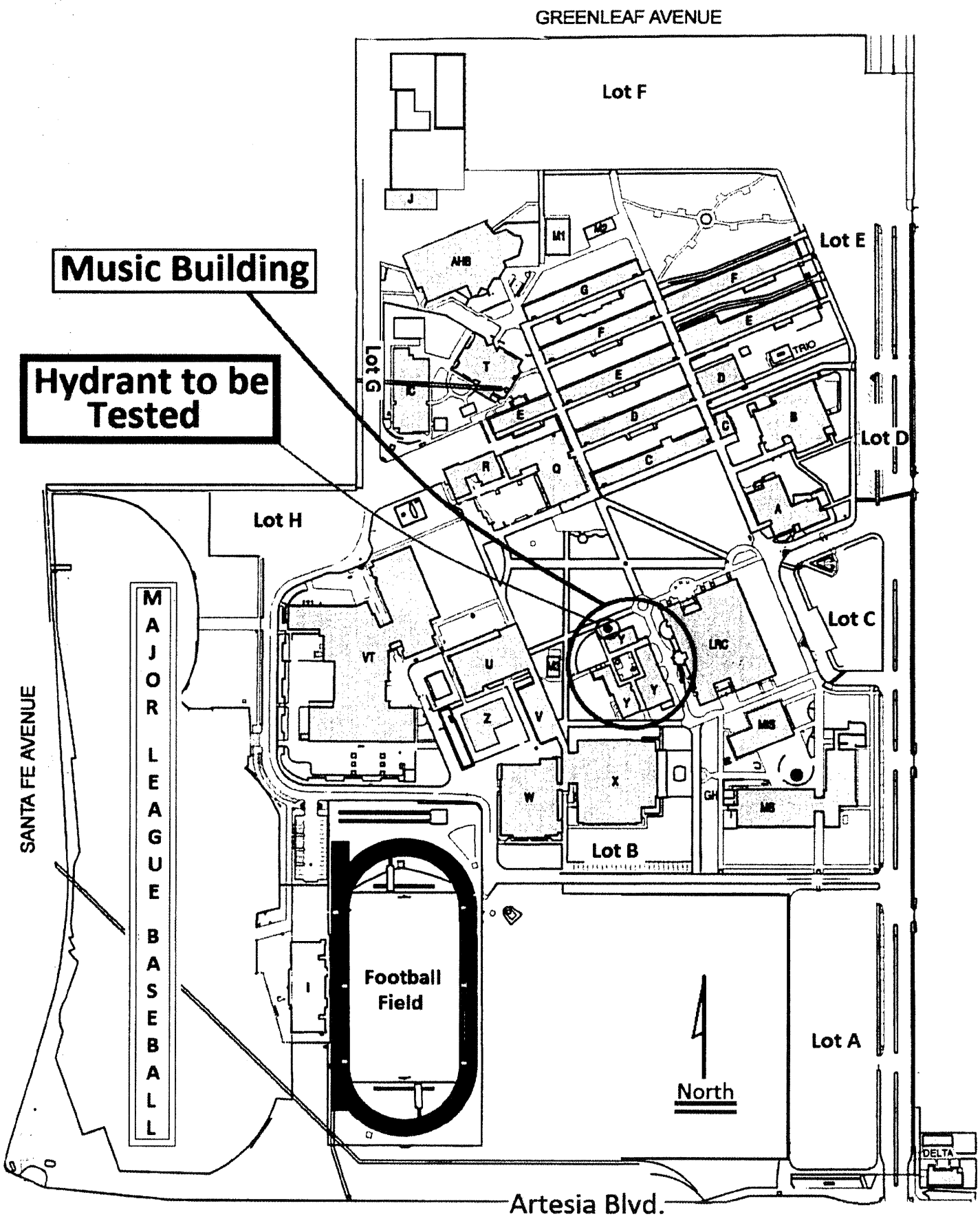
DIAMETER OF MAIN: _Unk___ inches___

DATE /TIME OF TEST: ____24Sept2014 1:00 pm_____

If you have any questions about these results, please call me at 1-310-605-5690

Alex Santos
COMPTON WATER DEPARTMENT
asantos@comptoncity.org

FORMS 2014-08-06



Compton Community College District

BETA Version

Fire Hydrant Flow Calculator

- Use the tab key to navigate.
- Tab between each box to update the calculation.
- Be sure to tab past your final entry for a correct calculation.

Static:	60	psi before flowing
Residual:	45	psi while flowing
Pitot:	30	pitot gage reading
Diameter:	2.5	size of opening tested
This hydrant is flowing:	919	GPM from the test outlet
Projected available hydrant flow:	1561	GPM Note 1
2nd Static:	0	secondary psi before flowing
2nd Residual:	0	secondary psi while flowing
The main can be expected to flow about:	NaN	GPM

Notes:

1. Projected available flows calculated at 20 psi residual, or ½ the static pressure for low pressure hydrants having static pressures of less than 40 psi.

2. This calculator is based on established Hazen-Williams formulas and is provided for convenience and estimation purposes only. The author and FireHydrant.org express no warranty for its suitability for any particular purpose.

Click for Legal Disclaimer

Site Design: FireHydrant.Org Volunteers - webmaster@firehydrant.org